# The evolving structure of world agricultural trade

Implications for trade policy and trade agreements

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of world agricultural trade

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edited by
Alexander Sarris
and
Jamie Morrison

Evolutions in the structure of global trade in agricultural commodities, and in the characteristics of the markets in which these commodities are traded, are driven by a large number of inter-related economic, political and social factors. These factors include rapidly changing food demand patterns arising from economic growth and associated urbanisation; the level and nature of support and protection provided to agriculture in both developed and developing countries; the increasing prominence of technical regulations and private standards; the increasing levels of concentration in agricultural supply chains; and growing concerns regarding pressures on the scarce natural resources in light of climate change.

These factors are often external to the control of individual nations, but their ramifications will be significant in terms of both the impacts that changing trade patterns will have on these countries and in modifying the effectiveness of their own trade and related policy interventions. An improved understanding of the factors driving the evolution of trade is, therefore, critical in informing decisions related to the future governance of global trade. This is even more so given the recent sea change in the way that the role of agriculture is conceived, which has resulted in an increasing recognition that agriculture's role, and the support that the sector needs to play out that role, differs widely from country to country, and depends considerably on a country's level of development.

This book seeks to improve the level of appreciation and understanding of the factors shaping the future pattern of agricultural trade and to highlight key international trade governance issues that require urgent consideration, by collecting a series of contributions by academics and practitioners active in the field of agricultural trade and related policy .

The book first sets the context for a discussion of trade policy interventions in the context of evolving structures of production and trade, stressing the importance of the roles that the agriculture sector can play in countries at different levels of development and the fact that policy interventions will need to reflect these different roles. It then reviews evidence on trends in a number of the factors that will shape the evolution of global agricultural trade. The final chapters of the book discuss how trade rules and their related institutions may need to be adapted to account for these evolving trends and to deal with the challenges that face policy makers attempting to achieve multifaceted objectives related to the agriculture sector and to agricultural trade in particular.

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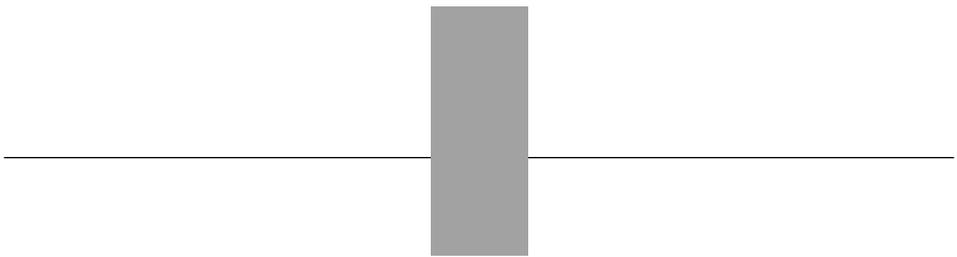
Preface

The chapters in this volume are based on a series of papers prepared as inputs to an FAO technical paper presented at the Expert Meeting on How to Feed the World in 2050, which was held at FAO Headquarters in Rome on 24th to 26th June 2009.

Subsequently edited, the papers have been collated in this volume as background to the High-Level Expert Forum on How to Feed the World in 2050 which was held in Rome on 12-13th October 2009.

The editors are grateful for the assistance of Rita Ashton in preparing this volume.
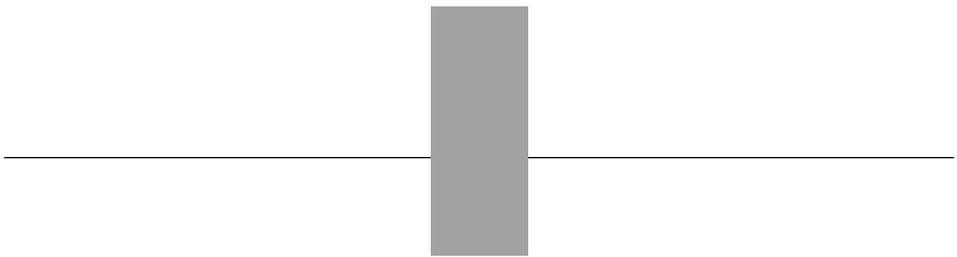
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Acronyms

ACP	Africa, Caribbean and Pacific
AFTA	Asian Free Trade Area
AGRA	Alliance for a Green Revolution in Africa
AoA	Agreement on Agriculture
APEC	Asia-Pacific Economic Cooperation
ARCH	Autoregressive conditional heteroscedasticity
ASEAN	Association of South East Asian Nations
B2B	Business to Business
B2C	Business to Customer
BRC	British Retail Consortium
CAP	Common Agricultural Policy
CARIFTA	Caribbean Free Trade Area
CBOT	Chicago Board of Trade
CGE	Computable General Equilibrium
COLEALP	Europe-Africa-Caribbean-Pacific Liaison Committee
CPM	Commission on Phytosanitary Measures
CR	Concentration Ratio
CRS	Constant Returns to Scale
CUSFTA	Canadian-United States Free Trade Agreement
CWB	Canadian Wheat Board
ECA	Eastern Europe and Central Asia
ETI	Ethical Trading Initiative
FDI	Foreign Direct Investment
FLO	Fairtrade Labelling Organisation International
FTA	Free Trade Agreement
FTAA	Free Trade Area of Americas
GAP	Good Agricultural Practice
GARCH	Generalised autoregressive conditional heteroscedasticity
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GI	Geographical Indication

GMO	Genetically Modified Organism
HACCP	Hazard Analysis and Critical Control Points
HIC	High Income Countries
ICFTU	International Confederation of Free Trade Unions
IFS	International Food Standard
IIED	International Institute for Environment and Development
IMO	International Maritime Organisation
IPPC	International Plant Protection Convention
IRS	Increasing Returns to Scale
ISO	International Standards Organization
LAC	Latin America and Caribbean
LAFTA	Latin America Free Trade Area
LDC	Least Developed Country
MCMC	Monte Carlo Markov Chain
MERCOSUR	Mercado Común del Sur/ Southern Common Market
MFN	Most Favoured Nation
MRL	Maximum Residue Limit
MTS	Multilateral Trading System
NAFTA	North American Free Trade Agreement
NAMA	Non-agricultural Market Access
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organisation
NRA	Nominal Rate of Assistance
NTB	Non-tariff Barrier
ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
OIE	Organisation Mondiale de la Santé Animale
OLS	Ordinary Least Squares
PROGRESA	Programa de Educacion, Salud y Alimentacion
RA	Rainforest Alliance
RTA	Regional trade agreement
SACU	Southern Africa Customs Union
SAN	Sustainable Agriculture Network
SDT	Special and Differential Treatment
SPS	Sanitary and Phytosanitary
SQF	Sage Quality Food
SSM	Special Safeguard Mechanism
STDF	Standards and Trade Development Facility
TBT	Technical Barrier to Trade
TNC	Transnational Corporation
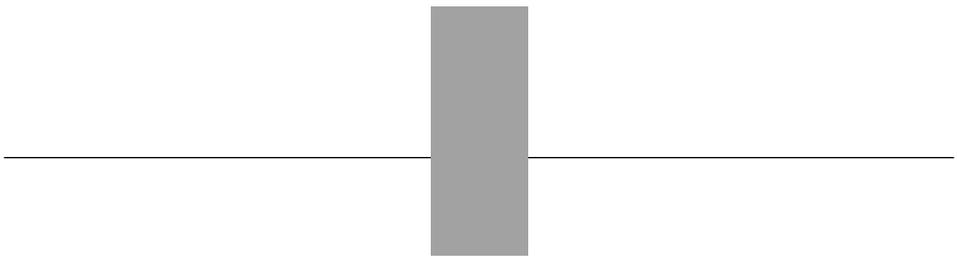
TOT	Terms of Trade
TRIPS	Trade Related Intellectual Property Rights Agreement
TRQ	Tariff Rate Quota
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
URAA	Uruguay Round Agreement on Agriculture
VAT	Value Added Tax
WFP	World Food Programme
WHO	World Health Organisation
WTO	World Trade Organisation

Contents

Introduction

Alexander Sarris and Jamie Morrison

The recent world food crisis alerted policy makers to the fact that global agricultural productivity growth has been slowing down. It also highlighted the fact that national agricultural trade policies and the current world trade rules that influence the design of these policies may not be adequate to prevent, or address such crises in the future. At the same time, changes in climatic patterns may be precursors of more food crises in the coming decades, with potentially significant negative impacts on many poor across the world. This necessitates a reconsideration of the factors that drive long term agricultural trade, and the role of agricultural trade policies and trade rules in ensuring that these trends are supportive of food security and economic development in poorer countries. The objective of this book is, therefore, to highlight and analyze several factors impinging on future agricultural trade developments, in order to identify possible needs for future global agricultural trade rules.

The book contains 10 chapters organized into three entities. The first entity comprising chapters 1 to 3 aims at examining longer term factors in light of the trends in global market instability, the pattern of agricultural development, and the trends in protection. The chapter by Sarris examines long term volatility patterns, while the chapters by Timmer and Masters set the context for the discussion of trade policy strategies by drawing upon extensive cross-country and cross-temporal data to test certain hypotheses as to why policies have evolved in the way that they have. The second entity comprises chapters 4 through 7 which seek to review the evidence on the nature and determinants of price volatility (Balcombe), on the distributional effects of trade reform in the context of increasing market concentration (Morrison and Murphy), and on the implications of the use of technical standards (Roberts) and private standards (Liu) for international trade. In the final part of the book, a series of chapters discuss how trade rules and related institutions may need to be adapted in the future to account for the evolving trends and to mitigate the challenges facing policy makers attempting to achieve the multifaceted objectives related to the agricultural sector and to agricultural trade in particular.

Unsurprisingly, viewpoints differ as to how trade policy and related institutions can and should be shaped to meet potential future challenges. Rather than seeking to develop a greater consensus of views, this introduction elaborates the main messages arising from each of the chapters.

The objective of chapter 1 by Sarris is to review several factors impinging on future agricultural trade and market instability, in order to identify possible needs for future global agricultural trade rules. The chapter first documents recent events in food markets and discusses factors behind these developments to identify whether there are tendencies that raise new concerns. It then analyses the pattern of global agricultural market instability over the past four decades and the factors that may affect it in the future. Subsequently it takes up the issue of vulnerability of the food economies of developing countries in light of global market instability. Finally, the chapter indicates that the global trading system must accommodate rules that can ensure a more stable and reliable food trade. It concludes by suggesting that appropriate systems must be developed to assure the continued availability of food imports to all countries.

With the objective of examining how trade policy evolves during the process of structural transformation, a process that is often missing in analyses of trade policy, Timmer (Chapter 2 in this volume) uses the ratio of agricultural to non agricultural terms of trade (AgTOT) as a proxy for the desired trade policy. Reviewing the literature on the role that agriculture has historically played in the processes of economic development, he stresses the importance of the multipliers and linkages associated with growth in agricultural output and asks what role governments can play in stimulating this. He also draws out the point that as structural transformation happens, the income gap between urban and rural populations increases. The chapter's analysis therefore focuses on whether the AgTOT as a policy target can be, or has been, successfully used to cushion the labour adjustment process during structural adjustment, whist stimulating agricultural growth. On the basis of his analytical results, Timmer argues that increases in agricultural protection can be explained as being a result of government efforts to counteract growing income disparities. Further, since growth in agricultural productivity will be the main driver of poverty reduction in poorer countries for some time to come, this implies that governments will need to intervene to connect small farmers and poor workers to growth processes and that these policies are likely to include interventions at the border.

Masters, using an extensive dataset reflecting distortions to agricultural incentives due to global agricultural policies, attempts to explain patterns of agricultural protection and to suggest how these might evolve over the next few decades. He stresses that the patterns of protection can in large part be explained by factors such as rent seeking, revenue seeking and group size effects. However, policy makers have the opportunity to act strategically to implement checks and

balances to ensure that future agricultural trade policy setting is not subject to lobby group pressure. On the basis of the fact that richer countries have tended to increase levels of producer support as they get richer, Masters argues that low and middle income countries, many of which currently have low to moderate levels of protection, will face increased pressure to increase import restrictions and subsidies and suggests that this could be avoided by locking in "desirable" (low level) protection now in order to resist the pressure to increase levels of protection in the future.

The measure of agricultural trade policy is taken as being the Nominal Rate of Assistance (NR) which is zero in the case of free trade, but positive where producers are supported. He finds that the relationship between NRA and the average per capita income is strong but non-linear. The poorest countries tend to heavily tax agriculture and the rate of tax falls to zero as incomes rise, but at per capita income levels of between USD1000 and 8000, levels of support appear to stabilise. At income levels higher than this, agricultural products become heavily protected. Masters also compares the period 1960-1994 with the period 1995-2004, finding that in the more recent period, characterised by structural adjustment programmes and trade agreements, the NRA is significantly closer to the free trade level at all income levels, reflecting perhaps the influence of the structural adjustment programs implemented under what has been termed the Washington Consensus.

To a certain extent, Masters' conclusions are contrary to those in the chapter by Timmer which argues that government intervention at the border is likely to be needed in lower income countries at earlier stages of transformation. Although Masters recognises the pressures on policy makers to support agriculture as incomes rise, he does not address the need for policy interventions during this important stage of economic transformation. Clearly, the key challenge is to identify the desirable policy interventions at different stages of transformation, especially at the stage of transition from an underdeveloped to a moderately developed state, then to structure rules that do not limit interventions likely to have a positive impact, but which minimise the scope for the potentially negative impacts of lobby driven interventions.

However, attempts to identify generic policy interventions are of rather limited value given the context specificity against which policy must be formulated in practice. Compounding this difficulty is the ever-evolving state of agri-food trade and of the markets in which this trade takes place. In the second part of this volume, a series of four chapters review evidence on the key trends driving this evolution.

Balcombe adopts two econometric approaches to further investigate a number of issues raised in earlier sections of this chapter in relation to the nature and determinants of agricultural price volatility. Although the analysis finds that there

is persistent volatility in agricultural prices, it does not find evidence in support of long term increases in volatility across most price series, with some exhibiting downward and some upward trends. It does, however, find strong evidence that both stock levels and yields influence price volatility. In addition, both volatility in oil prices and in exchange rates appear to be transmitted into volatility in agricultural prices, but export concentration and interest rate volatility are found to have less influence. The author concludes that unless there is increasing volatility in the determining factors, there will not necessarily be increasing volatility in agricultural markets in the future.

Drawing upon a review of the distributional effects of trade reform in non-agricultural sectors, Morrison and Murphy highlight a number of issues that need to be further analysed in the context of agricultural trade reform, arguing that an improved understanding of such issues should inform and influence policy decisions as to the future shape of trade rules. Key amongst such issues is the increasing level of concentration that characterises many agricultural markets. Evidence from non-agricultural sectors, primarily in developed countries, suggests that only a relatively small number of firms actually trade across international borders. Such firms tend to self-select from amongst those that are most efficient in an industry following measures to liberalise trade. Less efficient firms in the exporting industry appear to reduce their levels of activity. Such findings suggest that many of the effects of trade reform are likely to be of an intra-industry, rather than inter-industry nature. However, current analyses of the implications of trade reforms in agriculture on growth and poverty reduction tend to assume that impacts are through the latter, with resource shifts across, rather than within, industries and as such may neglect important impacts in terms of net employment, for example. The authors suggest that the translation of such findings to the agriculture sector is complicated by a lack of currently available data in intra-industry transactions in particular. However, they hypothesise that similar outcomes are likely, given the increasing levels of concentration in many agricultural markets. The authors conclude that an improved, publicly available, system of documentation of the activities of larger, particularly transnational firms, would assist in our understanding of how trade policy reform is likely to play out in practice and allow national governments to make better informed decisions in relation to trade policy implementation.

As the use of traditional barriers to trade has fallen with the increasing liberalisation of agricultural trade, technical regulations, which include those related to food safety and to labelling and packaging requirements, have become increasingly important. The chapter by Roberts investigates the role that such barriers are playing and the prospects for these barriers becoming an increased impediment to trade. Having explained the definition of technical regulations within the context of existing agreements such as the Technical Barriers to Trade Agreement and the Sanitary and Phytosanitary Agreements, the author assesses the main concerns that have arisen in relation to their use, which include rules

modifying their creation, the ability of developing countries to comply with the regulations and enforcement and transparency in use. On the basis of such concerns, he reviews evidence as to their use and finds that despite difficulties with measurement, there is evidence that technical regulations are increasingly being used as non tariff barriers, and that regulations on the appropriate use of labels for food products have proved especially problematic. Roberts concludes that given shifts in trade from trade in products to trade in tasks, which fragments the production process, technical regulations are likely to become an increasing obstacle to freer trade. Roberts provides a list of nineteen suggested actions to minimise the negative impact of their use as trade barriers. The list includes, for example, the need for increased and tailored technical assistance to developing countries in conforming to technical regulations, improved infrastructure and capacity building, and the facilitation of dispute settlement mechanisms.

In a similar vein, Liu considers the role that private standards play in influencing international trade. Liu argues that private standards have increased as a result of the globalisation of trade, improved communications technology, increased concentration of production and marketing activities and changes in consumer preferences. He outlines the multifaceted nature of private standards in terms of the objectives of their use, the types of organisations using/prescribing them, the targeted clients and scope, and the systems of conformity assessment. Acknowledging the advantages of their use, the author examines in some detail, the challenges posed by their use. These include the suitability of the standard, the process by which they are set, and the accountability of those setting the standards and the differential impacts on different value chain stakeholders. Similarly to Roberts' conclusion, Liu suggests that the use of private standards will also increase in the future as they play a key role in the regulation of value chain functions, in differentiating products and in relation to environmental, ethical and health goals.

Liu points out however, that unlike technical regulations, private standards are not subject to multilateral trade agreements. This can be problematic due to the nature of their ownership and their development process, which is seldom sufficiently participatory, transparent or based on scientific evidence. As a result, standard requirements and indicators may not be suitable to producers, especially those who are outside the area where the standard was originally developed. Complying with some private standards and demonstrating compliance requires substantial finance, time and skills, yet the value generated by the standard tends to be captured by downstream market operators, in particular large-scale retailers, and only a small share of it accrues to producers. The problem is compounded when the standard is de facto mandatory because a majority of large buyers demand it. As a result, Liu suggests that small-scale producers run the risk of being excluded from high-value markets and that this problem is particularly acute for developing countries due to the lack of public finance to help domestic producers implement

these standards. He concludes that some issues could be addressed by involving the main stakeholders in a transparent standard development process, basing the standard's requirements on scientific evidence and internationally agreed standards and focusing on desired outcomes rather than means in order to producer a standard that is adaptable to different contexts and can benefit producers also.

The final set of chapters in this volume focus on the types of changes to trade rules and related institutions that might be needed to accommodate the challenges facing policy makers that were considered by Timmer and Masters in the face of these evolving trends. In the first of the three chapters, Konandreas examines the difficulties that have been encountered in bringing agricultural trade under multilaterally agreed treaties, such as the GATT/WTO. He begins by considering the constraints that an agreement formulated to address overproduction might impose on countries attempting to address problems of underproduction, suggesting that poorer countries, which have traditionally taxed their agriculture are unlikely to be constrained by current agreements. However, he stresses that the types of policies that poorer, particularly food insecure countries are likely to need to use in order to stimulate agricultural and wider economic growth are likely to be coupled in nature and increasingly the target of restrictions in future trade agreements. This he suggests could be counterproductive, and that increased attention needs to be given to formulating adequate and effective special and differential treatment provisions in trade agreements.

In relation to the previous chapter by Liu, Roberts examines the compatibility of private standards with the current set of multilateral trade rules. He begins by explaining that most of the tendencies set out by Liu have given rise to private standards that are additional or different than those that apply under the Sanitary and Phytosanitary (SPS) Agreement of the WTO, which tried to control the ability of governments to set import standards that were not justified by risk assessment and based on scientific evidence. The SPS Agreement itself has been useful, particularly in the area of animal and plant diseases, but has not been effective in the area of private standards. Roberts argues that the lack of jurisprudence over private standards at a time when their use has expanded has given rise to numerous issues which can be grouped into two categories: legal issues that relate to the multilateral agreement structure of the GATT, SPS, and TBT agreements, and practical issues over the consequences of private standards. He explains that the legal issues address how GATT or the SPS and TBT agreements deal with private standards, for example, the relationship between the SPS agreement and private standards, and the applicability of the TBT agreement to private standards.

The lack of jurisprudence makes addressing these issues difficult and in turn makes it difficult for national governments to determine whether private standards are a legitimate private sector activity, with which governments should not interfere, or whether the SPS/TBT agreements obligate governments in

importing countries to be responsible for private standards. The author suggests that especially problematic is the blurring of the line between private and official standards. For example, at what point does the interaction between a government body and a private-standard setting body render meaningless the distinction between "voluntary" private standards and official standards? These issues are not addressed in the WTO jurisprudence and are not readily answered by the SPS and TBT agreements. In addition to such legal issues, Roberts argues that the most pressing practical issue that emerges from the employment of private standards in the global food supply is how small producers cope with the costs of compliance. He asks whether there are alternatives to certification that could provide a more practical and affordable model for small-scale producers while ensuring equivalent assurance outcomes, or whether there could be practical interpretation of standards to minimize unreasonable demands and opportunities for adding value.

In the final chapter of this volume, Josling provides a wide-ranging analysis of the evolution of trade related institutions. He essentially asks whether such institutions will build on progress made to date or whether the types of issues raised in the previous chapters will result in a change in the way that trade rules and their related institutions evolve in the coming decades. Having explained the way in which the trade policy environment has evolved through the GATT to the WTO, Josling turns to the emerging developments that will shape future trade policies. He examines ten such issues which he suggests will "determine the contours of future agricultural trade policy agreements": (i) continued growth in the global economy; (ii) continued growth in agricultural output and investment; (iii) continued liberalization and reform in developed countries; (iv) continued policy reform in developing countries; (v) variability of prices as a trade issue; (vi) continued concern for the environmental impacts of agriculture; (vii) continued concentration in the food system; (viii) continued provision of consumer-driven food attributes; (ix) continued integration by regional and bilateral agreements and (x) continued support to the WTO. Many of the issues covered by Josling are treated in somewhat more detail in the preceding chapters in this volume. In his chapter, Josling briefly considers the forces that are at work in relation to each issue and provides some tentative suggestions as to what may require change in terms of existing trade agreements and their related institutions. Taking the issues together, he concludes that global trading systems face serious governance difficulties given the many, often conflicting, objectives of the increasing number of parties to global trade agreements. He suggests that a successful conclusion to the Doha Round, where the requirements of all parties are adequately represented would result in significant potential gains simply as a result of the greater level of integration of developing countries into global trade. However, the single undertaking nature of the WTO may make this outcome difficult to achieve.

Part 1

Evolving structure of world agricultural market instability and requirements for new world trade rules

Alexander Sarris [1]

1. Introduction

The world food crisis of 2007-8 alerted the world and policy makers not only to the fact that global agricultural productivity growth has been slowing down but that current national agricultural trade policies may not be adequate to prevent such crises in the future and that the current world trade rules as agreed in the WTO Agreement on Agriculture may cause difficulties for policy makers seeking to implement policies that are appropriate. Compounding this issue is that increasingly visible climate changes may be precursors of more potential food crises, with significant negative impacts on the poor across the world.

This necessitates a reconsideration of the factors that drive long term agricultural trade and market instability, and the needs of future global agricultural trade rules. The objective of this chapter is to highlight several factors impinging on future agricultural trade and market instability, in order to identify possible needs for future global agricultural trade rules. The main conclusion is that the need to deal with potentially unstable global agricultural markets of the future will necessitate changes to existing world trade institutions and arrangements.

The sudden and unpredictable increases in many internationally traded food commodity prices in late 2007 and early 2008 caught all market participants, as

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well as governments by surprise and led to many short term policy reactions that may have exacerbated the negative impacts of the price rises. On the basis that such interventions were in many cases deemed inappropriate, many governments, think tanks, and individual analysts have called for improved international mechanisms to prevent and/or manage sudden food price rises. Similar calls for improved disciplines of markets were made during almost all previous market price bursts, but were largely abandoned after the spikes passed. However, the fact that the recent downturn in prices coincided with a global financial crisis, which in itself has contributed to increasing levels of poverty and food insecurity, appears to have galvanized attention on the issues facing global agriculture

The financial crisis that started to unravel in 2008 has coincided with sharp commodity price declines, and food commodities have followed this general trend. The price volatility has therefore been considerable. For instance, in February 2008, international wheat, maize and rice price indices stood higher than the same prices in November 2007, only three months earlier, by 48.8, 28.3, and 23.5 percent respectively. In November 2008, the same indices stood at -31.9, -3.2, and 52.3 percent higher respectively, compared to November 2007. In other words within one year these food commodity prices had increased very sharply and subsequently declined (except rice) equally sharply. Clearly such volatility in world prices creates much uncertainty for all market participants, and makes both short and longer term planning very difficult.

The high food commodity prices coincided with high prices for petroleum, and many mineral products, but not with high prices for many agricultural products of export interest to developing and least developed countries (LDCs) particularly those in Africa. Hence, the recent commodity price boom may have not benefited, and in fact may have hurt most such agriculture based economies.

Many developing countries and especially those in Africa have long had exports concentrated in primary commodities, and it is well known that these commodities are characterized by volatile world prices. This implies that the terms of trade for most such economies have been volatile. Nevertheless the (negative) impact of this instability on economic performance has not been explored at the macro level until recently (e.g. Collier and Dehn, 2001, Guillaumont and Chauvet, 2001, Collier and Goderis, 2007, Guillaumont and Korachais, 2006, Blattman et. al. 2007). Another issue, also well analyzed, albeit not resolved, concerns the possible existence of persistent negative trends of the prices of primary commodities (for a recent review see Cashin and McDermott , 2006). The combined effects of negative trending and unstable terms of trade for African economies is one of the reasons for their alleged negative performance.

A more recent but less analyzed development has been the increasing food import dependence of developing countries and especially LDCs, despite ample natural resources for food production. This trend in itself does not necessarily

imply any problems, as increased food import dependence may be a natural tendency during the transition of an agrarian economy to one based more on manufacturing and services, and can be managed if the export income generated by the non-agricultural sectors can pay for the increased food imports. Such trends, which have been observed in several now developed or middle income developing economies, have been the natural outgrowth of their transition to more productive and diversified structures, and have been characterized by increased agricultural productivity. Many LDCs, however, do not seem to have followed this trend, and hence their growing dependence on food imports seems to suggest another structural development that may contribute to vulnerability.

A major issue of LDCs and especially African economies' fragility and vulnerability is what this increased exposure to food imports implies about food security, and the impact of external food market shocks. The issue depends considerably on the degree to which the vulnerable populations in these countries are exposed to the international market shocks. In other words the issue is whether food insecure households are exposed to international market instability. Here, the evidence appears to be that they are very weakly exposed to international market signals, at least in the short term. The reasons have to do with weak infrastructures, high transactions costs, and government policies. This, however, tends to shield vulnerable agriculture dependent households from the international markets, but makes them more vulnerable to domestic agricultural income shocks, such as those due to unfavorable weather events. These internal shocks in fact maybe more detrimental to these households than the shocks due to external market instability. Hence insulation of food insecure household from international markets can shield them from external shocks but make them more vulnerable to internal shocks. The opposite is the case for households that are well integrated with international markets. This then presents a policy dilemma with respect to the optimal degree of insulation of food insecure households from world markets. Keeping food insecure households insulated from world markets makes them less vulnerable to global shocks but more vulnerable to domestic shocks, and the opposite is the case if the degree of insulation is smaller. The optimal degree of insulation to the two types of shocks will depend on the degree of exposure to domestic shocks and global, as well as the relative magnitude of these shocks. Some thoughts on this issue will be provided towards the end of the chapter.

The chapter first documents recent events in food markets and discusses factors behind these developments to identify whether there are tendencies that raise new concerns. It then analyses the pattern of global agricultural market instability over the past four decades and the factors that may affect it in the futures. Then it takes up the issue of vulnerability of the food economies of developing countries. The chapter tries to identify areas in which the current system of rules governing agricultural trade may need strengthening or adaptation in light of the trends in market instability. The final section summarizes.

2. Recent commodity price developments in perspective

Figure 1 indicates the evolution of an index of monthly nominal international prices of the main traded food commodities since 1990. It can be seen that the main commodity prices that soared in late 2007 and early 2008 were dairy, cereals and oils, while sugar and meat prices do not appear to have spiked in any exceptional way, given the trends since 1990. Similarly (and not shown), other agricultural commodities such as the tropical beverages coffee and cocoa, have not exhibited any marked price changes in 2007 and 2008, compared to the 1990-2006 patterns. As of mid 2009 these spikes have vanished, with most indices returning to historical levels.

   While, however, the world price changes in some of the basic food commodities appear significant in nominal terms in relation to the trends of the past twenty years, when examined in real terms, prices during the recent crisis appear still considerably smaller compared to the peaks during the previous major food crisis of the mid-1970s. Figures 2-4 indicates the real international prices (deflated by the US producer price index) of the main cereals and oilseeds, vegetable oils and livestock commodities from 1957 to 2008. It can be readily seen that for all commodities indicated, the real prices at the height of the crisis in 2008 were considerably lower compared to the real prices in the mid 1970s.

FIGURE 1
Recent basic food commodity international price indices (1998-2000=100)
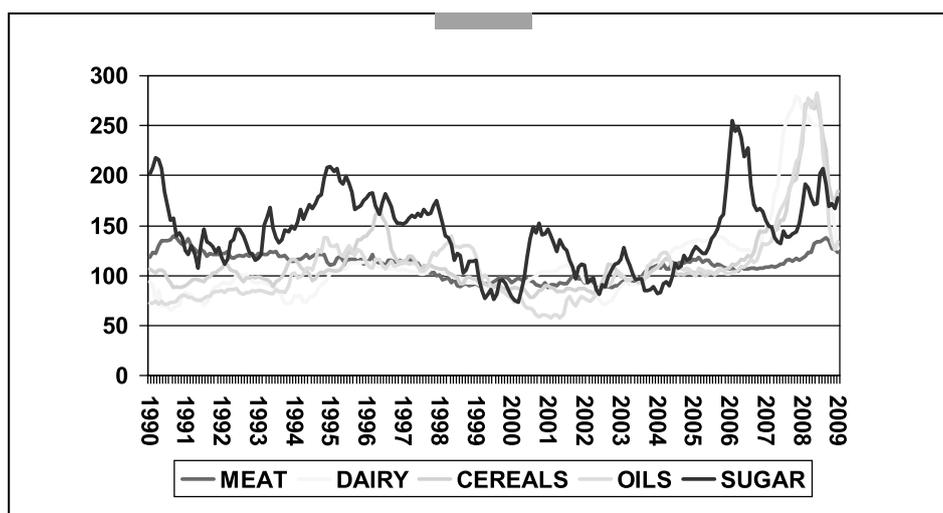
Source. FAO Trade and Markets Division

FIGURE 2
Real prices of bulk food commodities 1957-2008
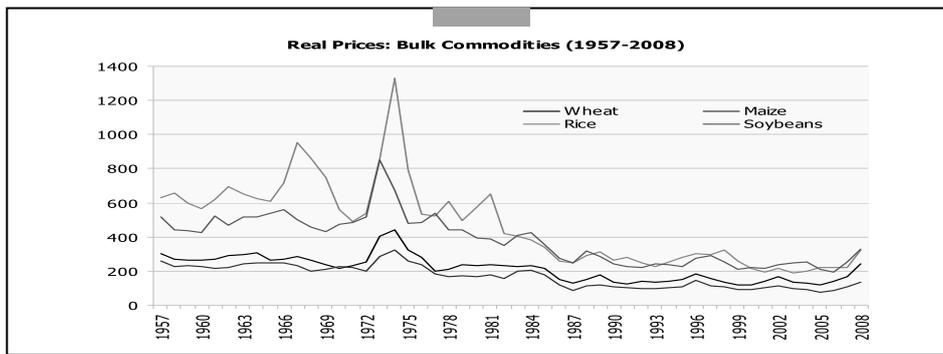
Source. FAO Trade and Markets Division

FIGURE 3
Real prices of vegetable oils 1957-2008
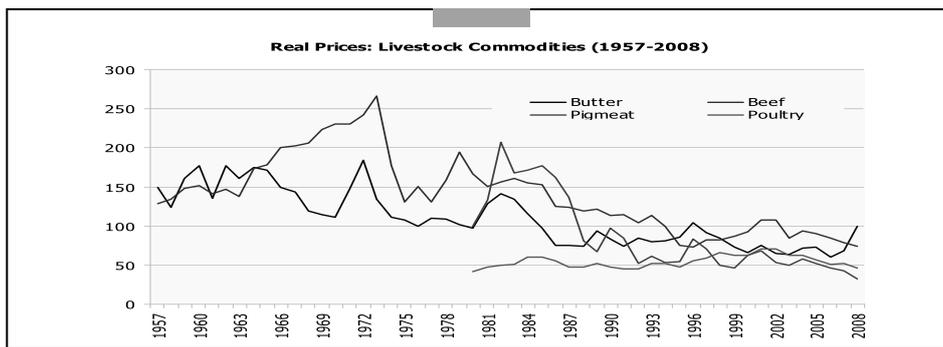
Source. FAO Trade and Markets Division

FIGURE 4
Real prices of livestock commodities 1957-2008
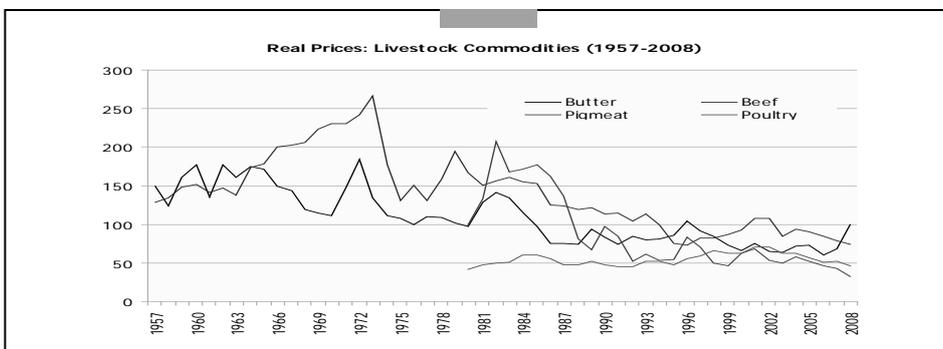
Source. FAO Trade and Markets Division

Another salient pattern evident in the graphs of figures 2-4 is that the long term decline in food commodity prices, that appears to have been in place since the late 1950s, seems to have stopped in the late 1980s and early 1990s, with the trend lines indicating steady, albeit still fluctuating patterns. This suggests that there may have been several slowly evolving factors affecting global food markets that gradually created a situation of tightly balanced supply and demand, where a spike was almost inevitable in response to small shocks. Several of these factors have been extensively discussed and analyzed (see for example FAO, 2009, Abbott, et. al. 2008; Baltzer et. al. 2008; Helbling et. al. 2008; Schnepf; 2008, Trostle, 2008; von Braun et. al., 2008; Mitchell, 2008). They include the following:

1. Growing world demand for basic food commodities, due to growth in emerging economies, such as China and India. This development has been touted considerably by many observers, but in fact it has been occurring gradually for several years, and cannot account for the sudden price spikes. Furthermore, the rate of growth of these countries' demand or utilization of cereals, the most widely consumed and traded food commodities, for food, feed and other non-biofuel uses, has been decreasing rather than increasing. In fact this is compatible and predicted by conventional economic wisdom, which indicates that as incomes rise, the demand for basic foods rises by less than the rise in incomes.

2. Demand of cereals for biofuel production. It is true that a significant amount of production of maize in the USA, oilseeds in the European Union, and sugar in Brazil have been utilized for biofuel production, often with help from a variety of support policies and mandated alternative energy targets. This has also been occurring over a number of recent years, and accounts for a significant portion of market demand for these commodities, as well as, via substitution, for indirect demand for several other commodities that compete for the same resources, such as land. As this has been occurring for some time, and helped keep prices increasing and strong overall, it is unlikely to have been a major factor for the sudden price spikes, albeit it may have had amplifying effects in an already tight market.

3. The rise in petroleum prices. Petroleum prices started rising in 2004, and continued rising, before sharply declining in late 2008. The reasons are largely related to demand by fast growing countries with energy intensive economies, such as China and India. The oil price increase, apart from pushing costs of agricultural production and transport higher, induced a demand for alternative fuels, which in the context of the rising awareness about climate change created a strong demand for biofuels. This, in turn, translated to increasing demand for agricultural raw material feed stocks for biofuel production. Food commodity prices, especially those for biofuel stocks, seem to have followed the trend in oil prices quite closely, including through the spike period of late 2007-2008 and hence one might induce that there is a close link between oil

prices and food prices that may have been one of the main contributing factors to the recent food price spike and subsequent decline.

4. Slowing rates of increases in farm productivity. During the more than thirty years since the last major food price crisis of 1973-75, agricultural prices in real terms have been declining due to fast rates of growth of agricultural productivity (both land productivity as well as total factor productivity). In the more recent period, agriculture has been neglected in most developing countries, as the World Bank's 2008 World Development Report aptly illustrated. The neglect not only involved lower productivity growth, via lower investments, but also the perception that agricultural supplies were not a problem in a world of low prices.

5. The gradual decline in global food commodity stocks. The ratio of end of season world cereal stocks to global utilization appears to have decreased considerably between 2000 and 2008. For two of the major cereal commodities (maize and rice) this decline can be accounted for by the decline in the stocks of China. Furthermore, globalization that linked markets much more and saw the proliferation of "just in time" production methods, may have had the effect of reducing the overall level of global food commodity stocks. Excluding China, world cereal stock ratios for most cereal commodities (except wheat) have not changed appreciably in the last 20 years. Nevertheless, several major cereal producing and trading countries experienced secular declines in end of season stocks. Irrespective of the source of the decline, however, it is a fact that when commodity markets face lower end of season stocks, they react much stronger to any negative shocks.

6. Commodity speculation. This factor has been highlighted by many analysts and politicians, to the point of blaming the organized commodity exchanges for the price spikes. Speculation is an ordinary fact of life in all commodity markets, and is a necessary ingredient of all commodity trade. Any agent who buys a contract for commodity (in the physical or future markets) with the intention of selling it later for a profit can be considered a speculator. Organized commodity exchanges are important institutions for both market transparency as well as the transfer of market risk from physical markets to speculators, and they guarantee transactions via the underlying clearing houses. It is no coincidence that they have evolved and grown over a period of more than two centuries, as they have been perceived as important institutions for managing market risks. The advent of large investments by commodity funds in recent years has raised new issues about the utility of the organized exchanges as risk transfer mechanisms, and about the role of unfettered speculation in persistent price rises. Detailed analyses of recent events (Gilbert, 2009) have suggested that there is weak evidence that such investments have contributed to the commodity price boom.

7. Macroeconomic factors. While most commodity market analysts look for commodity specific fundamental factors to explain individual commodity price spikes, there are systemic macroeconomic factors that affect all commodities that have been very influential. The recent commodity boom has involved most traded commodities, not only agricultural ones. One of the key factors that fueled such a boom seems to have been a period of easy money and loose regulation of financial transactions, which resulted in a fast expansion of global financial liquidity, a weak US dollar, and low interest rates. It is notable that the previous large commodity boom of 1973-75 was also preceded by a period of expanding global liquidity fueled by large US external deficits and loose monetary policies, much like in recent years. It has been shown (Abbott, et. al. 2008, Mitchell, 2008) that US dollar depreciation has contributed around 20 percent to increases in food prices. Frankel (2008), in turn, has made the argument that low interest rates, themselves induced by monetary expansion, encourages portfolio shift into commodities, and also discourages stockholding, therefore, contributing to commodity price rises. There is an additional factor in explaining the abrupt behavior in food commodity prices in the midst of the financial crisis of 2008. Many researchers suggest that commodities – especially commodity futures – have become a new 'asset class'. First, returns to commodity futures are negatively correlated with returns to traditional financial assets such as equities and bonds. This relationship indicates that commodity futures offer an attractive vehicle for portfolio diversification that reduces the volatility of portfolio returns. Second, comparisons between returns of commodity futures with those of traditional financial assets, such as stocks and bonds, indicate that investment in commodity futures is profitable. Futures and stocks have similar returns, amounting to about 5.2–5.6 percent per annum. This is twice as high as the return from investing in bonds. These observations suggest that commodity futures are not only regarded as providing insurance against price risk for farmers and food processors, but also as an asset which generates returns and can be used to diversify traditional financial portfolios. Given that the commodity boom of early 2008 came to an abrupt stop in late 2008, followed by subsequent strong price declines, in the wake of the global financial crisis, without substantial changes in the underlying commodity market fundamentals, suggests that macroeconomic factors were important in the recent boom.

The important point to highlight is that most of these factors were slow in developing over several years, but cumulatively they created a situation of tightly balanced world supply and demand for many agricultural commodities. Furthermore, they made the demand for the agricultural commodities very price inelastic. The demand curve for agricultural is price elastic when there are ample supplies (from both production and stocks) but becomes very inelastic when the overall supplies are small, and there is low capacity of the market to absorb or buffer exogenous shocks. As indicated above both the reduction of global stocks, as well as the

macro factors that fuelled demand growth, pushed the supply demand balance of most food commodities into a territory, where small shocks or small changes in perceptions could have very strong price effects. In fact, the food production shocks that occurred were small, exemplified by the fact that global grain production declined by only 1.3 percent in 2006, but then increased by 4.7 percent in 2007, and a further 4.8 percent in 2008, despite the fact that some of the major exporting countries such as Australia experienced very sharp negative production shocks.

A factor that seemed to have contributed considerably to the recent short term price spikes is hoarding tendencies and policies affecting the normal flow of commodities. It is well known that the reaction of many private agents as well as governments at the onset of price rises was destabilizing, in the sense that their actions fuelled the demand for current supplies, led by fears of impending basic commodity shortages. In other words when market agents realized that there were inadequate buffers in the global markets to ensure smooth supply flows, they started to behave atomistically, to ensure their own smooth supply flow. This created panic buying and hoarding, even when the underlying conditions did not justify it, thus creating the price spikes. The case of the global rice market is a good case in point, where, despite adequate global production and supplies, uncoordinated government actions, such as export bans, created a short term hoarding panic and an ensuing price spike. The realization in mid-2008 that the situation was not as critical as many thought, led to the opposite effect and a sharp price decline followed.

3. Factors affecting price volatility of internationally traded agricultural commodities and prospects

In the context of the events of the last two years, it is interesting to examine the evolution of world market price volatility. Figure 5 plots the indices of annualized historic volatilities (estimated by normalized period to period changes of market prices) of nominal international prices of wheat, maize, and rice over the previous five decades. The figures also exhibit the nominal international prices on the basis of which the indices of volatility are determined. The reason for the juxtaposition of the two types of information is to examine visually the relationship between the level of commodity prices and the market volatility. It has long been known (Samuelson, 1957) that in periods of price spikes, overall supplies are tight, and market volatility should be higher, hence the expectation is that during periods of price spikes the index of market volatility should exhibit a rise as well.

A most notable characteristic of the plots in figure 5 is that historic volatility (as an index of market instability) of most food commodities, while quite variable, appears not to have grown secularly in the past five decades. There also appears to be no clear correlation for most commodities between the two major price spike periods,

FIGURE 5
Historic volatility and nominal international price for the major food commodities
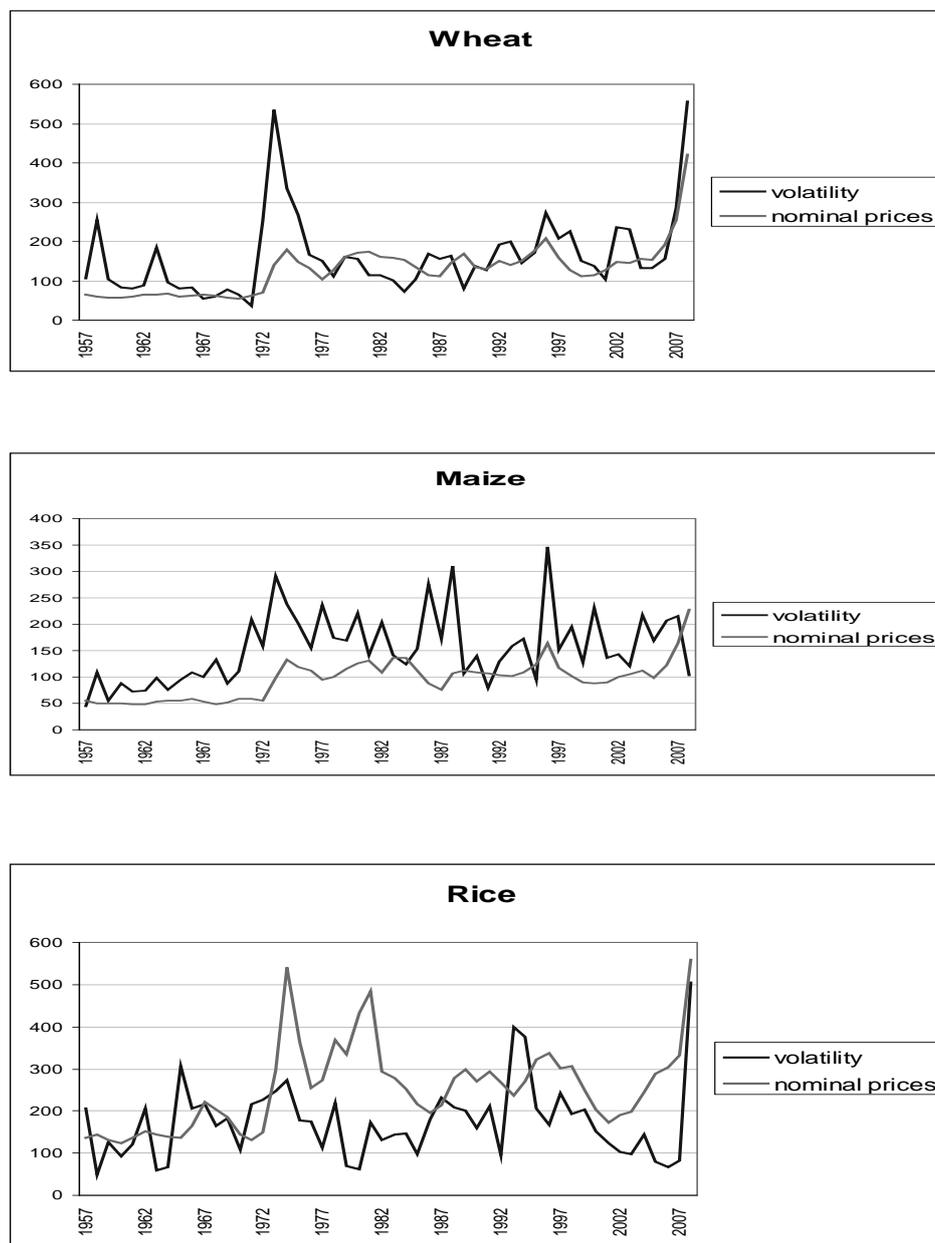
Source. FAO Trade and Markets Division and author's calculations

namely 1973-75 and 2007-8 and volatility. During the first boom period, namely 1973-75, volatilities of wheat and maize appear to have increased markedly relative to previous trends. However, this is not the case for rice. During the most recent boom of 2007-8, the volatility of wheat and rice appear to have increased markedly, but not that of maize. While these observations are just visual and need to be corroborated with appropriate econometric analysis, they raise some questions about the alleged positive relationship between the level of prices and the level of volatility.

There are two factors that traditionally have been considered as key in influencing agricultural market price instability are the variability of production, and the level of end of previous period stocks. The more variable is agricultural production, the more one expects to observe large period to period price variations, namely larger volatility. In the same vein, the smaller the end of season stocks, the more any new market developments are likely to affect prices, and hence the more variable is market price.

Figure 6 exhibits trends in the coefficients of variation of annual production of wheat, maize, and rice, computed for four ten year periods ending in 1999, as well as the most recent period 2000-06, and for the five continents, as well as the world as a whole. The data indicates the magnitude of year to year variability of agricultural production relative to the ten year average of the relevant period, in order to ascertain whether there appear to be any discernible trends.

Concerning wheat, there appears to be a marked <u>decline</u> in world production variability, and significant reductions in production variability of America (North and South) and Asia, which between them account for 60 percent of global production. It is only Africa, which accounts for a small share of global wheat production (only 3.3 percent), where production variability seems to have increased. Similarly for maize, global production appears also to have become less variable, with no apparent significant positive trend in any continent. Global paddy rice production variability also appears to be declining over time. The trend is similar in all continents, except Oceania, which, however, accounts for only 0.1 percent of global paddy production. The trend in global soybean production variability also appears to be negative, with most continents exhibiting declining or at most non-increasing coefficients of variation. It, therefore, appears that one of the main traditional factors that affect price volatility, namely production variability has become less important over the previous 50 years, implying lower overall market volatility.

Turning to end of season stock levels, figure 7 exhibits the end of season global stocks both absolutely and as a share of total utilization for wheat, maize, and rice. The same figures are also provided without China for the past twenty years. The first observation is that global end of season stocks of cereals do not appear to have been in 2007-8 much smaller in absolute levels than in earlier periods, notably the

FIGURE 6

Coefficients of variation of regional and global production of major food commodities since 1961
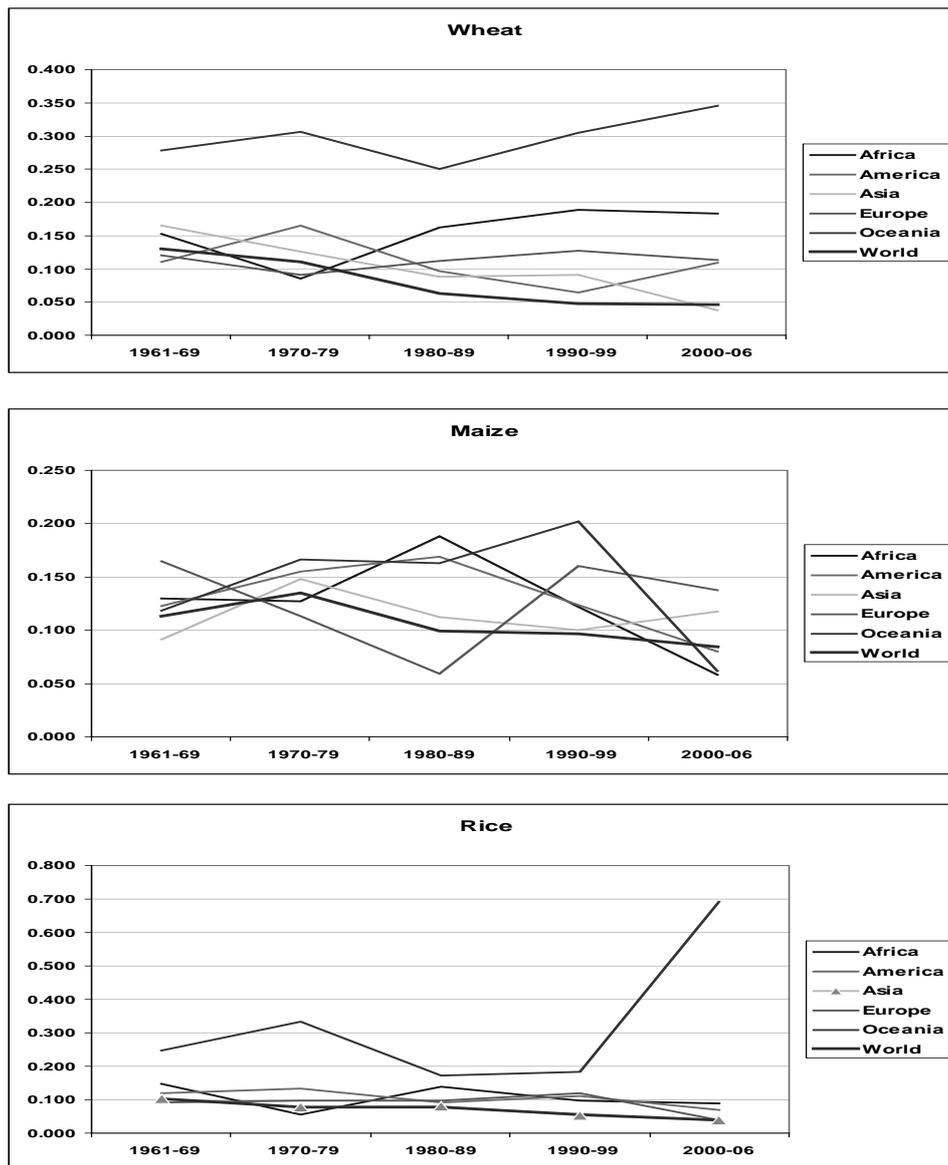
Source. Computed from FAO data

early-mid 1990s. Stocks increased considerably and reached a peak around 2000-2001 and then they started declining. The decline continued until 2004-5 and these trends occurred both with and without China. After 2005 stocks appear to have increased or at least not decreased in absolute terms.

Turning to stock to utilization ratios, the most interesting observation from figure 6 is that the ratios seem to follow the same patterns and turning points both with as well as without China. Also, although there appears to be a negative trend in the ratio of stocks to utilization for the world, when one examines the whole 30 year period from 1979 onwards, there is no marked negative trend for the ratios if China is excluded from the world total. In fact for rice, the ratios for the world as well as without China exhibit a slight positive trend.

However, China is an important producing and trading country, accounting for 17-18 percent of global wheat production, 15 percent of coarse grain production and 29 percent of global paddy rice production. It also accounts for 39 percent of global end of season wheat stocks, 30-33 percent of global coarse grain stocks, and 53 percent of global rice stocks. It is clear that, irrespective of whether the Chinese authorities use stocks for domestic market stabilization or for managing their net export/imports of basic food commodities, the size of Chinese stocks is likely to weigh heavily on any market analysis of these commodities, and on price expectations.

Turning now to the newer factors affecting market volatility, the most difficult to analyze is the influence of commodity traders in organized exchanges. This is because the classification of traders as commercial (namely those who have an interest in the actual physical commodity), and non-commercial, that has been adopted in several large exchanges, and on the basis of which some data can be compiled, is not representative of the actual intentions and positions of financial funds, as well as other non-commercial actors (Gilbert, 2009). Data from participation of commercial and non-commercial traders in total open interest in CBOT and in selected futures markets indicate that the share in open interest of non-commercial traders increased considerably in all CBOT markets between 2005-8, and this is the period of the financial boom. However, this simple contemporaneous development is not a proof of causality. The question is whether the undoubted increase in participation of non-commercial traders in the organized futures and other derivative markets, affected the market fundamentals, and in particular the level of prices and volatility. There is very little research on this issue, but some recent empirical analysis by Gilbert, 2009, and a policy brief by the Conference Board of Canada (CBS, 2008) seem to suggest that is price volatility that attracts non-commercial and other financial traders, and not the other way around.

A lot has been said about the influence of the unstable exchange rate of the US dollar on commodity markets. It is a fact that in recent years the USD exchange rate

has varied considerably against the currencies of other major trading countries. For instance the USD depreciated against the Euro by more than 30 percent between 2003 and 2007. It is also the case, that since the prices of most internationally traded agricultural commodities are quoted in USD, a USD depreciation has a considerable influence on USD prices of traded commodities. Figure 7 indicates that a 1 percent USD depreciation against all currencies, ceteris paribus, can have significant upwards influence on all agricultural commodity prices, and for some the relevant elasticity can be as high as 0.8-0.9 (this occurs mostly for livestock commodities, where developed countries are the major traders, and exchange rates most variable). Clearly then it appears that the instability of the USD exchange rates must have contributed significantly to market price volatility. Given recent global financial and production developments, the huge international financial flows they imply from agents looking for safe heavens, it is likely that this instability will continue in the future, and hence this is likely to continue affecting adversely commodity market volatilities.

Apart from the instability of the USD, macroeconomic instability is likely to have contributed considerably to commodity markets instability. Gilbert (2009) in his empirical analysis finds that both money supply as well as GDP seem to Granger cause commodity prices. The influence maybe indirect, for instance through interest rates as Frankel (2008) has already indicated. The current financial crisis, does not bode well for monetary stability, especially given the significant monetary expansion that is likely to follow the fiscal stimulus packages now envisioned in most large economies. Hence it is likely that macroeconomic factors will continue adding instability to world commodity markets.

The price of petroleum was already alluded to as an important determinant of agricultural commodity prices, especially for those commodities which can be utilized as biofuel production stock. Schmidhuber (2006) has shown that when petroleum prices are in a certain price range, then oil prices and biofuel stock prices seem to be much strongly correlated. This has been empirically substantiated by Balcombe and Rapsomanikis (2008) and for the sugar-oil—ethanol group. Several analysts have attributed significant influence on agricultural commodity prices from petroleum prices, coupled with biofuel policies (e.g. Mitchell, 2008, Abbott, et. al. 2008). Despite the rapid fall of petroleum prices in late 2008 and early 2009, the underlying demand for oil in the medium term is real and likely to increase (OECD-FAO, 2008). This is likely to induce a continuing linkage between petroleum prices and biofuel stock prices, albeit not at all periods. As oil prices are likely to be quite unstable given the uncertainties in global economic growth, this most likely will induce instability of the agricultural commodity markets, both for those products that are directly related to biofuels, such as maize, sugar, and rapeseed, but also in commodities that are substitutes in production.

The final factor that is likely to affect commodity market volatility is country level policy actions and reactions to external events. The commodity scare of 2007-8

FIGURE 7

Global ending stocks of major cereals and stock to utilization ratios for the whole world and for the world without China
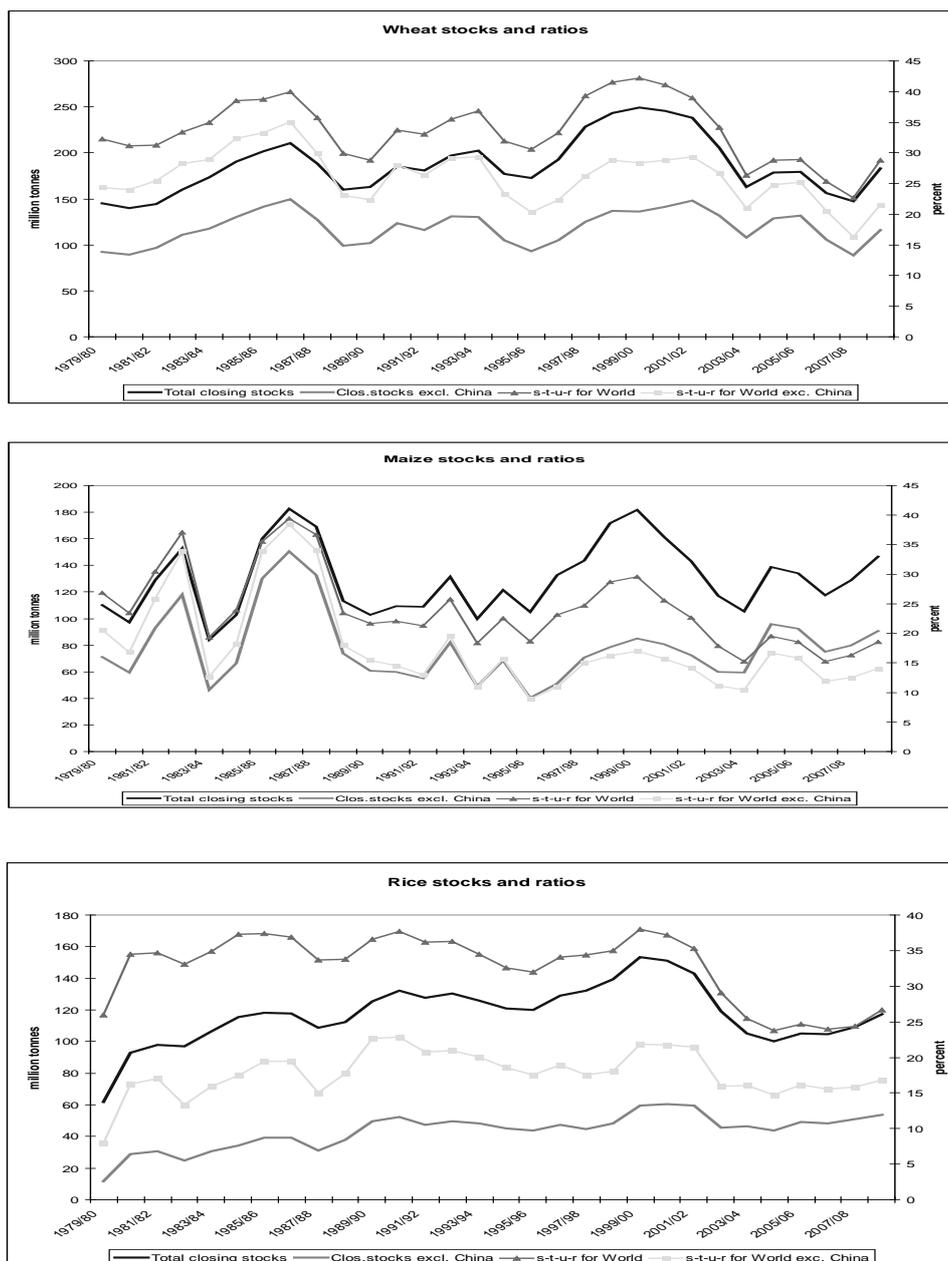
Source: FAO Trade and Markets Division

and the publicity it received caused many governments to overreact, implementing measures that were not always effective at achieving their stated objectives. A compilation from an FAO survey of government actions in 77 developing countries during the 2007-8 period revealed that there are only a few countries whose governments did nothing in response to the global commodity crisis. Perhaps surprisingly the region where few additional policies were adopted appears to be Africa. Secondly many developing countries intervened in trade by either reducing import tariffs or banning exports or other measures

Given the size of the recent international price variations during a single year, many governments and market agents are rightfully questioning whether this type of extreme market volatility might continue in the future. In this context the following thoughts may be useful in assessing the future prospects for market volatility.

First, it will take some time for food stocks to be replenished to their pre-2000 levels, especially if unusual weather events continue to occur over the next few seasons. Despite the fact that prices have come down from their peaks of 2008, and that global production seems to have responded positively to the crisis, the decline in prices may discourage many farmers from further production increases, and governments from productive investments. Hence, stock replenishment may be a slow process, implying that the markets will be tightly balanced for some time to come. With the financial crisis hitting on top of the food crisis, financing will also be scarce for all investments, and this will include investments in stocks. Low interest rates will certainly not make this process any easier, as Frankel (2008) has argued.

Biofuel demand is likely to be important for some time, if petroleum prices stay high. With the global financial and now economic crisis lowering overall petroleum demand, this looks like a less pressing issue, but petroleum prices are highly uncertain, and hence it is not clear that they will come down strongly and persistently. Hence, biofuel demand is likely to stay strong, especially since mandates are likely to stay, and investments made in biofuel producing plants will not be easy to just abandon. Finally, biofuel demand is likely to stay until more energy efficient new generation biofuels that do not compete with land resources for food production become widely available commercially, and this is not likely to happen for several more years.

The final factor that is likely to affect commodity market volatility is country policy actions and reactions to external events. Discrete and largely unexpected policy responses, especially through marketing boards operations, increase uncertainty and weaken the incentive for the private sector to engage in trade. The presence and trading activities of both marketing boards and private firms give rise to a dual marketing system that often increases the fragility of the market. The lack of trust and the poor coordination between the public and the private sectors often result in food deficits and high domestic price volatility.

Global food commodity markets are likely to stay volatile in the next few years, until stocks are replenished, petroleum prices stabilize, and the global financial crisis ends. An added risk is that the efforts currently made to renew emphasis on agricultural investments to boost productive efficiency, especially in developing agriculture dependent countries, are derailed by the probably short lived hiatus of low global food commodity prices.

4. Food dependency and food insecurity among less developed economies

Over the past 40 years, and despite significant developments in global trade, technology and aid, many developing countries but especially those in Africa have remained very dependent on agriculture. Table 1 indicates that both for Africa as a whole and for LDC Africa in particular the share of agriculture in GDP has decreased only slightly since 1970. During the same period, the share of economically active population employed in agriculture, while experiencing significant decline for Africa as a whole, from 76 percent in 1970 to 57 percent in 2002-4, in LDC Africa the share decreased from 83 percent to a still very high 71 percent. Despite this continuing dependence, Table 2 indicates that the shares of agricultural exports in total exports of merchandise as well as total exports of goods and services have declined to about half their shares in 1970.

This decline in agricultural export shares has been accompanied by growing agricultural imports. Table 3 indicates that during the same period, the share of

TABLE 1

Africa and dependence on agriculture

	Share of agriculture in GDP			
	1969-71	1979-81	1989-91	2002-04
North Africa	19.1	14.7	16.0	13.6
Sub-Saharan Africa: LDC	40.2	40.4	37.5	38.8
Sub-Saharan Africa: Other	30.6	27.6	27.1	26.6
Africa	31.9	29.6	28.7	28.4
Share of economically active population in agriculture in total economically active population				
	1969-71	1979-81	1989-91	2002-04
North Africa	0.54	0.43	0.30	0.23
Sub-Saharan Africa: LDC	0.83	0.79	0.76	0.71
Sub-Saharan Africa: Other	0.68	0.60	0.49	0.41
Africa	0.76	0.70	0.63	0.57

Source. Author's calculations from FAO data

TABLE 2
Africa and agricultural exports

Share of agriculture exports in total exports of goods and services			
	1969-71	1979-81	1989-91	2002-04
North Africa	24.5	7.3	4.2	3.7
Sub-Saharan Africa: LDC	65.5	43.4	38.6	32.4
Sub-Saharan Africa: Other	37.4	25.5	20.7	23.5
Africa	46.8	29.6	25.	23.4
Share of agricultural exports in total merchandise exports			
	1969-71	1979-81	1989-91	2002-04
North Africa	33.4	11.8	8.3	6.0
Sub-Saharan Africa: LDC	65.6	54.4	46.0	32.5
Sub-Saharan Africa: Other	52.1	34.2	26.2	19.3
Africa	58.8	44.7	36,9	26.3

Source: Author's calculations from FAO data

agricultural imports in total imports of goods and services has declined, but the share of imports in total merchandise imports has increased, with the exception of North Africa. More significantly, the share of agricultural imports in total exports of goods and services, an index that can indicate the ability of the country to finance food imports, while declining from 1970 to 1980 and 1990, has increased considerably from 1990 to 2002-04. This suggests that agricultural (mostly food) imports have necessitated a large share of the export revenues of African countries.

Among Asian developing countries, by contrast, over the same time period the average share of agriculture in GDP has declined from 37 percent to 22 percent, the share of economically active population employed in agriculture has declined from 70 to 51 percent. The share of agricultural exports in total exports of goods and services has declined from 28.4 percent to 7.8 percent (as a share of merchandise exports the share of agriculture declined from 46.5 to 8.7 percent). The share of agricultural imports in total imports of goods and services has declined from 33.0 to 7.8 percent, and the share of total food imports in total exports of goods and services has declined from 15.5 to 7.1 percent. Hence Asian developing countries' food imports have not increased beyond their capacity to import them.

In Latin America and the Caribbean (LAC) by contrast agriculture as a share of GDP has increased on average in all regions (except Latin Caribbean) over the past 25 years (from 7.1 to 8.1 percent) while the share of economically active population in agriculture has declined from 34.5 to 18.6 percent. For most LAC countries exports of agricultural products constitute a large share of total merchandise exports (average a bout 35 percent), and agricultural imports are on average less

TABLE 3
Developments in African agricultural import dependence 1970-2004

Share of agriculture imports in total imports of goods and services			
	1969-71	1979-81	1989-91	2002-04
North Africa	20.4	4.8	3.5	3.4
Sub-Saharan Africa: LDC	38.4	22.2	19.6	15.1
Sub-Saharan Africa: Other	33.5	20.9	21.4	15.9
Africa	33.3	18.5	17.3	13.2
Share of agricultural imports in total merchandise imports			
	1969-71	1979-81	1989-91	2002-04
North Africa	23.9	24.2	23.0	17.5
Sub-Saharan Africa: LDC	21.5	22.2	25.9	27.3
Sub-Saharan Africa: Other	17.4	14.8	14.2	18.1
Africa	20.6	20.3	22.4	23.7
Share of food imports in total exports of goods and services			
	1969-71	1979-81	1989-91	2002-04
North Africa	14.4	18.3	13.2	9.9
Sub-Saharan Africa: LDC	37.6	28.2	30.2	34.9
Sub-Saharan Africa: Other	14.1	8.7	6.8	11.1
Africa	24.1	18.8	17.9	20.9

than 20 percent of total merchandise imports. Hence the issue of growing food imports with inability to pay is mostly an African problem.

These developments have been accompanied by a decline in the income terms of trade for LDCs, which are largely African countries. Figure 8 indicates that during the period 1961-2002 the income terms of trade, as computed by the ratio of the value of agricultural exports to an index of import prices (the IMF Manufacturing Unit Value index), and which measures the purchasing power of agricultural exports, seems to have evolved totally differently for developed countries, LDCs and other (middle income) developing countries, with the index for the LDC showing a continuing decline (with a brief period of increases in the late 1990s), while that of the developed and other developing countries an increase. After 2002 it appears that all three indices move positively but with the one for LDCs growing at slower rates than those of the developed and other developing countries. The basic reason for this development, since both groups of countries face the same international prices is the different rates of productivity growth. Figure 9 exhibit average yields in cereals among developed, developing and LDC countries from 1985 to 2004. It is clear from that figure that in the last 20 years productivity increases have been strong in developed and other developing countries, while they have stagnated in LDCs. The same picture holds in all other agricultural products.

FIGURE 8
Income terms of trade of agricultural exports from 1961 to 2007 for developed countries, LDCs, and other developing countries

Value of Export/MUV index in Billion$
Left axis-LDC, Right axis--Other Developing and Developed
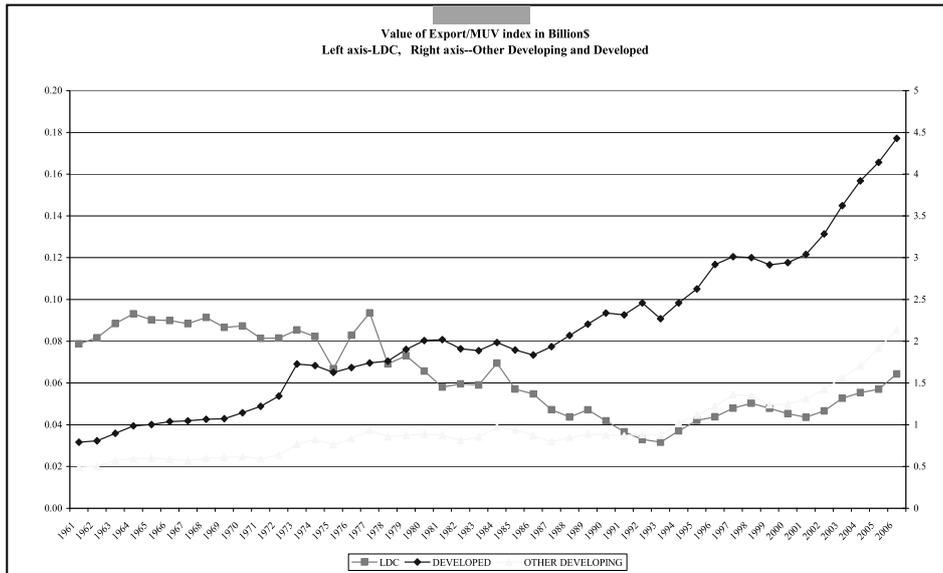
Source: FAO Trade and markets Division

FIGURE 9
Average cereal yields in Developed, LDC and other developing countries, 1985-2004

Cereals - weighted average yields: 1985 - 2004
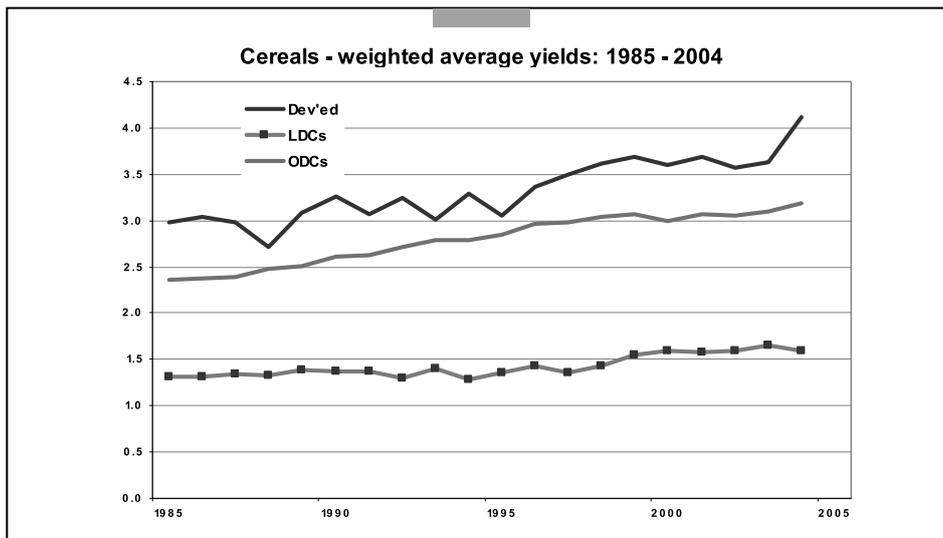
Two other interesting structural developments are in order. The first concerns the fact that despite the fact that agricultural export dependence has declined for most developing countries, the high commodity dependence of agricultural exports has continued, especially for African countries. The second structural development concerns changes in the production structure of LDC agriculture. After 1980, almost all developing countries and most LDCs adopted stabilization and structural adjustment programs that intended in transforming their economic sectors towards more tradable commodities. This was particularly intended for agriculture, which had been characterized by many institutional and market rigidities and government monopolistic interventions. However, two decades after the onset of such programs the share of agricultural production that is accounted for by exportable and importable products does not appear to have changed very much. As Table 4 illustrates, the average share of the value of exportable production in the value of total agricultural production for 24 low income African countries in 2001-3 was estimated by the author to be 21.8 percent compared to 23.1 percent in 1980-82. As for the share of import substitute products in total agricultural production over the same period, this seems to have stayed the same from 24.7 percent in 1980-82 to 25 percent in 2001-3.

Turning to medium term food outlook, projections of net imports from the FAO COSIMO model that pertain to developing countries and LDCs indicate that based on current estimates, developing countries will increase their net food imports by 2016 in all products except vegetable oils. Similarly LDCs are projected to become an increasing food deficit region in all products and increasingly so. Clearly this suggests that as LDCs become more dependent on international markets, they will become more exposed to international market instability.

The conclusion of this descriptive exposition is that many developing countries and especially LDC countries in Africa, have become more food import dependent, without becoming more productive in their own agricultural food producing

TABLE **4**

Evolving production structure in commodity dependent developing countries

	Ratio of the value of production of exportables to the total value of agricultural production (%)			Ratio of the value of production of importables to the total value of agricultural production (%)		
	1980-82	1989-91	2001-03	1980-82	1989-91	2001-03
Africa (24 countries)	23.1	22.1	21.8	24.7	25.7	25.0
Latin America & the Carribbean (11 countries)	48.1	52.8	48.0	45.0	43.8	41.8
Oceania (3 countries)	45.8	39.3	37.1	8.4	9.5	12.6

Source: Author's calculations from FAO data

sectors, or without expanding other export sectors to be able to counteract that import dependency. This implies that they may have become more exposed to international market instability and hence more vulnerable.

5. New challenges to the global agricultural trading system in light of future global market instability

There are many events that are likely to shape future agricultural trade and trade policies. The past 30-35 years, namely the period since the mid 1970s and the last food crisis, have seen the emergence of a more globalized food system, and the policy concerns shifted to issues of growth in non-agriculture, and more open trade. The WTO and the debates surrounding agricultural trade have tended to neglect food security concerns. Nevertheless, the recent global food market events have refocused many policy makers' views back towards food security.

Price instability can undermine the legitimacy of the global market as a place in which countries can buy food supplies on a regular basis and make use of trade to supplement domestic production. The WTO rules are currently unbalanced: they spring into action when prices are low but do little to constrain government action when prices rise. So export subsidies are constrained and tariffs are bound, but export taxes are not limited and export embargoes barely mentioned. The ability of the world trade system to respond in times of price volatility is likely to be tested severely in the future, and some creative institutional arrangements may be needed.

The recent food crisis created mistrust of the international trading system and has inspired policy moves in some countries to promote food self sufficiency. Many middle and high income net food importing countries, such as countries in the petroleum exporting Gulf region, have started thinking about investments in food production in other countries with contractual commitments to buy back products. If this tendency materializes, it is likely to change world trade patterns for basic food products, as it will create a growing tendency for medium and long term supply arrangements between such importers and with main exporters, which may leave a smaller remaining part of the world market to absorb shocks, and hence may make markets more unstable.

To promote developments along agricultural comparative advantage and avoid possibly uneconomic tendencies toward self sufficiency, there is a need to create a system to assure net food importing countries (both developing and higher income) that their physical import supplies can be guaranteed through imports. Similarly there is a need to create a system to manage increased price volatilities.

A problem that was highlighted during the recent food crisis was the unavailability of trade finance, especially for the most vulnerable low income food dependent developing countries. Clearly a major aspect of any new institutional arrangement

must be a better system to ensure low income food deficit countries appropriate finance to import in times of high food prices

A first concern is to assure adequate grain supplies for world markets. One such way is to promote "production reserves" instead of commodity reserves. The idea is very simple. In several OECD countries policies have been instituted to set-aside land. Such policies are largely "decoupled", namely non-trade distorting, hence acceptable from a WTO perspective. However, the land set-aside policies could possibly be expanded to include support for technology and farm human capital skills, incentives to maintain set-aside land in environmentally sustainable condition, etc. Such productive land set-aside could be brought into physical production in high income countries within 6-10 months (the recent supply response is evidence to that) and hence could go some way to alleviate fears of many net food importing countries of lack of physical supplies.

Concerning appropriate policies to assure grain market access by middle and high income net grain importing countries, which envision medium and long term arrangements with main exporters, there is a need to create a mechanism for international contract enforcement. The basic missing institution is an international clearing house type of arrangement similar to the clearing houses that are integral parts of the organized commodity exchanges, which ensure that all contracts are executed.

Concerning import trade finance one could envision a new food import financing facility (FIFF) to provide financing to importing agents/traders of LDCs and NFIDCs to meet the cost of excess food import bills. The idea would be to create a guarantee facility for trade financing banks, to overcome their exposure limits to low income country financing. These limits become more stringent in times of high import costs, and hence limit the ability of food importing countries to import the amounts they need. Such a FIFF would not replace existing financing means and structures but could complement established financing sources of food imports when needed. This will help to maintain usual levels of quantities of imports in the face of price shocks, or to make it possible to import necessary extra quantities in excess of usual commercial import requirements when necessitated by some kind of domestic shock. The financing will be provided to food importing agents. It could follow the already established financing systems through central and commercial banks, which usually finance commercial food imports using such instruments as letters of credit (LCs). The financing provided through the FIFF would be aimed at increasing the financing capacity of local banks, but will also induce the exporters' banks to accept the LCs of importing countries in hard currency amounts larger than their credit ceilings for these countries.

6. Conclusions and outlook

The above discussion has illustrated various aspects that may impinge on the future of agricultural market volatility and attendant the world agricultural trade. Given population growth patterns and income projections, the largest challenge in the coming decades seems to be to ensure a global trading system that balances the objective of an orderly and dependable market for food with the objective of growth of many developing and least developed countries.

The conclusion of the discussion on the volatility of global food commodity markets is that they are likely to stay volatile in the next few years, until stocks are replenished, petroleum prices stabilize, and the global financial crisis comes to an end. An added risk is that the efforts currently made to renew emphasis on agricultural investments to boost productive efficiency, especially in developing agriculture dependent countries, are derailed by the probably short lived hiatus of low global food commodity prices. This calls for continuing watch on global food markets and developments. In the medium and longer run, growing demand by emerging developing economies is likely to condition world food markets. Given that the conditions for agricultural production are likely to stay favorable (from a technological and ecological perspective) with the more developed and some middle income countries, the future seems likely to produce more trade and especially more north-south trade in agricultural products.

Almost all global projections suggest that growth in the next few decades, whether fast or slow will be faster in developing countries, and especially those of Asia. This will increase demand for the most income elastic food products, such as livestock products, fruits and vegetables. If most of the growth in many of the faster growing economies takes place outside agriculture, then the demand for imports will increase faster than overall demand. Concerns about how to satisfy this growing domestic demand for food is a major factor that will shape developing country agricultural trade policies, as well as their attitudes towards the WTO in the years to come. Similarly, fast growth in non-agricultural sectors may induce the familiar (from the now developed countries) political pressures to ease the adjustment via subsidies to rural areas. This will bring pressures for protection or provision of domestic support. If the WTO constrains countries' freedom to apply relevant policies, then a conflict may arise between the WTO commitments and the domestic adjustment pressures.

Finally and not least, the global trading system must accommodate rules that can ensure a more stable and reliable food trade. Lack of food creates considerable insecurities across the world and may lead to perverse policies and outcomes. The recent events demonstrated that a more liberal agrifood trading system is not necessarily more stable. It is conceivable that more stability may need more long term contractual arrangements on a country-country or even country-private

nature. Regional or bilateral arrangements may create more stability but the trading system may need to ensure that this is not at the expense of more instability of those that are left outside such arrangements. The difficulties of developing and in particular net food importing countries must be particularly born in mind. To that end systems must be developed to assure the continued availability of food imports. Similarly development needs to be a continuing and integral part of the WTO.

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2

Agricultural trade policy during structural transformation

C. Peter Timmer [1]

1. Introduction

In an ideal world, most economists think that optimal price policy for agricultural commodities is no policy at all, that is, free trade and no subsidies. No country actually manages such a hands-off policy for all agricultural products, not even Singapore or New Zealand, so either the world is not ideal or policy makers routinely ignore economists' insights. The two possibilities are linked and this chapter uses the insights from modern political economy to understand why and how the linkage influences actual agricultural price policy. Because most agricultural price policy is implemented through border interventions, it is appropriate that modern treatment of political economy has its roots in explaining the perverse patterns of agricultural trade policy during the process of structural transformation (Olson, 1965; Anderson, 1986; Lindert; 1991; Timmer, 1993).

The structural transformation is the defining characteristic of the development process, both cause and effect of economic growth (Chenery and Syrquin, 1975; Timmer, 2008). Three quite relentless and interrelated processes define the structural transformation: a declining share of agriculture in GDP and employment (see Figure 1); urbanization and the rise of a modern industrial and service economy; and a demographic transition from high rates of births and deaths (common in backward rural areas) to low rates of births and deaths (associated with better health standards in urban areas). The final outcome of the structural transformation, already visible

on the horizon in rich countries, is an economy and society where agriculture as an economic activity has no distinguishing characteristics from other sectors, at least in terms of the productivity of labor and capital. This stage also shows up in Figure 1, as the gap in labor productivity between agricultural and non-agricultural workers approaches zero when incomes are high enough.

A quite separate literature treats the issue of agricultural price policy within the framework of optimal tax theory (Sah and Stiglitz, 1992). The general equilibrium models used in this approach are more "operational" than those used to explain the structural transformation, and require many simplifying assumptions (or highly detailed understanding of empirical behavior by households and firms if the computable general equilibrium models are to be relevant). Still, these general equilibrium models do emphasize the importance of addressing agricultural price policy from an economy-wide perspective. This chapter attempts to integrate the political economy perspective with the general equilibrium perspective, in

FIGURE 1.
The Structural Transformation in 86 Countries from 1965 to 2000:
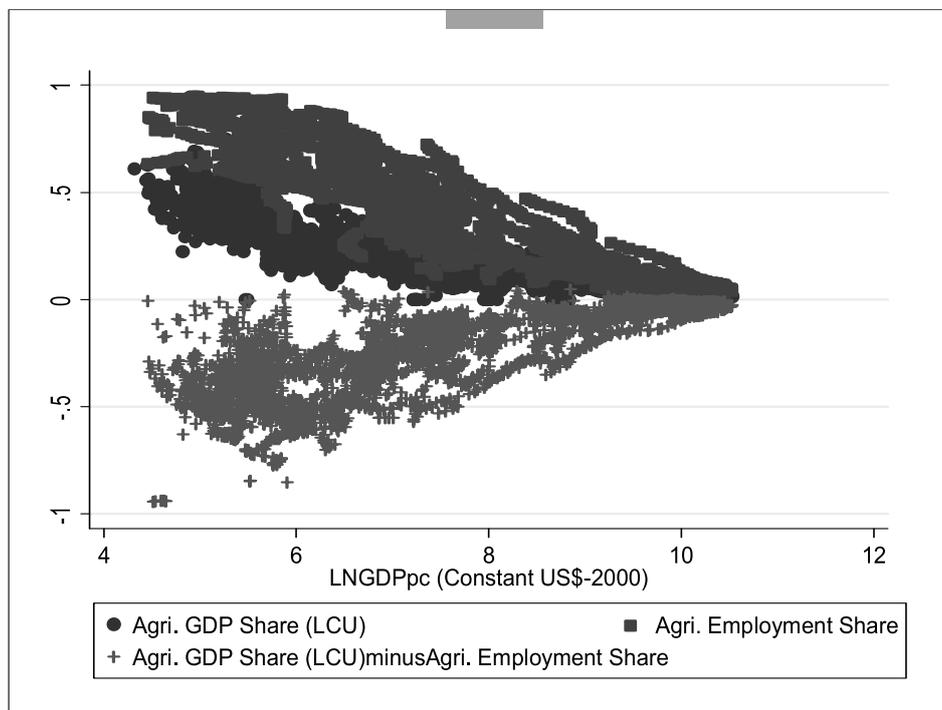
Source: Timmer (2008).

the context of the process of structural transformation. The value of doing so is suggested by the summary Sah and Stiglitz provide of their findings:

> Among the policy prescriptions often associated with the modern theory of public finance are the following: taxes should not be imposed on imported goods because such taxes interfere with production efficiency; different goods should be taxed at different rates in the urban sector to reflect differences in elasticities of demand (in accordance with the principles of efficient taxation set out by Ramsey 1927); in particular, food in the urban sector should not be subsidized, except possibly as a second-best way of redistributing money to the urban poor (in which case the food subsidies should be focused on those foods consumed by the very poor, for example millet rather than rice); and shadow wages should be considerably below market wages to reflect the pervasiveness of unemployment, but above zero to reflect the fact that investment is more valuable than consumption, and to reflect that increasing the wage bill diverts resources away from investment.

> Each of these conclusions is suspect (Sah and Stiglitz, 1992, p. 10).

These two very different perspectives on how agricultural price policy "should" be set are bound to be confusing to policy makers. At one level, political pressures to cope with the tensions of a rapid structural transformation push policy makers toward providing higher prices to their farmers, usually through some form of border intervention and agricultural protection. At another level, pressures from the budget and forces arguing for efficient resource allocation to stimulate economic growth lead to less intervention. How should policy makers respond? The answer obviously depends on what they are trying to achieve.

In policy makers' eyes, agricultural price policy has the capacity to change both the quantity of a commodity traded—imported or exported--as well as its domestic price. Economists understand that the changes in quantities and prices in domestic markets are connected by the supply and demand functions for the commodity, but policy makers persist in promulgating trade policies that seek to do both independently. For example, Indonesia's desire to restrict rice imports, support farm prices and lower consumer prices all at the same time is a common feature of many agricultural trade policies in developing countries, and the multiple objectives are almost never met with a single policy instrument (Timmer, 1986).

This chapter seeks to stand back from such complexity. The goal here is broader and longer run than understanding the realities of actual agricultural trade policies—as designed and implemented. For that, the update of the classic Krueger, Schiff, and Valdez (1991) study of agricultural price distortions being led by Kym Anderson is providing much valuable information (Masters, 2007; Anderson, 2009). Instead, this chapter examines how agricultural price policy evolves over the

long-run process of structural transformation. In this analysis, the agricultural to non-agricultural terms of trade (AgToT) is used as a quantifiable proxy for desired agricultural trade policy. The AgToT can be calculated easily as the ratio between the GDP deflator for agricultural value added in national income accounts and the GDP deflator for value added in the rest of the economy. As a result, the analysis focuses exclusively on the price effects of agricultural trade policy and does not analyze quantity effects separately[2]. Thus the emphasis is on understanding desired domestic agricultural price policy and its quantifiable impact, with the mechanics of implementation largely ignored.

Of course, agricultural price *policies* are only one of the many variables that influence the domestic AgToT. However, many of the influencing variables are beyond the direct influence of policy makers, such as the real exchange rate, international commodity prices, and the changing structure of the economy during economic development (Timmer, 1984). Agricultural trade policies are, by design, things policy makers can change according to their priorities. When we control for the exogenous factors over the process of development, the changing level and impact of agricultural price policies can be identified. That is the approach taken here.

A roadmap for the chapter proceeds as follows: Section 2 reviews the role of agriculture in the structural transformation. Section 3 reviews the empirical evidence on how AgToT evolves during the course of economic development, and its impact on the structural transformation. Section 4 then reverses the question and addresses the question of what pressures are created from the structural transformation and how these are then manifested in policy responses involving AgToT. It is necessary to "purge" the AgToT as measured empirically from the influence of external factors, and this is done country by country. The results are worth the effort, however, as it is possible to show for the first time that a macro-measure of policy-induced agricultural incentives is highly responsive to changes in sectoral income inequality that are manifested during the structural transformation. A final section summarizes the lessons from historical experience and their continuing relevance.

2. Agriculture and the structural transformation

No country has been able to sustain a rapid transition out of poverty without raising productivity in its agricultural sector (if it had one to start—Singapore and Hong Kong are exceptions). The process involves a successful structural transformation

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[2] Quantity effects that impact food consumption are often more important for food security and nutritional well-being than price effects that are measured in markets. Such effects are not the main focus of this paper. See Timmer (2005) for treatment of the food security dimensions.

where agriculture, through higher productivity, provides food, labor, and even savings to the process of urbanization and industrialization. A dynamic agriculture raises labor productivity in the rural economy, pulls up wages, and gradually eliminates the worst dimensions of absolute poverty. Somewhat paradoxically, the process also leads to a decline in the relative importance of agriculture to the overall economy, as the industrial and service sectors grow even more rapidly, partly through stimulus from a modernizing agriculture and migration of rural workers to urban jobs.

Despite this historical role of agriculture in economic development, both the academic and donor communities lost interest in the sector, starting in the mid-1980s, mostly because of low prices in world markets for basic agricultural commodities. Low prices, while a boon to poor consumers and a major reason why agricultural growth specifically, and economic growth more generally, was so pro-poor for the general population, made it hard to justify policy support for the agricultural sector or new funding for agricultural projects (World Bank, 2004b). Historical lessons are a frail reed in the face of market realities and general equilibrium models that show a sharply declining role for agriculture in economic growth (Sarris, 2001).

Still, historical lessons have a way of returning to haunt those who ignore them. This is especially true when the lessons are robust, have been observed for very long periods of time, and fit within mainstream models of how farmers, consumers (and politicians) behave. The lessons from the structural transformation fit these conditions and, as Figure 1 illustrates, they seem to point toward "a world without agriculture" (Timmer, 2008). The issue is whether "early" investments in raising agricultural productivity are necessary to achieving this "late" outcome.

2.1 Agriculture and poverty reduction

Earlier literature stressed the direct impact of agricultural development on poverty reduction that comes from rising rural wages and incomes. Most of the world's poor live in rural areas, or migrated from them in search of better opportunities. It seems almost obvious that growth in agricultural productivity is the surest way to end poverty. The historical evidence confirms this logic. Growth in agricultural productivity not only can increase farm incomes, it also stimulates linkages to the non-farm rural economy, causing economic growth and rapid poverty reduction, with overall growth multipliers almost always significantly greater than one (Hazell and Haggblade, 1993).

> Nonfarm linkages generated by technical change in agriculture can enhance both growth and its poverty-reducing effect. A growing agricultural sector demands nonfarm production inputs, and supplies raw materials to transport, processing, and marketing firms. Likewise, increases in farm incomes lead

to greater demand for consumer goods and services. Besides stimulating national economic growth, these production and consumption linkages affect poverty and spatial growth patterns, particularly when agricultural growth is concentrated on small and medium-size farms (Johnston and Kilby, 1975; Mellor, 1976; and Mellor and Johnston, 1984). [Hazell and Haggblade, 1993, p. 190]

But with more open trade possibilities, low prices for staple cereals in world markets, and population growth slowing, the size and relevance of these linkages are no longer so clear. Agriculture must be dynamic and profitable if it is to help reduce rural poverty, and growing staple cereals has not been a source of dynamism in rural economies for two decades (although this might change with growing demand for bio-fuels). A profitable agriculture with rising productivity will now depend on diversification into crops and livestock with better demand prospects than for cereals, and into production for the agri-business sector, which can add value through processing and enhanced consumer appeal.

2.2 Rural diversification as the conceptual framework

A sequence of progressively broader diversification steps defines a successful agricultural transformation (Timmer, 1988). In countries where farm sizes are small and likely to remain that way for decades because of population pressures and insecure property rights, diversification from production of staple grains to higher-valued commodities will be the first step in this process. The next step will be to move beyond basic commodity production in order to access value-added supply chains for the modern retail sector, especially supermarkets, where the value-added comes in the form of quality, timeliness, food safety, and labor standards in production. These are highly management-intensive factors and may well contribute to economies of scale in production that are not seen in commodity production alone (Timmer, 2004b; Reardon and Timmer, 2007).

The next step is the diversification of the rural economy itself, from being primarily driven by its agricultural base to depending more on industrial and service sectors as the base for rural economic growth. This step seem feasible only when population densities permit substantial clusters of activities that feed on themselves for inputs and demand for output (Hayami and Kawagoe, 1993; Lanjouw and Lanjouw, 2001; McCulloch, Weisbrod and Timmer, 2007). Thus the effectiveness of the model proposed by Mellor (1976, 2000) of demand for labor-intensive, rural non-tradables as the vehicle for pro-poor growth, driven by agricultural profitability and wages from labor-intensive exports, would seem to be conditional on good rural infrastructure and human capital, and hence seems to be limited to Asia, parts of coastal and highland Africa, and several countries in Latin America and the Caribbean. At the same time, good rural infrastructure *reduces* the relative importance of non-tradables in local economies and increases competitive pressures

from world markets. It is precisely this tension that raises doubts about the future potential for agriculture to be an important driver in poverty reduction, even in rural areas (DfID, 2004).

Where rural diversification is not economically feasible, the alternative to diversification out of agricultural commodity production will be the transition of economic activity from rural to urban areas. In this transition, the importance of migration (and remittances) will be critical (Larson and Mundlak, 1997). It is really quite astonishing how little attention is paid to facilitating the migration of rural workers to urban jobs when investments in the rural economy have low payoffs[3]. One of the main justifications for investing in rural schools and public health facilities is to improve the competitiveness of rural migrants to urban areas.

Whatever the stage or dimension of rural diversification, it must be driven by market demand. Since the 1970s, the development profession has identified "market demand" with border prices and international trade, on the assumption that domestic markets are saturated, politically manipulated, or not remunerative for producers of higher quality products. This focus on international trade has allowed a revolution in food marketing in developing countries to go virtually unnoticed until several years ago, the extensive consolidation of the food retail sector and the rapid rise of supermarkets. The revolution has already created a challenge to higher rural incomes because the process has a tendency to have such high standards for quality, safety, hygiene and farm labor practices that many of a country's own farmers are excluded from the supply chains that provision their consumers, even poor consumers (Reardon et al., 2003; Timmer, 2004b; Reardon and Timmer, 2007).

In the ultimate stage of rural diversification, globalization permits procurement officers to source food supplies from anywhere in the world, so local farmers compete not just against each other for local consumers, they compete against the global market. But farmers increasingly also have access to the global market if they are the low-cost producer meeting global standards. The future of agricultural development will depend on putting productive new technologies in the hands of farmers and creating an open market environment to make the resulting production as profitable to farmers as employment opportunities in other sectors. Where that development is not possible, *and there will be many environments where it is not*, rural poverty will only be solved by migration to alternative opportunities, usually in urban areas.

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[3] The penultimate draft of the World Bank's *Directions in Development: Agriculture and Poverty Reduction*, barely mentioned the topic (World Bank, 2004b). It is a much more prominent theme in the *World Development Report 2008: Agriculture for Development* (World Bank, 2007).

Where the strategy does work, diversifying the rural economy will be the key to increasing income opportunities. Placing rural diversification at the center of agricultural and rural development means there are two quite different tasks that need to be managed simultaneously: (a) raising the productivity of staple food crops for those farmers who continue to grow them; and (b) using the low costs of these staple foods as "fuel" for the agricultural diversification effort, including as the wage good for workers and as feed for livestock. In low-income Asia, diversification will depend on continued availability of low-cost rice, especially in rural markets. In Africa and Latin America, having cheap corn, wheat and rice available in rural markets will be important if diversification is to be successful. Low-cost staple foods are also important to the poor directly, because they devote such a large share of their budget to them, and indirectly, because low real wages, made possible by cheap food staples, make labor-intensive activities more profitable[4].

2.3 The role of agriculture in economic development

The role of agriculture in economic development is complicated and controversial, despite a long historical literature examining the topic (Johnston and Mellor, 1961; Hayami and Ruttan, 1985; Timmer, 2002). Part of the controversy stems from the structural transformation itself, which is a general equilibrium process not easily understood from within the agricultural sector (Timmer, 1988, 2008).

Over long historical periods, agriculture's role seems to evolve through four basic stages: the early "Mosher" stage when "getting agriculture moving" is the main policy objective (Mosher, 1966); the "Johnston-Mellor" stage when agriculture contributes to economic growth through a variety of linkages (Johnston and Mellor, 1961); the "T.W. Schultz" stage when rising agricultural incomes still fall behind those in a rapidly growing non-agricultural economy, inducing serious political tensions (Schultz, 1978); and the "D. Gale Johnson" stage where labor and financial markets fully integrate the agricultural economy into the rest of the economy (Johnson, 1997; Gardner, 2002) (see Figure 2).

These stages were first proposed in Timmer (1988) and are developed in the context of more recent experience in the World Bank's treatment of the role of agriculture in poverty reduction (World Bank, 2004b; 2007). Efforts to "skip" the early stages and jump directly to a modern industrial economy have generally been a disaster. Of particular interest here is whether agricultural trade policy also follows similar stages as countries move through the structural transformation.

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[4] Obviously, if demand for bio-fuels continues to escalate and keeps upward pressure on the prices of staple food crops, this diversification process will slow or even be reversed, to the extreme detriment of the rural landless and urban poor (Naylor, et al., 2007).

FIGURE 2
Changing environment for agricultures contribution to economic growth

Resource Flows From Agriculture

Mosher Environment

Johnston-Mellor Environment

Schultz-Ruttan Environment

D.G. Johnson Environment

"Jump Strategy"

Without high agricultural protection

Financial Flows:
• rural savings to urban investments
• transfer of incomes through price policy
  – commodity policy
  – exchange rate policy
  – industrial price/tariff policy

With high agricultural protection

Labor Flows

Time or Per Capita Income

Policy Settings:

"Getting Agriculture Moving"—institutional change; new technology; structure of markets and incentives; significant investments in rural infrastructure

"Agriculture as a Contributor to Growth"—establish market links with industry; technology and incentives to create a healthy agricultural sector; improve factor markets to mobilize rural resources

"Integrating Agriculture into the Macro Economy"—declining share of food in urban budgets; push to make agriculture efficient; shift resources out, but substantial income distribution problems from lagging rural labor productivity

"Agriculture in Industrial Economies"—small share of food commodities in consumer budgets; income distribution a political issue; unemployment in industrial sector creates pressures to keep labor in agriculture; environmental concerns and "way of life" issues

(Source: Timmer, 1988)

Another reason for controversy over the role of agriculture stems from the heterogeneity of agricultural endowments and the vastly different cropping systems seen in Latin America, Africa and Asia (not to mention the diversity within these regions). It is unrealistic to expect much of a common role in such diverse settings. When coupled with the enormous differences in stage of development around the world, and hence the vastly different roles that agriculture plays in economies at different levels of economic maturity, it is easy to understand why there is so little common ground in academia or the donor community on the role of agriculture in economic development. Bravo-Ortega and Lederman (2004) document clearly the different contributions of agriculture to national welfare across these various categories.

There does seem to be widespread agreement in the literature on the basic linkages connecting agriculture and overall economic growth that were first articulated to a general economics audience by Lewis (1954) and Johnston-Mellor (1961). At a conceptual level, these linkages have long been part of the core of modern development theory and practice (Timmer, 1988; 2002). Establishing the empirical value of these linkages in different settings has been a cottage industry since the early 1970s (Byerlee, 1973; Mellor and Lele, 1973; King and Byerlee, 1978; Hazell and Roell, 1983; Haggblade, Hammer and Hazell; 1991; Hazell and Haggblade; 1993; Timmer, 1997; Delgado, Hopkins and Kelly, 1998; Fan, Hazell and Thorat, 2000; Fan, Zhang and Zhang, 2002; Fan, Thorat and Rao, 2004).

Virtually all of these studies conclude that the "agriculture multiplier" is significantly greater than one, especially in relatively closed, "non-tradable" economies of the sort found in rural Africa, where the multiplier is often between 2 and 3. But even in the more open economies of Asia, where rice was more tradable than most African staple foods and local prices more easily reflected border prices, the agriculture multiplier is close to 2 in the early stages of agricultural modernization when productivity gains are the fastest. Because economic growth usually has a direct impact on poverty, any contribution agriculture makes to speeding overall economic growth through these large multipliers will, in most circumstances, also directly contribute to reducing poverty (Dollar and Kraay, 2002; World Bank, 2004a).

Despite the potential impact of these large multipliers, a combination of market failures and political biases led to a systematic undervaluation of output from rural economies. Correcting these biases can have economy-wide benefits. The historic bias against the rural sector in developing countries left them starved for resources and discriminated against by macro economic and trade policies (Lipton, 1977; Bautista and Valdes, 1993: Timmer, 1993). Failures in rural credit and labor markets – some of which can cause "poverty traps" – have provided the analytical context for much of modern neoclassical development economics (Dasgupta, 1993). But even global commodity markets for many products from developing countries

"fail" in the sense that agricultural surpluses from rich countries are dumped there, depressing world market prices below long-run costs of production.

A final set of linkages makes growth originating in the agricultural sector tend to be more "pro-poor" than it would be if the source of growth came from the industrial or service sectors (Mellor, 1976; Ravallion and Datt, 1996; Ravallion and Chen, 2004; Timmer, 1997, 2002). New agricultural technologies that improve farm productivity strengthen this connection. Separate reviews by Thirtle, et al. (2004) and by Majid (2004) confirm the strong empirical link between higher agricultural productivity and poverty reduction, as does recent research reported in the *World Development Report 2008: Agriculture for Development* (World Bank, 2007).

Direct contribution to economic growth via Lewis linkages.--The "Lewis Linkages" between agriculture and economic growth provide the non-agricultural sector with labor and capital freed up by higher productivity in the agricultural sector. These linkages work primarily through factor markets, but there is no suggestion that these markets work perfectly in the dualistic setting analyzed by Lewis (1954). Chenery and Syrquin (1975) argue that a major source of economic growth is the transfer of low-productivity labor from the rural to the urban sector. If labor markets worked perfectly, there would be few productivity gains from this structural transfer.

Indirect contributions to economic growth via Johnston-Mellor linkages.-- The "Johnston-Mellor Linkages" allow market-mediated, input-output interactions between the two sectors so that agriculture can contribute to economic development. These linkages are based on the agricultural sector supplying raw materials to industry, food for industrial workers, markets for industrial output, and the exports to earn foreign exchange needed to import capital goods (Johnston and Mellor, 1961). Again, for the Johnston-Mellor linkages as with the Lewis linkages, it is difficult to see any significance for policy or economic growth unless some of the markets that serve these linkages are operating imperfectly (or, as with many risk markets, are missing altogether). That is, resource allocations must be out of equilibrium and face constraints and bottlenecks not immediately reflected in market prices if increases in agricultural output are to stimulate the rest of the economy at a rate that causes the "contribution" from agriculture to be greater than the market value of the output, i.e. the agricultural income multiplier is greater than one (Timmer, 1995).

Roundabout contributions from agriculture to economic growth.--Writing in the mid-1960s, Mosher was able to assume that "getting agriculture moving" would have a high priority in national plans because of its "obvious" importance in feeding people and providing a spur to industrialization (Mosher, 1966). That assumption has held only in parts of East and Southeast Asia, and has been badly

off the mark in much of Africa and Latin America. In the latter regions, a historically prolonged and deep urban bias led to a distorted pattern of investment. Too much public and private capital was invested in urban areas and too little in rural areas. Too much capital was held as liquid and non-productive investments that rural households use to manage risk. Too little capital was invested in raising rural productivity.

Such distortions have resulted in strikingly different marginal productivities of capital in urban and rural areas. New growth strategies--such as those pursued in Indonesia after 1966, China after 1978, and Vietnam after 1989--altered investment priorities in favor of rural growth and benefited from this disequilibrium in rates of return, at least initially. For example, in Indonesia from the mid-1960s to the mid-1990s, farm GDP per capita increased by nearly half, whereas it had declined from 1900 to the mid-1960s. In China, the increase from 1978 to 1994 was nearly 70 percent, whereas this measure had dropped by 20 percent between 1935 and 1978 (Prasada Rao, Maddison and Lee, 2002). A switch in investment strategy and improved rates of return on capital increase factor productivity (and farm income) because efficiency in resource allocation is improved.

One explanation for more rapid and pro-poor economic growth as urban bias is reduced is provided by Mellor's model of agricultural growth, rural employment and poverty reduction that emphasizes the role of the rural non-tradables sector in pulling underemployed workers out of agriculture and into the non-agricultural rural economy. The Mellor model explicitly integrates manufactured export performance (the source of much dynamism in East Asia's economies since the 1960s) and the non-tradables sector in the rural economy (which includes a wide array of local agro-processing) to explain subsequent reductions in poverty. This model, drawing on Mellor's earlier work in India (Mellor, 1976) and more recently in Egypt (Mellor, 2000), explains why countries with substantial agricultural sectors that experienced rapid growth from labor-intensive manufactured exports had such good records of overall economic growth and poverty reduction.

An additional set of linkages focuses on more nebulous and hard-to-measure connections between growth in agricultural productivity and growth in the rest of the economy. These linkages grow explicitly out of market failures, and, if they are quantitatively important, government interventions are required for the growth process to proceed as rapidly as possible. The contribution of agricultural growth to productivity growth in the non-agricultural economy stems from several sources: greater efficiency in decision making as rural enterprises claim a larger share of output and higher productivity of industrial capital as urban bias is reduced; higher productivity of labor as nutritional standards are improved; and a link between agricultural profitability (as distinct from agricultural *productivity*) and household investments in rural human capital, which raises labor productivity as well as facilitates rural-urban migration.

Several of these mechanisms stand out as likely to be important (and potentially measurable) because they draw on the efficiency of decision making in rural households, the low opportunity cost of their labor resources, the opportunity for farm investment without financial intermediaries, and the potential to earn high rates of return on public investments that correct for urban bias. Each of these factors alone, as public investments and favorable policy stimulate growth in the agricultural sector, should cause an increase in the efficiency of resource allocation. In combination, these mechanisms should translate faster agricultural growth into measurably faster economic growth in aggregate, after controlling for the direct contribution of the agricultural sector to growth in GDP itself.

One of the most visible determinants of poverty is hunger and malnutrition. The development profession continues to argue over the causation—whether hunger causes poverty or vice versa--but hunger as a *measure* of poverty is widely established. Most poverty lines have an explicit or implicit food component. The evidence for nutritional poverty traps, where workers are too malnourished to work hard enough to feed themselves and their families, has strong historical roots (Fogel, 1991, 1994; Bliss and Stern, 1978; Strauss, 1986; Strauss and Thomas, 1998). But simple energy shortages cannot account for very much of the chronic poverty observed over the past several decades because the cost of raw calories, in the form of staple foods, has fallen too sharply relative to wages for unskilled labor (Johnson, 1997; Fox, 2002). If *inadequate food intake* is the primary cause of poverty, the solution would be in sight (and food aid could be an important part of the answer). If, however, *poverty* is the main cause of inadequate food intake, hunger will be much harder to end. In most countries, the domestic agricultural sector is likely to play a key role in ending hunger (and ready availability of food aid may well be part of the problem).

3. The Agricultural Terms of Trade: Patterns and Impact

What is the role of government in stimulating growth in agricultural productivity and reaping the benefits of all the positive linkages to overall economic growth and poverty reduction noted in the above brief survey on agricultural development? Clearly, there is a set of economic (and political) basics that provide the foundation for such growth—macroeconomic stability, public sector investments in public goods (especially rural infrastructure and facilities for household investments in human capital), and effective institutions that provide property rights and a societal capacity to innovate. The narrower question here is the nature of incentives needed to stimulate growth in agricultural productivity, and the role of price and trade policy in putting those incentives in place.

In the broadest, economy-wide perspective, incentives to raise agricultural productivity are reflected in the terms of trade between agriculture and the rest

of the economy. As noted, the agricultural terms of trade can be calculated easily as the ratio between the GDP deflator for agricultural value added in national income accounts and the GDP deflator for value added in the rest of the economy. This variable is an index, based on whatever year is used as the base for the GDP deflator in these accounts. As a practical matter, the *World Development Indicators* published by the World Bank use a common year for all countries, so the variable used in the following analysis is equal to 100 for all countries in the year 2000. Thus the AgToT variable only captures relative movements in time across countries, but not any initial differences in relative price incentives at a given point in time. Figure 3 shows the average value of the AgToT variable annually from 1965 to 2000 for the 85 countries included in this analysis. All countries have a value of 100 in 2000, but the inclusion of country fixed effects in the analysis is a partial substitute for not having country-specific levels for the AgToT.

Even with these provisos, the AgToT variable is very important in explaining agricultural performance across countries and over time. After controlling for country and year fixed-effects in regressions seeking to explain the structural transformation as a quadratic function of the logarithm of real GDP per capita in purchasing power parity terms, the domestic terms of trade between the agricultural sector and the rest of the economy is always a highly significant variable. Whether the dependent variable is the share of agriculture in GDP (AgGDPshr), the share of agriculture in total employment (AgEMPshr), or the gap between these two variables (AgGAPshr), the AgToT variable contributes substantially to explaining the variance in these share variables (see Timmer, 2008, for detailed discussion of these regressions).

In these regressions that capture the regularity of the structural transformation, the AgToT variable is controlling mostly for short-run price movements, and the signs for the coefficient reflect that—positive and highly significant for AgGDPshr. The negative and somewhat less significant coefficient for AgEMPshr is perhaps more interesting as there are no price terms in the dependent variable. Higher agricultural prices are associated with a *lower* share of agricultural employment in total employment, after controlling for real per capita GDP (a statistical and not necessarily causal relationship), which suggests a policy motive in using AgToT to cushion the labor adjustment process during the structural transformation. Investigating this possibility is the main empirical contribution of this chapter.

In addition, the terms of trade variable is important and interesting on its own. Table 1 shows that AgToT has a significant negative trend over time, after controlling for a slight tendency to increase with lnGDPpc (and Figure 3 shows a similar negative trend for the raw AgToT variable). The Year coefficients for AgToT, which reflect the "global" market forces at work on domestic economies, account for just 20 percent of the variance in the overall AgToT variable.

TABLE 1.
Regression Results for: AgToT = Constant + B(1)* lnGDPpc + B(2) *(lnGDPpc)sq + B(3) * dummy_year2 + … + B(37)*dummy_year36

Source	SS	df	MS		Number of obs	2723
					F(37, 2685)	19.76
Model	1972003.79	37	53297.3997		Prob > F	0
Residual	7240473.35	2685	2696.63812		R-squared	0.2141
					Adj R-squared	0.2032
Total	9212477.14	2722	3384.45156		Root MSE	51.929

AgToT_2000~100	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
lngdppccon~0	18.2222	6.404284	2.85	0.004	5.664369	30.78002
lngdppcsqu~0	-0.4587605	.4231844	-1.08	0.278	-1.288561	0.3710398
dummy_year2	0.9242428	10.65635	0.09	0.931	-19.97124	21.81973
dummy_year3	-3.084957	10.45251	-0.30	0.768	-23.58075	17.41083
dummy_year4	-7.250342	10.36004	-0.70	0.484	-27.5648	13.06411
dummy_year5	-9.230883	10.31581	-0.89	0.371	-29.45863	10.99686
dummy_year6	-8.023869	10.00998	-0.80	0.423	-27.65191	11.60417
dummy_year7	-2.363302	9.667979	-0.24	0.807	-21.32074	16.59413
dummy_year8	6.559846	9.668806	0.68	0.498	-12.39921	25.5189
dummy_year9	11.32463	9.669817	1.17	0.242	-7.636406	30.28567
dummy_year10	3.2391	9.645291	0.34	0.737	-15.67385	22.15205
dummy_year11	1.862731	9.621081	0.19	0.846	-17.00275	20.72821
dummy_year12	3.8987	9.621868	0.41	0.685	-14.96832	22.76572
dummy_year13	10.90713	9.599639	1.14	0.256	-7.9163	29.73057
dummy_year14	0.7277091	9.60015	0.08	0.94	-18.09673	19.55214
dummy_year15	-1.433556	9.600848	-0.15	0.881	-20.25936	17.39225
dummy_year16	-16.33049	9.624809	-1.70	0.09	-35.20327	2.542301
dummy_year17	-20.08843	9.601444	-2.09	0.037	-38.9154	-1.261454
dummy_year18	-22.93968	9.578247	-2.39	0.017	-41.72116	-4.158191
dummy_year19	-22.49143	9.578464	-2.35	0.019	-41.27335	-3.709524
dummy_year20	-24.06248	9.557112	-2.52	0.012	-42.80253	-5.322442
dummy_year21	-25.17786	9.557579	-2.63	0.008	-43.91882	-6.436907
dummy_year22	-25.70993	9.514202	-2.70	0.007	-44.36584	-7.054031
dummy_year23	-25.92303	9.514851	-2.72	0.006	-44.5802	-7.26585
dummy_year24	-27.4548	9.536939	-2.88	0.004	-46.15529	-8.754316
dummy_year25	-30.09681	9.537451	-3.16	0.002	-48.7983	-11.39532
dummy_year26	-35.52899	9.49771	-3.74	0	-54.15255	-16.90543
dummy_year27	-39.69737	9.519671	-4.17	0	-58.364	-21.03074
dummy_year28	-41.45511	9.520739	-4.35	0	-60.12383	-22.78639
dummy_year29	-42.31326	9.499576	-4.45	0	-60.94048	-23.68603
dummy_year30	-45.06872	9.501156	-4.74	0	-63.69904	-26.4384
dummy_year31	-45.1054	9.501546	-4.75	0	-63.73648	-26.47431
dummy_year32	-46.95137	9.481205	-4.95	0	-65.54257	-28.36017

TABLE 1. (CONT'D)
Regression Results for: AgToT = Constant + B(1)* lnGDPpc + B(2) *(lnGDPpc)sq +
B(3) * dummy_year2 + … + B(37)*dummy_year36

dummy_year33	-48.21638	9.482437	-5.08	0	-66.80999	-29.62276
dummy_year34	-50.09673	9.482728	-5.28	0	-68.69092	-31.50255
dummy_year35	-56.5411	9.483456	-5.96	0	-75.13672	-37.94549
dummy_year36	-60.05601	9.48485	-6.33	0	-78.65436	-41.45766
_cons	51.07281	24.72814	2.07	0.039	2.5847	99.56093

FIGURE 3.
The average AgToT from 1965 to 2000 for 85 countries:
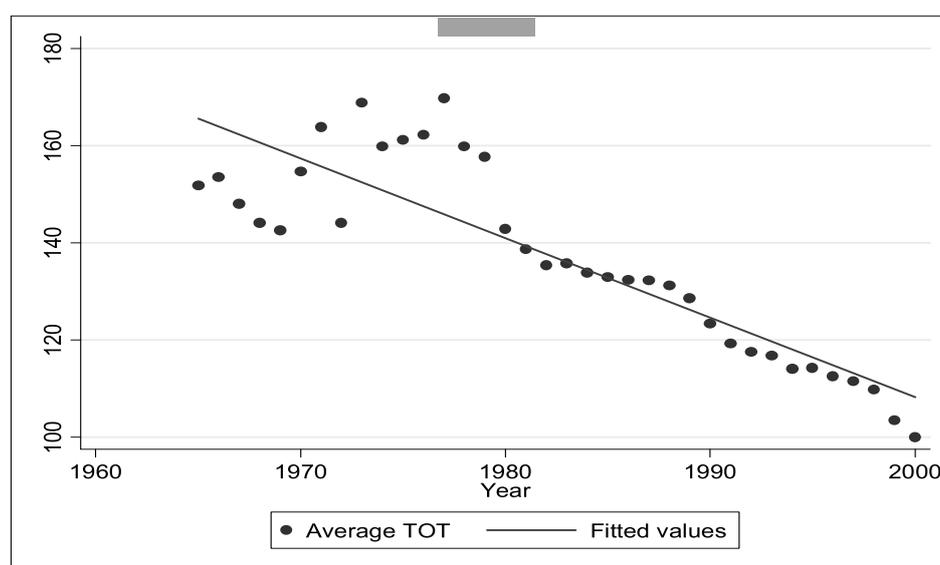
Note: All countries have a value of 100 in 2000.

But of this variance, 80 percent is accounted for by indices of world food prices, world non-food agricultural prices, and energy prices (see Table 2). So although world markets are an important determinant of the domestic terms of trade between agriculture and non-agriculture, most of the variance is due to specific domestic economic and policy factors. Understanding the extent to which domestic policy uses instruments to influence the terms of trade between the two sectors is key to understanding the political economy of the structural transformation.

Most empirical analysis of the structural transformation has focused on just two variables—agriculture's share in employment and in GDP (Kuznets, 1955). The

TABLE 2.

Regression results to explain the Year coefficients in the Terms of Trade (AgToT) regression on lnGPDpc and (lnGDPpc) squared:

Y (Year Coefficients) = a + b*(WorldFoodPriceIndex) + c*(Agri. RawMaterialsPriceIndex) + d*(RealPridesforCrudeOil) + e

					Number of obs	35
Source	SS	df	MS		F(3, 31)	44.42
Model	12104.1527	3	4034.71756		Prob > F	0
Residual	2815.79212	31	90.832004		R-squared	0.8113
					Adj R-squared	0.793
Total	14919.9448	34	438.821906		Root MSE	9.5306
year coefficients for AgToT	Coef.	Std. Err. t		P>t	[95% Conf.	Interval]
world food price index	0.5966682	.1015925 5.87		0	0.3894689	0.8038676
World agri raw material price index	-0.9034912	.0818054 -11.04		0	-1.070334	-0.7366478
real price for crude oil	-4.52973	1.168563 -3.88		0.001	-6.91303	-2.146429
_cons	-3.419399	6.64719 -0.51		0.611	-16.97643	10.13763

Source: Timmer (2008)

gap between the two has often been recognized, but it has received little of the systematic analysis that the two "basic" variables have received. The analysis in van der Meer and Yamada (1990) is an important exception. This chapter reverses that pattern, because much attention to agricultural price policy is motivated by concerns to narrow this gap, defined as the difference between the share of agriculture in GDP and its share in employment. The definition consciously causes this gap to be negative for virtually all observations, a visual advantage in Figure 1, which shows the gap approaching zero from below.

One advantage of using the difference in shares rather than their relative values is that the gap variable then translates easily into a "sectoral Gini coefficient" that indicates the inequality of incomes (labor productivity) between the two sectors[5]. The negative of the GAP variable is equal to the Gini coefficient for agricultural GDP per worker compared with non-agricultural GDP per worker. This "sectoral

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[5] See the Gini diagram in Annex 1 and the accompanying proof for details.

Gini coefficient" accounts for 20-30 percent of the variation in the overall Gini coefficient for this sample of countries, and so the rural-urban income gap is a significant part of a country's income inequality. Again, much interest in agricultural trade policy stems from a concern over worsening income inequality between urban and rural areas, and it should be possible to test whether there is a quantifiable link between changing sectoral income inequality and policy measures to influence the agricultural terms of trade.

A worrisome aspect of this rural-urban income gap is that it actually gets larger during the early stages of economic growth. This result alone is likely to explain much of the political difficulty faced during a rapid structural transformation. Countries consciously intervene in agricultural prices, using trade policy, as a way to cope with the stresses on income distribution created by the structural transformation.

Perhaps the most striking evidence that the turning point is becoming harder to reach is presented in Figure 4, which shows a nine-year moving average of the calculated turning points in the agGAPshr relationship for each sub-sample, starting with 1965-1973 and ending with 1992-2000. Although there are ups and downs that seem

FIGURE 4.
Nine-year moving average for turning point in AgGAPshr relationship, with comparisons with incomes in Kenya, Mexico, Thailand, and France
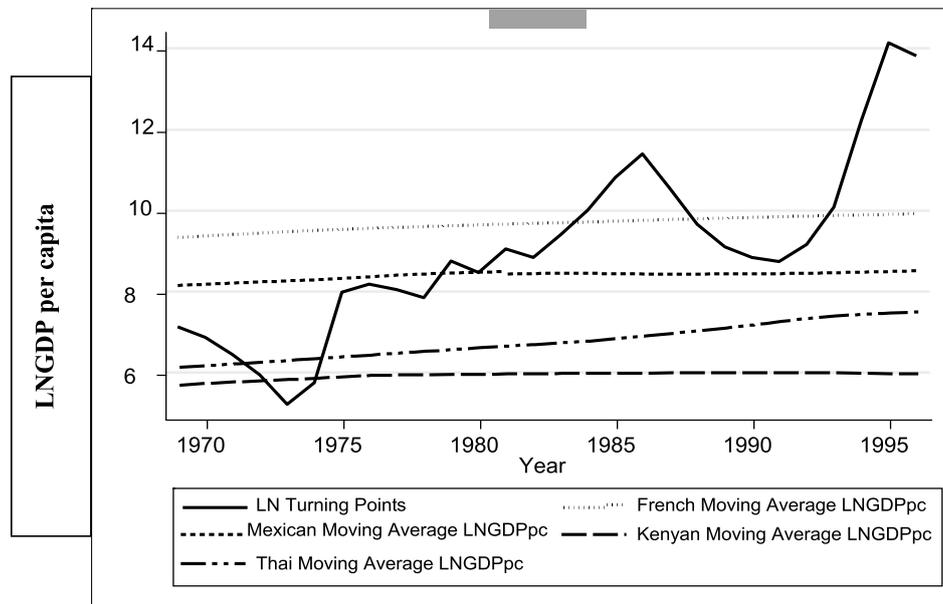
Source: Timmer (2008)

to be associated with broad trends in the global economy, the upward movement is striking. Indeed, by the latter years in the sample, even rich countries were no longer guaranteed to be on the converging side of the agGAPshr relationship.

A worsening sectoral income gap—a deteriorating Gini coefficient between urban and rural areas—spells political trouble. Policy makers feel compelled to address the problem, and the most visible way is to provide more income to agricultural producers. The long-run way to do this is to raise their labor productivity and encourage agricultural labor to migrate to urban jobs, but the short-run approach—inevitable in most political environments—is to use trade policy to affect domestic agricultural prices. Agricultural protection is a child of growing income inequality between the sectors during the structural transformation. And it is possible to see this child develop in the empirical record.

4. Agricultural Price Policy during the Structural Transformation: The Empirical Link via the Structural Gini

Two steps are required to test this link. First, in order to create a price variable that reflects intentions of policy makers, the AgToT series for each country needs to be "purged" of impact from prices in world markets, over which individual countries have little or no control. As was noted above, the Year coefficients in the overall AgToT regression explain just 20 percent of total variance in the AgToT variable, but this assumes all countries have the same relationship with world prices. Thus the first step is to relax that assumption and generate a new AgToT series that is net of those prices, a variable that is termed the "domestic policy agricultural terms of trade," or DomPolAgToT for short.

The second step is to explain the variance in this new domestic price policy variable. The hypothesis is that widening sectoral income inequality is a major driver of domestic policy formation, and this is tested by making DomPolAgToT a function of agGAPshr (equal to the negative of the sectoral Gini coefficient). An obvious concern is that domestic agricultural prices appear in some form on both sides of this regression, which should cause a positive bias in the estimated coefficient. But the hypothesis calls for a *negative* coefficient (because of how agGAPshr is defined). Fortunately, the full fixed effect model has a large and significantly negative coefficient, so this concern is alleviated.

4.1 Creating DomPolAgToT

Table 2 shows that the annual average terms of trade variable is significantly related to three key price series from world markets—a food price index, an index of agricultural non-food raw materials, and real crude oil prices—with a +,-,- pattern

to the signs. Varying economic structures and levels of development, however, would suggest that not all countries will follow this pattern. Since the interest here is in country-specific policy initiatives to cope with the pressures of changing income distribution during the structural transformation, it is necessary to let each country have its own response to this set of world prices.

The results are, predictably, complex and heterogeneous. Instead of just 20 percent of the variance in domestic AgToT being explained by common world prices (see Table 1), the *median* R-squared for the 84 countries run separately is about 0.59. The most common pattern of response to these three world prices remains +,-,- and 29 countries have three significant coefficients with this pattern[6].

There are 20 countries with just two significant coefficients and 19 countries with just one significant coefficient, with no visible pattern as to which variable is consistently more significant. Interestingly, there are 12 countries with no significant price coefficients at all[7].

The distribution of *t*-values for the three coefficients for the 84 countries in the analysis (Ireland is excluded to avoid an identity matrix) shows the tendency for a +,-,- pattern of coefficients, but also substantial diversity around this pattern:

Variable	Median t-value	Number of significant coefficients	
Food prices	2.0	42+	5-
Agric. Non-food prices	-4.1	13+	52-
Crude oil prices	-1.7	6+	38-

With these statistical results in hand, it is possible to generate a predicted value of each country's agricultural terms of trade for each year. From this new series a variable reflecting just the domestic policy influence on the terms of trade is created, as follows:

DomPolAgToT(ratio) = (predicted ToT / actual ToT) x 100

The series is roughly centered on 100 and does not have a distinguishable time trend, which was captured by the strong time trends in all three world price series.

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[6] An additional three countries (Burkina Faso, China and Pakistan) have three significant coefficients with a -,+,+ pattern, and Costa Rica has three significant coefficients with a +,-,+ pattern.

[7] These are Algeria, Cote d'Ivoire, Ethiopia, Guatemala, Iran, Malawi, Nicaragua, Nigeria, Senegal, Tunisia, Zambia, and Zimbabwe. The dominance of African countries in this set is striking.

One additional result from this process is worth noting. As expected, there is a reasonably close relationship between the explanatory power of each country's regression on the three world prices (R-squared) and the combined significance of the three coefficients. But the rank orders are not always the same, and for some countries the divergence is substantial.

For example, when "R-square rank minus Sum|t| rank" is calculated, seven countries have a positive difference of 15 rank points or higher[8]. At the other end of the spectrum, ten countries have a negative difference of 15 rank points or higher[9]. Do these extremes tell us anything about factors influencing the domestic agricultural terms of trade in these countries?

It is tempting to argue that countries with highly significant coefficients on world prices, but relatively low explanatory power in explaining the overall domestic terms of trade (i.e. the countries listed in footnote 9) have open commodity markets but a number of other policy instruments, including subsidies and *ad valorem* tariffs (that permit variations in world prices to be transmitted, although levels are different). This is speculative, of course, and the presence of South Korea and Japan on the list, with their tight controls over many agricultural imports, suggests other factors may be at work as well.

4.2 Explaining the formation of DomPolAgToT (ratio)

It has taken many steps, both logically and statistically, to reach this stage. But the results are worth the effort. In its simplest specification, the question is whether domestic policy makers are influenced by changing sectoral income distribution during the structural transformation, and whether this influence can be seen in the formation of the "domestic policy" agricultural terms of trade.

The most persuasive result is the simplest:

DomPolAgTot(ratio) = Year effect + Country effect + a x agGAPshr

As Annex Table 1 shows in detail, 21 of the year coefficients are significant, 45 of the country coefficients are significant, and the coefficient on agGAPshr is -51.512 with a t-statistic of 11.4. This is equivalent to an elasticity of about 0.25 at mean

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[8] In increasing order of disparity, the countries are Benin (18), Venezuela (20), Papua New Guinea (25), Sri Lanka (25), Rwanda (27), Indonesia (32) and Syria (50). Papua New Guinea has only one significant coefficient; the rest have two.

[9] These countries are Norway (-16), Turkey (-16), South Korea (-17), Paraguay (-18), Brazil (-20), Pakistan (-22), Philippines (-22), Japan (-27), Thailand (-27), and Dominican Republic (-31). All of these countries have three significant coefficients with +,-,- pattern, except for Norway, where the third coefficient is only marginally significant (and negative), and Pakistan, which has a significant -,+,+ pattern.

values of DomPolAgToT(ratio) and agGAPshr. This full fixed effects model shows a highly significant response of domestic policy makers to changes in the sectoral distribution of income, after controlling for year and country effects.

The adjusted R-squared is only 0.17, but substantial "noise" in this variable is to be expected given the way in which it was constructed, as a residual from the regression of year- and country-specific agricultural terms of trade on world prices for food, agricultural non-food raw materials, and oil.

The year and country coefficients exhibit significant patterns with respect to time (for the year coefficients) and with respect to real per capita incomes in 2000 (for the country coefficients). In both cases, the relationship is positive (see Figure 5 and Figure 6).

Thus DomPolAgToT(ratio) is increasing over time, independently of what is happening to the sectoral distribution of income. But Figure 5 has also shown that the turning point in the GAP relationship with respect to real per capita incomes is rising rapidly (thus sectoral income distribution is deteriorating), so domestic policy formation is stimulated by both factors.

In addition, Figure 6 shows that richer countries do more to protect their agricultural sectors, in the form of higher values of DomPolAgToT(ratio), than poorer countries,

FIGURE 5.
Time Dummy Coefficients plotted against time variable:
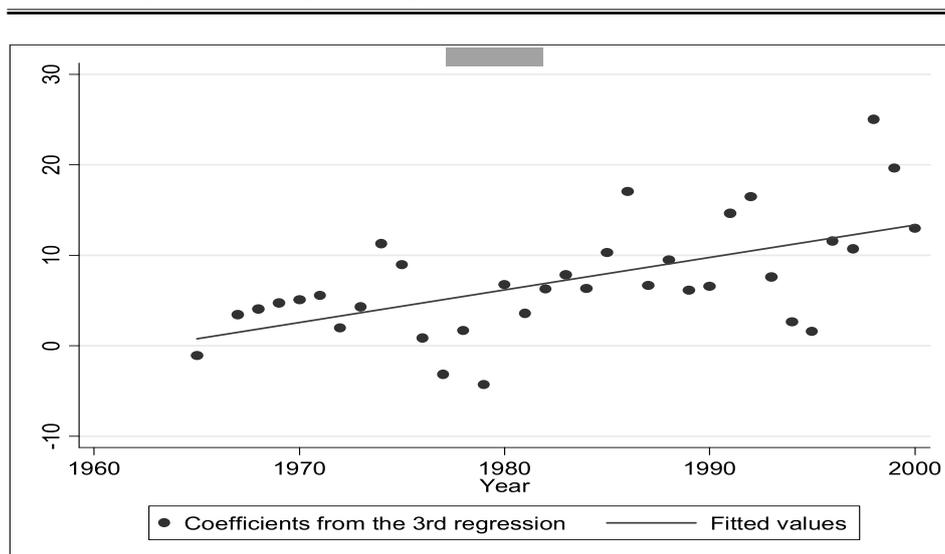
FIGURE 6.
Country Dummy Coefficients Plotted against LNGDPpc2000 variable:
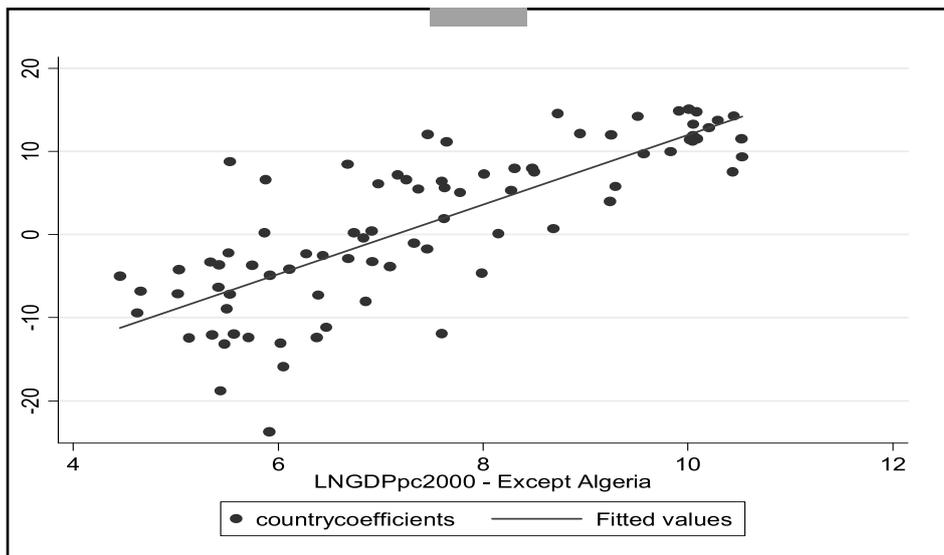
even after controlling for the time effect and the pressures from the sectoral Gini itself. The overall pattern has been well-known for some time (Lindert, 1991), but disaggregating it into these three sources of policy motivation is new.

From this more disaggregated perspective, agricultural protection can be seen to be a modest economic "necessity," as the income elasticity implied in Figure 7 is positive but less than one. For the countries in this sample, this income elasticity is about 0.035 (calculated from Figure 6). This is a small, but significant, income elasticity for this "pure" form of agricultural protection[10].

5. So What? The Relevance of Historical Experience

At one level it is easy to dismiss these results in terms of providing guidance to policy makers in developing countries or to donor agencies seeking to help these countries. After all, the results are based on historical data, some of which are more than four decades old. The statistical manipulations needed to generate the results were convoluted and required close attention to the logic of the model. The model itself is not particularly novel, based as it is on observations in the political economy literature that have been around for decades (Olsen, 1965; Anderson, 1986).

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[10] For an analysis of lag structures in this relationship see Timmer and Akkus, 2008, for details.

Still, the specific results reported here are new to the economics profession. They confirm statistically what most policy makers know intuitively, that political pressures arising from deteriorating income distribution between rural and urban areas during a successful structural transformation are nearly irresistible. The pervasiveness of agricultural protection, its increasingly early onset, and its multiple sources of causation, are all identified and quantified in the analysis here. The result is to provide new confidence to policy analysts and policy makers alike that they understand this powerful phenomenon.

There are broader implications as well, stemming from the background analysis of the structural transformation in historical perspective that provides the foundation for the work here (Timmer, 2008). Three main implications of this research are worth noting here. They focus on how agricultural trade policy changes during the structural transformation, at least from the perspective of the role of agriculture in poverty reduction for contemporary developing countries:

1. For poor countries, growth in agricultural productivity is the main driver of poverty reduction in the short to medium term (5-20 years). The type of investments needed to raise agricultural productivity varies by country and even agro-ecological zone within countries, but these investments are not small. The payoff to these investments in narrow financial terms may not be large even at current commodity prices (inflated by the boom in bio-fuels), and valuing such non-market payoffs as differential impact on poverty reduction, role as macro economic safety nets for the urban poor, and contributions to a sustainable carbon economy may be necessary to pass financial thresholds dictated by standard benefit-cost analysis (World Bank, 2007).

2. Connecting rural economies to dynamic urban economies is the long-run solution to rural poverty, and this involves a process of structural transformation that lasts for generations. But the convergence of rural labor productivity with urban labor productivity, the ultimate welfare manifestation of the structural transformation, has become increasingly difficult over the past three decades. Active government policies will be needed to connect small farmers and rural landless workers to the economic growth process, and these policies are likely to include interventions to affect commodity prices at the border. It is important to understand, however, that these policies will be highly country specific and will depend on domestic political processes that donors understand poorly (Timmer, 2002, 2008).

3. The international market environment for agricultural development is severely hampered by protection of domestic farmers in OECD countries and by the complexity of food standards for international trade. The dominance of large integrated supply chains in managing this trade is a challenge to the participation of small farmers. More importantly, the reach of these modern

supply chains into the food retail systems of developing countries threatens access by small farmers to their own domestic markets (Reardon and Timmer, 2007). There is an active debate underway as to whether appropriate remedial or preventive actions should be taken at the nation or international level, that is, whether agricultural trade policies will be effective instruments in linking small farmers into domestic supply chains (Maxwell, 2004).

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APPENDIX 1:
Calculating the sectoral Gini coefficient and relating it to the overall Gini coefficient for an economy
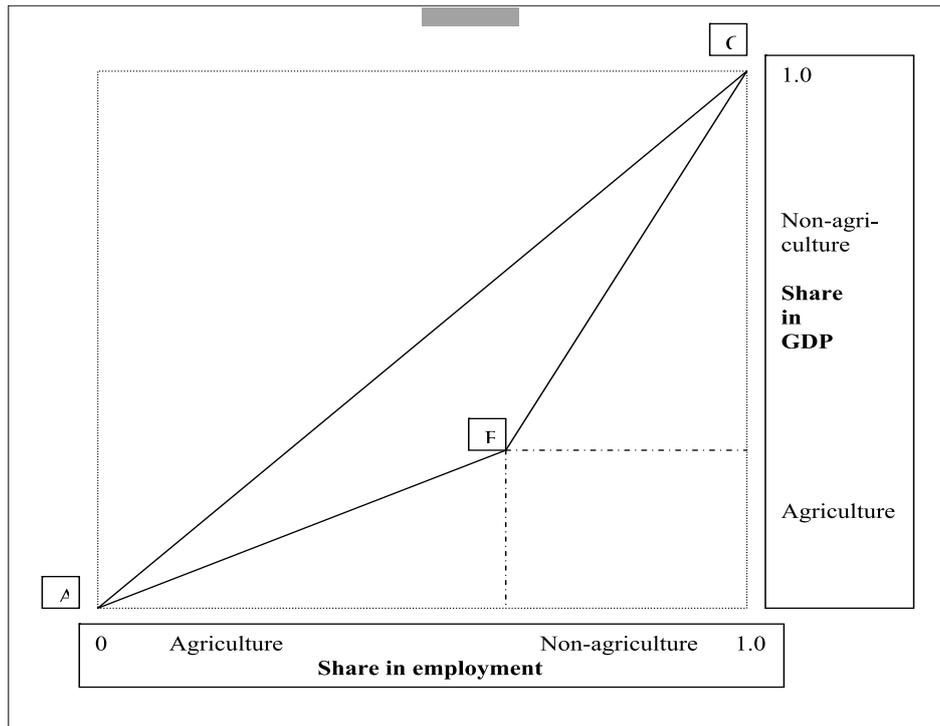
The "sectoral Gini" is equal to the area of Graph ABC/2. But this is also equal to minus the value of AgGAPshr. The proof is as follows:

Let agEMPshr = X (in the interval 0,1) and agGDPshr = Y (in the interval 0,1). Define

GAP = Y − X (in the interval -1,0 typically). The "sectoral Gini" is equal to ABC/0.5, so

2*ABC = (X − Y). Therefore, the "sectoral Gini" = - GAP
Proof: ABC = ½ - [X*Y/2 + (1 − X)*(1 − Y)/2 + Y*(1-X) = ½*(X − Y).

Appendix Table A1.
Regression results for DompolAgToT(ratio) as a function of GAP

The sectoral Gini coefficient is equal to the area of triangle ABC/2. But this is also

				Number of obs =	2711
Source	SS	df	MS	F(1, 2709) =	8.64
Model	2188.80065	1	2188.80065	Prob > F =	0.0033
Residual	686094.629	2709	253.264905	R-squared =	0.0028
				Adj R-squared =	0.0028
Total	688283.43	2710	253.979125	Root MSE =	15.914

dompolagto ~o	Coef.	Std. Err	t	P>{t}	{95% Conf. Interval}	
agrigdpsha ~e	-4.820339	1.639691	-2.94	0.003	-8.03551	-1.605167
_cons	100.8747	.5185416	194.54	0.000	99.85791	101.8915

equal to minus the value of AgGAPshr. The proof is as follows:

				Number of obs =	2711
Source	SS	df	MS	F(36, 2674) =	10.43
Model	84719.049	36	2353.30692	Prob > F =	0.0000
Residual	603564.381	2674	225.715924	R-squared =	0.1231
				Adj R-squared =	0.1113
Total	688283.43	2710	253.979125	Root MSE =	15.024

A. DompolAgToT(ratio) = a + b*GAP

Source	SS	df	MS	Number of obs =	2711
				F(119, 2591) =	4.56
Model	119294.474	119	1002.47457	Prob > F =	0.0000
Residual	568988.955	2591	219.602067	R-squared =	0.1733
				Adj R-squared =	0.1354
Total	688283.43	2710	253.979125	Root MSE =	14.819

B. DompolAgToT(ratio) = a + b*GAP + year dummies

dompolagto~o		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
agrigdpsha~e		-6.666433	1.578005	-4.22	0.000	-9.760667	-3.572199
dummy_year2		(dropped)					
dummy_year3		3.005202	3.007182	1.00	0.318	-2.891435	8.901839
dummy_year4		3.754088	2.980375	1.26	0.208	-2.089984	9.598161
dummy_year5		4.454335	2.967659	1.50	0.133	-1.364805	10.27347
dummy_year6		4.592258	2.878538	1.60	0.111	-1.052128	10.23664
dummy_year7		4.885896	2.777482	1.76	0.079	-.5603334	10.33213
dummy_year8		.9840875	2.777715	0.35	0.723	-4.4626	6.430775
dummy_year9		3.08483	2.777926	1.11	0.267	-2.36227	8.531931
dummy_year10		9.655159	2.77123	3.48	0.001	4.221188	15.08913
dummy_year11		7.730494	2.763995	2.80	0.005	2.31071	13.15028
dummy_year12		-.7033344	2.764335	-0.25	0.799	-6.123784	4.717116
dummy_year13		-5.099865	2.758152	-1.85	0.065	-10.50819	.3084618
dummy_year14		-.1465537	2.75805	-0.05	0.958	-5.55468	5.261573
dummy_year15		-6.285165	2.75826	-2.28	0.023	-11.6937	-.8766272
dummy_year16		4.97605	2.764696	1.80	0.072	-.445108	10.39721
dummy_year17		1.691267	2.764857	0.61	0.541	-3.730208	7.112742
dummy_year18		4.222053	2.758086	1.53	0.126	-1.186144	9.63025
dummy_year19		5.545631	2.758425	2.01	0.044	.1367699	10.95449
dummy_year20		3.863507	2.751752	1.40	0.160	-1.532271	9.259284
dummy_year21		7.596253	2.752116	2.76	0.006	2.199762	12.99274
dummy_year22		13.82221	2.73969	5.05	0.000	8.450082	19.19433
dummy_year23		3.361344	2.739756	1.23	0.220	-2.010911	8.733598
dummy_year24		5.975308	2.746686	2.18	0.030	.5894641	11.36115
dummy_year25		2.587224	2.746691	0.94	0.346	-2.79863	7.973077
dummy_year26		2.927578	2.73418	1.07	0.284	-2.433742	8.288899
dummy_year27		10.84036	2.740589	3.96	0.000	5.466473	16.21425
dummy_year28		12.65822	2.740592	4.62	0.000	7.284322	18.03211
dummy_year29		3.439157	2.728844	1.26	0.208	-1.911701	8.790016
dummy_year30		-1.489399	2.728782	-0.55	0.585	-6.840137	3.861338

dummy_year31	-2.750041	2.729204	-1.01	0.314	-8.101604	2.601523
dummy_year32	6.942341	2.723789	2.55	0.011	1.601396	12.28329
dummy_year33	6.013718	2.723951	2.21	0.027	.6724534	11.35498
dummy_year34	20.11512	2.72439	7.38	0.000	14.773	25.45725
dummy_year35	14.72168	2.72436	5.40	0.000	9.379614	20.06374
dummy_year36	8.12707	2.724252	2.98	0.003	2.785216	13.46892
dummy_year1	-1.191856	3.083006	-0.39	0.699	-7.237175	4.853462
_cons	95.63876	2.228322	42.92	0.000	91.26935	100.0082

C. DompolAgToT(ratio) = a + b*GAP + year dummies + country dummies

dompolagto~o	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
agrigdpsha~e	-51.51209	4.503103	-11.44	0.000	-60.34214	-42.68205
dummy_year2	(dropped)					
dummy_year3	3.414663	2.968159	1.15	0.250	-2.40554	9.234866
dummy_year4	4.045568	2.942415	1.37	0.169	-1.724155	9.815291
dummy_year5	4.733267	2.93019	1.62	0.106	-1.012483	10.47902
dummy_year6	5.066182	2.845261	1.78	0.075	-.5130331	10.6454
dummy_year7	5.528644	2.749615	2.01	0.044	.1369791	10.92031
dummy_year8	1.960102	2.750657	0.71	0.476	-3.433606	7.353809
dummy_year9	4.314549	2.751722	1.57	0.117	-1.081248	9.710346
dummy_year10	11.2829	2.747198	4.11	0.000	5.895973	16.66983
dummy_year11	8.967961	2.738764	3.27	0.001	3.597574	14.33835
dummy_year12	.857996	2.74056	0.31	0.754	-4.515913	6.231905
dummy_year13	-3.190175	2.736802	-1.17	0.244	-8.556716	2.176366
dummy_year14	1.686457	2.736233	0.62	0.538	-3.678967	7.051882
dummy_year15	-4.296891	2.737408	-1.57	0.117	-9.66462	1.070838
dummy_year16	6.730222	2.742459	2.45	0.014	1.352589	12.10785
dummy_year17	3.57122	2.743337	1.30	0.193	-1.808133	8.950574
dummy_year18	6.269018	2.737812	2.29	0.022	.9004968	11.63754
dummy_year19	7.837624	2.73979	2.86	0.004	2.465226	3.21002
dummy_year20	6.316209	2.73476	2.31	0.021	.9536731	11.67875
dummy_year21	10.29345	2.737069	3.76	0.000	4.926385	15.66051
dummy_year22	17.04888	2.729852	6.25	0.000	11.69597	22.4018
dummy_year23	6.627582	2.730321	2.43	0.015	1.27375	11.98141
dummy_year24	9.491264	2.740473	3.46	0.001	4.117525	14.865
dummy_year25	6.105955	2.740509	2.23	0.026	.7321458	11.47977
dummy_year26	6.564034	2.729577	2.40	0.016	1.21166	11.91641
dummy_year27	14.63281	2.737357	5.35	0.000	9.265184	20.00044
dummy_year28	16.45272	2.737385	6.01	0.000	11.08504	21.8204
dummy_year29	7.587522	2.73064	2.78	0.005	2.233065	12.94198
dummy_year30	2.628377	2.730193	0.96	0.336	-2.725204	7.981958

dummy_year31		1.572339	2.733246	0.58	0.565	-3.787228	6.931906
dummy_year32		11.58136	2.731584	4.24	0.000	6.225049	16.93767
dummy_year33		10.72547	2.732786	3.92	0.000	5.366803	16.08413
dummy_year34		25.01811	2.736037	9.14	0.000	19.65306	30.38315
dummy_year35		19.61171	2.735813	7.17	0.000	14.24711	24.97631
dummy_year36		12.97062	2.735013	4.74	0.000	7.607583	18.33365
dummy_year1		-1.11923	3.041418	-0.37	0.713	-7.083085	4.844625
dummy_cou~y2		12.15475	3.615535	3.36	0.001	5.065117	19.24438
dummy_cou~y3		14.8755	3.84879	3.86	0.000	7.328489	22.42252
dummy_cou~y4		11.56238	3.79967	3.04	0.002	4.111682	19.01308
dummy_cou~y5		.2297088	3.497206	0.07	0.948	-6.627893	7.08731
dummy_cou~y6		15.09636	3.829146	3.94	0.000	7.587865	22.60486
dummy_cou~y7		-3.707566	3.638871	-1.02	0.308	-10.84295	3.427822
dummy_cou~y8		-3.251131	3.641561	-0.89	0.372	-10.3918	3.889533
dummy_cou~y9		.1323536	3.493032	0.04	0.970	-6.717063	6.98177
dummy_cou~10		-18.79903	3.957912	-4.75	0.000	-26.56002	-11.03804
dummy_cou~11		-6.816893	3.670544	-1.86	0.063	-14.01439	.3806044
dummy_cou~12		-7.318193	3.559355	-2.06	0.040	-14.29766	-.3387254
dummy_cou~13		11.88085	3.843522	3.09	0.002	4.344168	19.41754
dummy_cou~14		-7.224933	3.551798	-2.03	0.042	-14.18958	-.2602835
dummy_cou~15		-12.41779	3.677858	-3.38	0.001	-19.62963	-5.205955
dummy_cou~16		7.5462	3.555496	2.12	0.034	.5742985	14.5181
dummy_cou~17		-8.059394	3.575113	-2.25	0.024	-15.06976	-1.049026
dummy_cou~18		6.382625	3.539762	1.80	0.071	-.5584244	13.32367
dummy_cou~19		-4.993095	3.707322	-1.35	0.178	-12.26271	2.276518
dummy_cou~20		7.984359	3.543263	2.25	0.024	1.036445	14.93227
dummy_cou~21		-2.535491	3.51099	-0.72	0.470	-9.420121	4.34914
dummy_cou~22		13.71276	3.696344	3.71	0.000	6.464673	20.96085
dummy_cou~23		5.0319	3.536714	1.42	0.155	-1.903172	11.96697
dummy_cou~24		7.176577	3.50249	2.05	0.041	.3086145	14.04454
dummy_cou~25		-1.005434	3.49345	-0.29	0.774	-7.85567	5.844801
dummy_cou~26		11.16341	3.539469	3.15	0.002	4.222933	18.10388
dummy_cou~27		-9.465302	5.836931	-1.62	0.105	-20.91082	1.980219
dummy_cou~28		11.30144	3.64086	3.10	0.002	4.162152	18.44073
dummy_cou~29		11.45447	3.821929	3.00	0.003	3.960127	18.94881
dummy_cou~30		11.8281	3.816808	3.10	0.002	4.343803	19.31241
dummy_cou~31		8.754385	3.555249	2.46	0.014	1.782969	15.7258
dummy_cou~32		3.980633	3.520385	1.13	0.258	-2.92242	10.88369
dummy_cou~33		-1.742156	3.49295	-0.50	0.618	-8.591411	5.107099
dummy_cou~34		-23.71746	4.888298	-4.85	0.000	-33.30283	-14.1321
dummy_cou~35		-.3799394	3.493116	-0.11	0.913	-7.22952	6.469642
dummy_cou~36		-4.181483	3.502916	-1.19	0.233	-11.05028	2.687315
dummy_cou~37		-2.88223	3.547713	-0.81	0.417	-9.83887	4.07441
dummy_cou~38		5.471028	3.885934	1.41	0.159	-2.148823	13.09088

dummy_cou~39	(dropped)					
dummy_cou~40	9.981171	3.755357	2.66	0.008	2.617366	17.34498
dummy_cou~41	9.354413	3.610407	2.59	0.010	2.274838	16.43399
dummy_cou~42	12.05609	3.88438	3.10	0.002	4.439283	19.67289
dummy_cou~43	-13.05394	3.658368	-3.57	0.000	-20.22756	-5.880323
dummy_cou~44	5.776802	3.538374	1.63	0.103	-1.161525	12.71513
dummy_cou~45	-13.14989	3.798768	-3.46	0.001	-20.59882	-5.700966
dummy_cou~46	-7.122691	3.677484	-1.94	0.053	-14.33379	.0884134
dummy_cou~47	5.310495	3.676397	1.44	0.149	-1.898478	12.51947
dummy_cou~48	-3.347739	3.592466	-0.93	0.351	-10.39213	3.696656
dummy_cou~49	.7166437	3.494582	0.21	0.838	-6.135812	7.5691
dummy_cou~50	-3.871572	3.505753	-1.10	0.270	-10.74593	3.00279
dummy_cou~51	-12.0456	4.485008	-2.69	0.007	-20.84016	-3.251038
dummy_cou~52	-6.350823	3.529887	-1.80	0.072	-13.27251	.5708625
dummy_cou~53	13.28545	3.849012	3.45	0.001	5.738001	20.8329
dummy_cou~54	14.18497	4.053196	3.50	0.000	6.237142	22.1328
dummy_cou~55	8.457705	3.521255	2.40	0.016	1.552946	15.36246
dummy_cou~56	-4.197906	3.55555	-1.18	0.238	-11.16991	2.7741
dummy_cou~57	6.593892	3.519358	1.87	0.061	-.3071467	13.49493
dummy_cou~58	11.54287	3.810923	3.03	0.002	4.070112	19.01564
dummy_cou~59	-2.348537	3.494178	-0.67	0.502	-9.200201	4.503127
dummy_cou~60	-11.16081	3.620554	-3.08	0.002	-18.26028	-4.061337
dummy_cou~61	6.607906	3.55196	1.86	0.063	-.3570604	13.57287
dummy_cou~62	5.649744	3.665533	1.54	0.123	-1.537927	12.83741
dummy_cou~63	.4219652	3.494428	0.12	0.904	-6.430188	7.274119
dummy_cou~64	12.00768	3.749548	3.20	0.001	4.655268	19.36009
dummy_cou~65	-3.644317	3.567877	-1.02	0.307	-10.6405	3.351863
dummy_cou~66	-15.90654	3.734983	-4.26	0.000	-23.2304	-8.58269
dummy_cou~67	(dropped)					
dummy_cou~68	7.303003	3.552938	2.06	0.040	.3361172	14.26989
dummy_cou~69	9.696753	3.764899	2.58	0.010	2.314238	17.07927
dummy_cou~70	.2482777	3.494491	0.07	0.943	-6.604	7.100555
dummy_cou~71	-4.905439	3.756117	-1.31	0.192	-12.27073	2.459856
dummy_cou~72	12.85824	3.83919	3.35	0.001	5.330046	20.38643
dummy_cou~73	7.552148	5.213414	1.45	0.148	-2.670731	17.77503
dummy_cou~74	6.071034	3.525884	1.72	0.085	-.8428026	12.98487
dummy_cou~75	-11.94543	5.169814	-2.31	0.021	-22.08282	-1.80805
dummy_cou~76	-11.93448	3.630555	-3.29	0.001	-19.05356	-4.815397
dummy_cou~77	-2.247485	3.502496	-0.64	0.521	-9.11546	4.62049
dummy_cou~78	1.928261	3.504362	0.55	0.582	-4.943373	8.799895
dummy_cou~79	-4.651333	3.59013	-1.30	0.195	-11.69115	2.388481
dummy_cou~80	-8.910929	4.241707	-2.10	0.036	-17.22841	-.5934501
dummy_cou~81	14.76253	3.857857	3.83	0.000	7.19774	22.32733
dummy_cou~82	14.24845	3.854064	3.70	0.000	6.691088	21.8058

dummy_cou~83	14.59525	3.671207	3.98	0.000	7.396458	21.79405
dummy_cou~84	7.966418	3.574598	2.23	0.026	.9570592	14.97578
dummy_cou~85	-12.39907	3.785145	-3.28	0.001	19.82129	-4.976859
dummy_cou~86	-12.40387	3.802859	-3.26	0.001	-19.86082	-4.946919
_cons	79.96483	3.581989	22.32	0.000	72.94097	86.98868

Trends in agricultural protection: How might agricultural protection evolve in the coming decades?

William A. Masters [1]

1. Introduction

This chapter uses data from the recently-completed World Bank project on distortions to agricultural incentives to analyze historical trends and assess prospects for changes in food and farm policy around the world. A series of nonparametric and OLS regressions document clear regularities in past policy choices, and suggest how future governments can learn from these patterns to act strategically and improve their own countries' prospects for more rapid, equitable and sustainable economic growth.

The data we use offer unprecedented detail and coverage of global agricultural policies, accounting for more than 90 percent of the world's population, agricultural output and GDP for over 40 years. The data were assembled from case studies covering 74 countries, measuring the tariff-equivalent magnitude of each country's various agricultural sector policies in each year since about 1960, for each of their major crop and livestock products—an average of 12 products per country. Most importantly, the data are freely available online (Anderson and Valenzuela 2008), and are accompanied by detailed narratives for each country published in a series of books and also available online (World Bank 2009).

To help explain policy choices, we consider a wide range of hypotheses about government decision-making from the political science and economics literature. These hypotheses were often formulated and originally applied to other sectors in specific countries. We bring them together here for head-to-head comparison and testing in the agricultural context, where we have a large global sample of comparable policy choices made in response to very diverse socioeconomic conditions. Our goal is to find regularities in how governments have responded to predictable trends, building on the empirical results presented in Masters and Garcia (2009), as well as Anderson and Masters (2008) and the other studies available in World Bank (2009).

The regularities that we find in agricultural policy can be explained as the result of powerful and longstanding influences, and create the opportunity for governments to act more strategically in the future. For example, our results confirm that today's low- and middle-income food importers, many of whom now have moderate levels of agricultural protection, will soon face increasingly strong domestic pressures for increased import restrictions and farm subsidies. Their governments do not yet face these pressures, however, and so might now be willing to enter trade agreements that lock in their current policies, in exchange for relatively small concessions from today's agricultural exporters. Strategic interests arise within countries as well, as political leaders who seek growth, equity and sustainability can use reforms to lock in more desirable policies.

In summary, this chapter aims to explain past choices in order to help governments reach a preferable set of policies, by anticipating changes in the political balance of power. The next section briefly describes the empirical regularities we see and what policymaking processes could have given rise to those regularities, citing the original political-economy literature where these explanations were first proposed and the current data with which we will test their applicability to the agricultural policymaking.

2. Trends in agricultural protection: patterns and theories

The central pattern we see in agricultural policy is a powerful *income effect:* on average, governments in richer countries tend to subsidize agriculture, at the expense of their own taxpayers and food consumers, while governments in poorer countries tend to tax their farmers, and thereby help their taxpayers and food consumers. This pattern is sometimes called the "development paradox", as agricultural policies in both settings tend to support a relatively wealthy minority at the expense of a poorer majority: the subsidized farmers in richer countries often have incomes that are already near and sometimes above average for those countries, whereas in poorer areas the taxed farmers are a majority whose incomes are typically below

local averages. The modern literature documenting this tendency begins with Bale and Lutz (1981), and includes notable contributions from Anderson and Hayami (1986), Lindert (1991), Krueger, Schiff and Valdes (1991) among others. To assess these income effects using our more extensive dataset we use real per-capita GDP in purchasing-power-parity terms, so as to compare policy choices across countries and over time along the full spectrum of income levels.

A second key regularity we observe is a *land abundance effect*, whereby governments in countries with more land per capita often impose a heavier tax burden on agriculture, or subsidize it less, than governments of countries in otherwise similar situations. This phenomenon is also paradoxical, as it drives countries against comparative advantage by taxing the use of their abundant resources and subsidizing use of scarce ones. The tendency for natural-resource rents to distort policymaking is particularly well studied in the case of countries with abundant oil and other mineral resources, as in Auty (2001); applications to agriculture include McMillan and Masters (2003) and Isham et al. (2005). For our purposes, the resource rent which may be available in agriculture is measured crudely here by arable land area per capita; ideally we would control for the quality of land as well.

A third fundamental regularity is *direction-of-trade effect*. Governments tend to international trade more heavily than domestic activity, which results in an "anti-trade" bias in favour of self-sufficiency. For agriculture, the impact is a subsidy for production of import-competing products, at the expense of food consumers, and at the same time a tax on production of exportable products, at the expense of farmers. These impacts may be incidental side-effects of governments' need to collect revenue where taxation is easiest to administer, or could be deliberately imposed for other reasons. Whatever the motivation, asymmetric direction-of-trade effects in policymaking deprive the country of gains from trade, and was among the very first concerns of economics in the 18th and 19th centuries when Adam Smith and David Ricardo first described how restrictions on imports and exports affect incentives for specialization. The World Bank dataset identifies whether a given product is imported, exported or not traded, with a sufficiently large number of products in each category to observe trends in anti-trade biases.

The regularities we observe could be caused by a wide variety of influences on government policy. The explanations we consider here follow from the political economy literature, in which policies result from forward-looking decisions that balance competing economic interests among those who would gain or lose from any given policy. In these political economy theories, each interest group is motivated by economics, but political processes limit their ability to "buy" or "sell" policies so observed outcomes may fall short of an unconstrained social optimum in systematic ways. In other words, observed policies often create more losses than gains, but the difficulty of political action can still prevent losers from

exerting enough political pressure to obtain reform, until a change in circumstances alters incentives for political action. The most well informed political leaders could take such changes into account and thereby make more strategic policy choices. Presumably, policymakers are already making forecasts and acting strategically, but our new data offer an unprecedented opportunity to improve our understanding of past choices, and thereby improve future outcomes.

The most striking pattern in agricultural policy is its link to per-capita income. The new data give us far more observations of policy choices than were previously available, over a wider range of income levels. To explore these data in detail, we use nonparametric regressions to identify nonlinearities and characterize uncertainty in how policy outcomes respond to economic growth. We then use OLS regressions, controlling for income, to ask how observed policies have been linked to other factors, notably whether a product is imported or exported, and the country's degree of land abundance. Having established these basic empirical regularities, we then test a variety of possible explanations for the observed patterns. What constraints on political influence might make particular interest groups, such as farmers in land-abundant countries, or export-crop growers or food consumers, face similar levels of protection or taxation around the world?

The most fundamental explanation we consider is *rational ignorance*, which predicts that individuals who lose (or would gain) only a small amount per person from policy change will have little reason or ability to invest in influencing policy. If only those with large sums at stake are likely to pursue influence over policy, then the policies we see are likely to be ones whose benefits are concentrated among a few while the costs are spread among many. For example, an import tariff may provide large gains to a few thousand politically active workers and owners in the protected sector, at the expense of everyone else in that country. Total costs can be much larger than total gains, but if the cost to each other person is low enough they may never know or care about those losses. The "rational ignorance" explanation for policy outcomes is associated with the work of Anthony Downs (1954), and remains a powerful explanation of many of the patterns we see, as policies tend to arise and evolve so as to have costs that are spread widely and benefits that are concentrated narrowly.

A closely related explanation for policy choices is the number of people in each group affected by policy. This may influence outcomes through *free-ridership*, if individuals in larger groups have more reason to stand by in the hope that others will act, as described by Mancur Olson (1965). An opposite *group-size* effect could arise if larger groups are more influential, perhaps because they can mobilize more votes, political contributions, or other political forces. As it happens, we find that larger groups tend to obtain more favorable policies, perhaps because all of these groups are very large and have similar levels of free-ridership. However, the magnitude of group-size effects is larger for urban people than for rural people,

suggesting that on average an additional urbanite has more political influence than an additional rural person.

Other explanations are also important, of course. For example, in our data we find a major role for governance institutions' control of *rent-seeking* by political leaders, a term often attributed to Anne Krueger (1974). This approach predicts that governments which are more insulated from the interests of all constituents are more likely to intervene in trade and thereby deliver policy rents to a narrow constituency, at the expense of other citizens in their own country. Our agricultural-policy data are consistent with that prediction: what we find is that countries with more checks and balances in their political systems, as measured by the World Bank's Database of Political Institutions (Beck et al. 2008), have policies that are closer to free trade.

Trade restrictions are not necessarily the result of rent-seeking. Most notably, governments may tax trade as the only way to fund productive public goods, when other tax instruments such as VAT or income and property taxes are administratively infeasible. In keeping with this *revenue motive,* we find that trade restrictions are greater in countries where domestic transactions are less monetized, and hence less easily subject to taxation. This test is implemented using the economy's money supply (M2) relative to GDP, from the World Bank (2007). Interestingly, our results suggest that revenue motives apply only to import taxes; policies on export crops are driven by other factors.

A subtle but powerful explanation for some policy choices involves *time consistency,* which could help explain why we find that long-lived tree crops tend to be taxed more heavily (or subsidized less) than annual crops. This approach, which is associated primarily with Kydland and Prescott (1977), argues that inefficient policies are likely to arise where production requires irreversible investments in fixed assets such as tree crops, but the government cannot commit to sustaining favorable policies over their full lifespan. Without credible commitments, potential investors will expect future governments to raise taxes, leaving present governments little reason not to do so right away. This idea is applied to help explain agricultural policy in Africa by McMillan and Masters (2003), who show that tree crops and other irreversible investments are more vulnerable to high taxation and simultaneously attract less public services. A same effect holds in these data, suggesting that commitment devices such as international treaties can help countries sustain favorable policies and greater private investment.

Another kind of explanation for the pattern of policy choices we see would be *status-quo bias*, in which political leaders resist change as such, even if the change would be desirable in retrospect. Status quo bias could lead policymakers to resist both random fluctuations and persistent trends, even when accepting these changes would generate more gains than losses. Several different mechanisms have been

proposed to explain why change would be resisted *ex ante*, despite the desirability of reform *ex post*. An informal version of this idea that is specific to policy-makers is described by Corden (1974) as a "conservative welfare function." A micro-foundation for this idea could be individual-level "loss aversion", as formalized by Kahneman and Tversky (1979): people systematically place greater value on losing what they have than on gaining something else. Status quo bias can also arise for other reasons: most notably, Fernandez and Rodrik (1991) show how Pareto-improving reforms may lack political support if those who will lose know who they are, whereas those who could gain do not yet know if they will actually benefit. If status-quo bias leads policymakers to resist change in world prices, observed policies would be more favourable to producers after world prices have fallen. Policies could also try to resist changes in crop profitability more generally, and therefore be more favourable after acreage planted in that crop has fallen. We test for both kinds of status quo bias, and find some support for status-quos bias in prices, as there is a negative correlation between policies and lagged changes in world prices. However, there is no remaining correlation between policies and lagged changes in crop area, suggesting that status quo bias is not as powerful an influence on policy choices as other forces.

Finally, we test a relatively new kind of explanation, in which *entry of new producers* into a sector limits that sector's ability to organize and exert political influence. This approach is due to Hillman (1982) and also Baldwin and Robert-Nicoud (2002), who used it to help explain why governments protect declining industries. In their work, declining industries invest more to seek policy-induced rents because their secular decline creates a barrier to entry in the future. Agriculture experiences this kind of secular decline in its labour force only after the "structural transformation turning point", when total population growth is slow enough and nonfarm employment is large enough for the absolute number of farmers to decline (Tomich, Kilby and Johnston 1995). Before then, the number of farmers is rising, and hence it is relatively difficult for farmers to organize themselves politically and seek favourable policies. Empirically, we find that the direction of change in the number of farmers does correlate with policy outcomes, being more favorable to farmers once their number stops rising.

Each of the political economy hypotheses that we test is the predicted result of some constraint on the political process. To the extent that these constraints remain in place over time, we can anticipate that governments will continue to respond to changing circumstances in the same way, allowing a political leader to act strategically by taking these responses into account. The implications of this are discussed at length in the final section of this chapter.

3. Data and methodology

Following Anderson et al. (2008), our principal measure of agricultural trade policy is a tariff-equivalent "Nominal Rate of Assistance" (NRA), defined as:

$$NRA \equiv \frac{P_d - P_f}{P_f} \tag{1}$$

In equation (1), P_d is the observed domestic price in local currency for a given product, country and year, and P_f is the estimated domestic price that would hold in the absence of commodity-market or exchange-rate intervention. By definition, such an NRA would be zero in a competitive free-trade regime, and is positive where producers are subsidized by taxpayers or consumers. The NRA is negative where producers are taxed by trade policy, for example through export restrictions or an overvalued exchange rate. In a few cases, we use the absolute value of NRA in order to measure distortions away from competitive markets, and where national-average NRAs are used they are value-weighted at the undistorted prices.

The NRA results we use are based on the efforts of country specialists to obtain the best possible data and apply appropriate assumptions about international opportunity costs and transaction costs in each market. There is inevitably much measurement error, but by covering a very large fraction of the world's countries and commodities, over a very long time period, we can detect patterns and trends that might otherwise remain hidden. To document these empirical regularities, and test whether they are consistent with the predictions of various political economy theories of policymaking, we use variations on equation (2):

$$Y = \alpha + \beta \cdot X + \gamma \cdot Z + \varepsilon \tag{2}$$

In these tests, Y are the policy measures of interest (variously NRA at the country level, NRA at product level, or absolute value of NRA), X is a set of regressors that describe empirical regularities which could be explained by many different policymaking mechanisms (income, direction of trade, resource abundance, continent dummies), and Z are regressors that are associated with a specific mechanism hypothesized to cause the policies we observe. Our tests aim to test the significance of introducing each variable in Z when controlling for X, and to ask whether introducing Z explains the main empirical regularities (that is, reduces the estimated value of β) or adds to them (that is, raises the equation's estimated R-squared without changing the estimated value of β), or perhaps adds no additional significance at all. The specific variables used for each regression are described below, and also listed in Appendix Table A1.

4. Empirical results

Our dataset covers an extraordinary diversity of commodities and countries, with huge variation in agricultural policies. In this section we explore the most robust empirical regularities in policy choices, to establish the background variation for which we will want to control when testing the predictions of specific theories. A given theory could help explain these patterns, or could fit the residual variation they leave unexplained. In either case, controlling for key characteristics of commodities and countries allows us to compare possible explanations in the simple, consistent framework.

For this study, the main empirical regularities in agricultural policy are those associated with each country's per-capita income and land abundance, and each commodity's direction of trade in that country. These are the X variables in equation (2). For per-capita income, we use real GDP in constant PPP terms from the Penn World Tables (2007), chain indexed over time in international dollars at year-2000 prices. For land abundance effects, we use FAOSTAT (2007) for the per-capita availability of arable land, defined as the area under temporary crops, temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow, per person in that country and year. For the direction of trade, we use our own database to classify each commodity as exported, imported or nontraded in each country and year.   In addition, a large number of other data sources provide the Y variables in equation (2), to test each political-economy explanation as described above.

4.1 The role of per-capita income in policymaking: a graphical view

Our analysis of policy choices begins with a graphical view of how taxation or protection varies with national income, focusing on the development paradox and anti-trade bias across countries and regions. One way to test for significant differences in NRAs across the income spectrum is to draw a smoothed nonparametric regression line through the data, with confidence intervals at each level of income. The general tendency of governments in poorer countries to tax their farmers while governments in richer countries tend to subsidize them is illustrated with smoothed lines in Figure 1, showing countries' aggregate NRAs relative to their level of real per-capita income in that year. These are weighted-average covered NRAs, summing across commodities by their value at undistorted prices, so as to represent the total burden of taxes or subsidies on farm production.

Interestingly, the relationship between taxation/protection and average per-capita income is strong but non-linear in the log of income, and is different for exportables and importables.   Governments in the poorest countries have imposed heavy taxes on all kinds of farmers. Tax rates move rapidly towards zero as incomes rise, then at income levels of about one to eight thousand dollars per year they stabilize with

FIGURE 1.
National-average NRAs and real income per capita
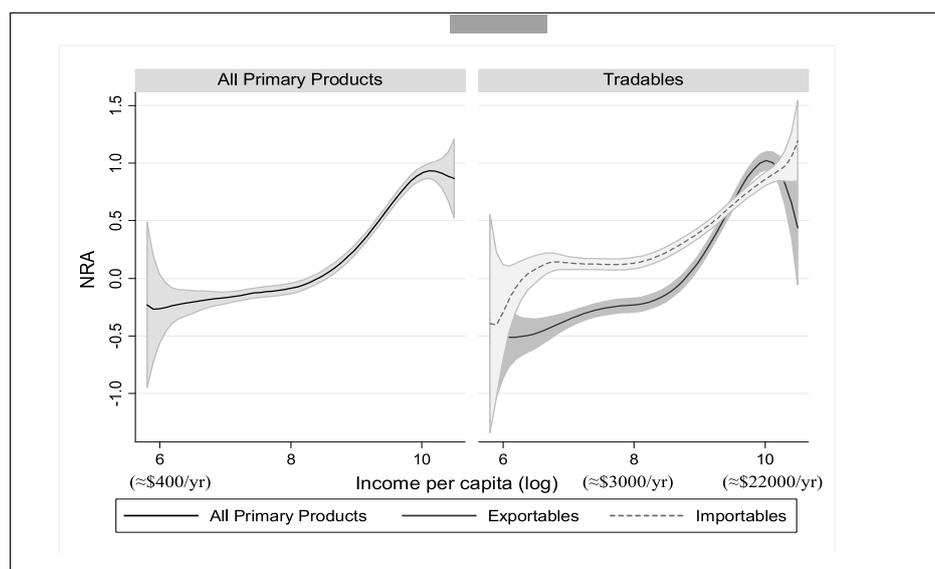
Note: Smoothed line and 95% confidence interval computed with Stata's lpolyci using bandwidth 1 and degree 4. Income per capita is expressed in I$ (2000 constant prices).

slight protection of importables and strong taxation of exportables, and as incomes rise above that all crops become heavily protected.

Before we turn to detailed hypothesis tests, we must ask whether the patterns we see in historical data still apply today. Have liberalizations and other reforms eliminated these relationships? Each country case study provides an analytical history of policymaking by successive governments, and it is clear from those studies that national trade policies are not determined in isolation: there are waves of policy change that occur more or less simultaneously across countries, driven by economic conditions and the spread of ideas. These policy trends are often geographically concentrated, perhaps due to common economic circumstances or intellectual conditions.

Figure 2 decomposes and summarizes the country NRAs into each region's average for all exportables, importables, and total tax/subsidy burden for all farm production. In each panel of Figure 2, the gap between the top and bottom lines measures the region's average degree of *anti-trade* bias: the top line is average NRA on importables, the bottom line is average NRA on exportables, and the gap between them is the degree to which production incentives are distorted towards serving the home market as opposed to international trade. The central line

FIGURE 2.
National-average NRA over time, by trade status and region
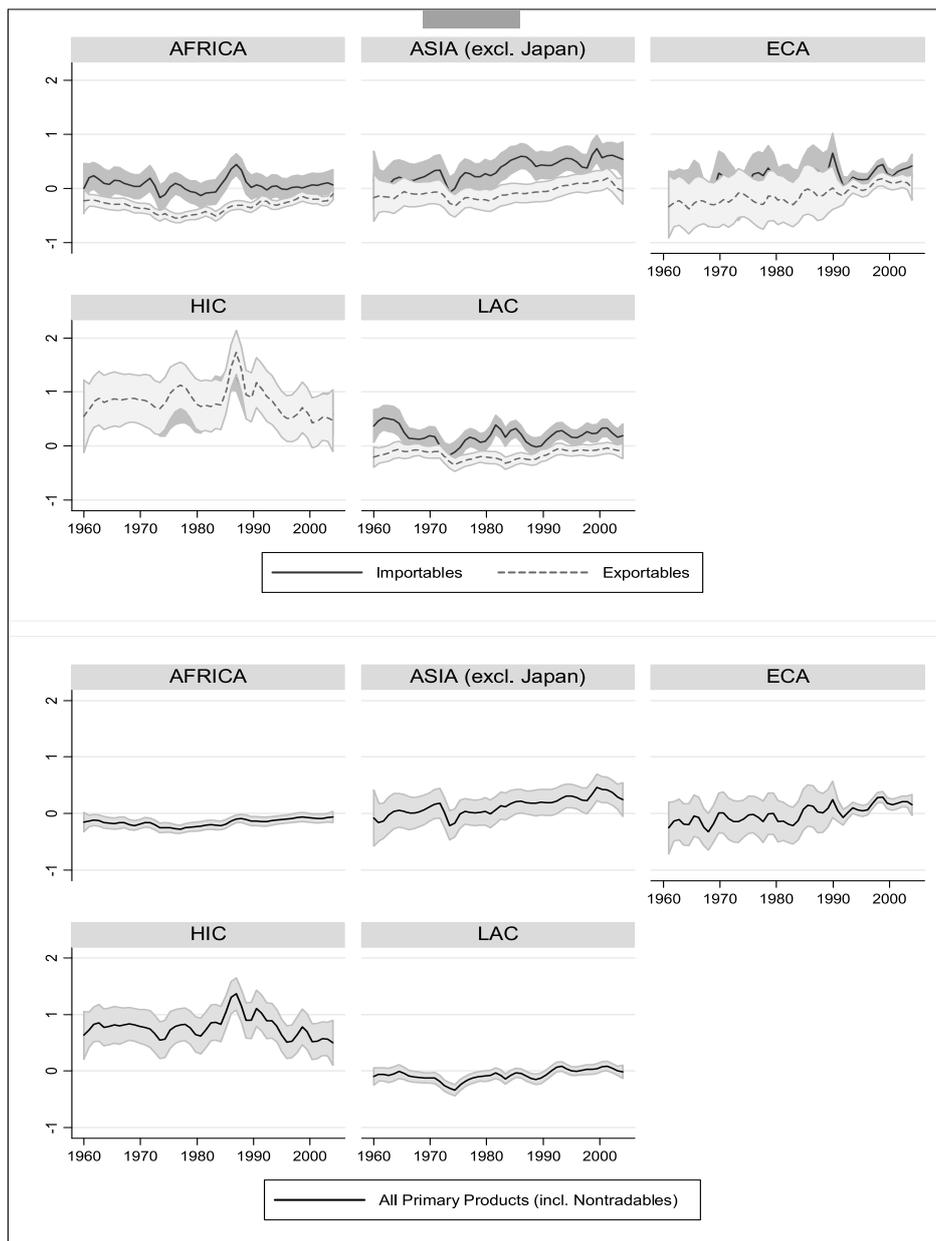
Notes: LAC – Latin America, ECA – Europe and Central Asia, HIC – High income countries. Smoothed line and 95% confidence interval computed with Stata's lpolyci using bandwidth 1 and degree 2.

measures the region's average degree of *anti-farm* bias, which includes any policy intervention on nontradable products.

The Africa data in Figure 2 reveal a decade-long trend from the early 1960s to the early 1970s towards greater anti-farm bias, due to less protection on importables and more taxation of exportables. After 1980 this was followed by twenty years of slow reduction in the taxation of exportables, and a rise then fall in protection on importables, so that anti-trade bias actually expanded in the early 1980s and was then reduced substantially after 1990.

The data for other regions in Figure 2 show a range of experiences, but all except ECA (Eastern Europe and Central Asia) show a trend towards reduced anti-trade bias in the 1990s. In Asia there were increasingly heavy taxes on farm exports through the 1970s, but reform came earlier and faster than in Africa so that export taxes were largely eliminated by the 1990s. Latin America during the 1970s shares some of Africa and Asia's growing anti-farm bias, and has had an even greater degree of reform towards freer trade (NRAs of zero) in the 1990s. The ECA region, on the other hand, experienced a rapid rise in its NRA levels towards the norms seen in High Income Countries, whose NRA levels fluctuate but show little trend from the 1960s to today.

Note that anti-trade bias could help account for the development paradox, to the extent that low-income countries tend to be net exporters of farm products while richer countries tend to be net importers of them. And both could be driven by changes in the relative administrative cost of taxation, insofar as a country's income growth and capital accumulation allows government to shift taxation from exports and imports (at the expense of farms and farmers) to other things (at the expense of firms and their employees). Thus we need to control for income when testing for anti-trade bias, and control for anti-trade bias when testing for the development paradox, while controlling for both of these when looking at resource effects.

4.2 Empirical regularities: income effects, land abundance and anti-trade bias

Table 1 describes three empirical regularities simultaneously, using a series of OLS regressions to show the correlations between NRAs and each kind of determinant. In each column we control for the link to income in logarithm form, with log income as the only regressor in columns 1 and 4. The additional regressors in other columns are often significant, but they raise the regression's R^2 relatively little. Income alone explains most of the variance that is explained in any of the regressions shown here, including the variance within countries presented in column 4. Columns 1-4 use over 2,000 observations of national average total NRA for all covered products as the dependent variable, while column 5 uses the much larger number of individual commodity-level NRAs.

TABLE **1.**
Empirical regularities in agricultural policy

Explanatory variables	Model				
	(1)	(2)	(3)	(4)	(5)
Income (log)	0.3420***	0.3750***	0.2643***	0.2614***	0.2739***
	(0.0121)	(0.0130)	(0.0230)	(0.0226)	(0.0579)
Land per capita		-0.4144***	-0.4362***		
		(0.0264)	(0.0256)		
Africa			0.0651		
			(0.0404)		
Asia			0.1404***		
			(0.0418)		
Latin America			-0.1635***		
			(0.0176)		
High income countries			0.4311***		
			(0.0340)		
Importable					0.1650*
					(0.0829)
Exportable					-0.2756***
					(0.0849)
Constant	-2.6759***	-2.8159***	-2.0352***	-1.9874***	-2.0042***
	(0.0941)	(0.0965)	(0.2024)	(0.1920)	(0.4174)
R2	0.28	0.363	0.418	0.827	0.152
No. of obs.	2520	2269	2269	2520	28118

Notes: Covered total NRA is the dependent variable for models 1-4, and NRA by commodity for model 5. Model 4 uses country fixed effects. Results are OLS estimates, with robust standard errors (models 1-4), country clustered standard errors (model 5) and significance levels shown at the 99% (***), 95% (**), and 90% (*) levels. The Europe and Central Asia region is the omitted continent variable.

One of the main patterns we observe is that governments across the income spectrum tend to tax all kinds of trade, thus introducing an anti-trade bias in favor of the home market. From column 5, controlling for income the average NRA on an importable product is 16.5 percent higher and on an exportable it is 27.6 percent lower than it otherwise might be. Most interestingly, LAC have NRAs that are a further 16 percent lower (column 3) than those of other regions. Relative to Africa, Latin America and the omitted region (Eastern Europe), Asia and the High Income Countries have unusually high NRAs when controlling for their income level.

4.3   Explaining policies: testing the mechanisms of policymaking

The policy choices presented above could be driven by many different influences. What kinds of political economy explanations best fit our new data? Some of these possible mechanisms operate at the country level, and are tested using aggregate national-average data in Table 2. Other mechanisms operate at the level of individual products, and are tested with product-level data in Table 3. Column 1 of Table 2 provides a baseline regression, simply repeating the results of column 3 in the previous table, for ease of comparison with each of the specific hypothesis tests.

   Rational ignorance effects are tested in column 2, where the dependent variable is the value-weighted average of all commodity NRAs for the country as a whole, and the independent variable used to test for rational ignorance is its total cost (benefit) per capita in that sector. This test is applicable only to observations with positive total NRAs, so that a larger NRA imposes a greater cost (benefit) per urban (rural) person. Results show a large and significant pattern: when costs (benefits) per capita are larger, the percentage NRA levels are correspondingly smaller (higher). Furthermore, the effect is larger for people living in urban areas, perhaps because city-dwellers are more easily mobilized than their rural counterparts, when controlling for other factors.

   Column 3 of Table 2 tests a related but different explanation: the absolute size of each group. This may influence outcomes through free-ridership, to the extent that individuals in larger groups have little incentive to be political active, but an opposite group-size effect could arise if larger groups are more influential. We find that larger groups do obtain more favourable policies, and interestingly the magnitude is larger for urban people than for rural people. On average, an additional urban person has more political influence than an additional rural person. Note also that relative to the unconditional regression in column 1, the estimated coefficient on national income is markedly lower when controlling for rational ignorance in column (2), and somewhat greater when controlling for group size in column (3). In that sense, rational ignorance helps to account for income effects, while group size is an additional influence; these regressions are not necessarily comparable, however, because of differences in the sample size.

   Column 4 of Table 2 concerns the rent-seeking behaviour of political leaders themselves. We test the ability of government institutions to limit rent-seeking by using the absolute value of NRA as our dependent variable, and a variable for "Checks and Balances" from the World Bank's Database of Political Institutions (Beck et al. 2008) as our measure of politicians' power. Results are significant, suggesting that after controlling for income, governments that impose more checks and balances on their officials do have less distortionary policies.

TABLE 2.
Testing political economy hypotheses at the country level

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total NRA for:	All Prods.	All Prods.	All Prods.	|All Prods.|	Exportables	Importables	All Prods.
Explanatory variables							
Income (log)	0.2643***	0.1234***	0.3175***	0.1913***	0.2216***	0.1142***	0.2461***
	(0.0230)	(0.0440)	(0.0242)	(0.0291)	(0.0184)	(0.0299)	(0.0248)
Land per capita	-0.4362***	-0.2850***	-0.4366***	-0.4263***	-0.7148***	-0.6360***	-0.4291***
	(0.0256)	(0.0467)	(0.0245)	(0.0277)	(0.0818)	(0.0338)	(0.0266)
Africa	0.0651	0.1544***	0.0964**	0.2612***	-0.1071***	-0.0628	0.0844**
	(0.0404)	(0.0489)	(0.0419)	(0.0522)	(0.0363)	(0.0575)	(0.0423)
Asia	0.1404***	0.2087***	0.1355***	0.1007**	-0.1791***	0.0217	0.1684***
	(0.0418)	(0.0515)	(0.0457)	(0.0504)	(0.0361)	(0.0564)	(0.0472)
LAC	-0.1635***	-0.0277	-0.1189***	-0.0947***	-0.2309***	-0.1780***	-0.1460***
	(0.0176)	(0.0242)	(0.0203)	(0.0189)	(0.0245)	(0.0311)	(0.0212)
HIC	0.4311***	0.2789***	0.4203***	0.3761***	1.0694***	0.8807***	0.4346***
	(0.0340)	(0.0456)	(0.0343)	(0.0390)	(0.1332)	(0.0604)	(0.0338)
Policy transfer cost		-0.0773*					
per rural person		(0.0422)					
Policy transfer cost		-1.2328***					
per urban person		(0.2830)					
Rural population			1.4668***				
			(0.1528)				
Urban population			-3.8016***				
			(0.3717)				
Checks and				-0.0173***			
balances				(0.0063)			
Monetary depth					-0.0310***	-0.0401***	
(M2/GDP)					(0.0041)	(0.0073)	
Entry of new							-0.0737*
farmers							(0.0407)
Constant	-2.0352***	-0.9046**	-2.4506***	-1.2465***	-1.5957***	-0.4652*	-1.8575***
	(0.2024)	(0.3576)	(0.2102)	(0.2568)	(0.1629)	(0.2696)	(0.2210)
R2	0.4180	0.45	0.437	0.294	0.373	0.397	0.419
No. of obs.	2269	1326	2269	1631	1629	1644	2269

Notes: Dependent variables are the total NRA for all covered products in columns 1, 2, 3 and 7; the absolute value of that NRA in column 4, and the total NRA for exportables and importables in columns 5 and 6, respectively. For column 2, the sample is restricted to countries and years with a positive total NRA. Monetary depth is expressed in ten-thousandths of one percent. Results are OLS estimates, with robust standard errors and significance levels shown at the 99% (***), 95% (**), and 90% (*) levels.

TABLE 3.
Testing political economy hypotheses at the product level

Explanatory variables	Model					
	(1)	(2)	(3)	(4)	(5)	(6)
Income (log)	0.2605**	0.2989***	0.2363**	0.2159**	0.3160**	0.2804**
	(0.1089)	(0.0576)	(0.1039)	(0.0965)	(0.1230)	(0.1295)
Importable	0.0549	0.0048	-0.0061	0.1039	0.1106	0.0331
	(0.0753)	(0.0937)	(0.0901)	(0.0972)	(0.0882)	(0.1018)
Exportable	-0.2921***	-0.3028***	-0.2918***	-0.2868***	-0.3614***	-0.3414***
	(0.0697)	(0.0868)	(0.0749)	(0.0805)	(0.0728)	(0.0756)
Land per capita	-0.3066***	-0.3352***	-0.3478***	-0.3140***	-0.4738***	-0.1746**
	(0.0884)	(0.1080)	(0.1035)	(0.0950)	(0.1532)	(0.0760)
Africa	0.0553		0.1171	0.0901	0.0554	0.1236
	(0.1898)		(0.1956)	(0.1874)	(0.2207)	(0.2127)
Asia	0.2828		0.2998	0.2903	0.1833	0.2311
	(0.2250)		(0.2110)	(0.2140)	(0.2311)	(0.2355)
LAC	-0.0652		-0.0309	-0.0515	-0.1426	-0.0863
	(0.0880)		(0.0998)	(0.1053)	(0.1066)	(0.1151)
HIC	0.2605*		0.3388**	0.3136**	0.4837*	-0.0298
	(0.1395)		(0.1430)	(0.1393)	(0.2770)	(0.1762)
Perennials		-0.1315**	-0.1492***			
		(0.0540)	(0.0549)			
Animal Products		0.2589***	0.2580***			
		(0.0889)	(0.0892)			
Others		-0.1764**	-0.1956**			
		(0.0820)	(0.0795)			
Sugar				-1.0903**		
				(0.5398)		
Rice				-1.1926		
				(1.2711)		
Milk				-4.1447***		
				(1.0724)		
Wheat				-0.6149		
				(0.4403)		
Other Cereals				0.6198		
				(0.4822)		
Sugar*Income				0.1790***		
				(0.0620)		
Rice*Income				0.1502		
				(0.1663)		

TABLE 3. (CONT.d)
Testing political economy hypotheses at the product level

Milk*Income				0.5476***		
				(0.1214)		
Wheat*Income				0.068		
				(0.0471)		
Other*Income				-0.0678		
				(0.0526)		
Lagged Change in					-0.0025***	
Border Prices					(0.0006)	
Lagged Change in						0.0083
Crop Area						(0.0358)
Constant	-1.8516*	-2.0109***	-1.6685*	-1.5914*	-2.1625**	-2.0549*
	(0.9409)	(0.3957)	(0.8978)	(0.8445)	(1.0507)	(1.1023)
R2	0.1950	0.2100	0.2240	0.2800	0.3020	0.1940
No. of obs.	25599	20063	20063	20063	15982	9932

Notes: The dependent variable is the commodity level NRA. Observations with a lagged change in border prices lower than -1000% were dropped from the sample. Results are OLS estimates, with clustered standard errors and significance levels shown at the 99% (***), 95% (**), and 90% (*) levels.

Columns 5 and 6 of Table 2 tests another kind of explanation, in which observed policies may be by-product distortions caused by policies chosen for other reasons, such as a revenue motive or tax-base effects. Governments with a small nonfarm tax base may have a stronger motive to tax agricultural imports and exports, or conversely governments with a larger tax base may be less constrained by fiscal concerns and hence freer to pursue other political goals. Here the variable we use to capture the extent of taxable activity is the country's monetary depth, as measured by the ratio of M2 to GDP. Since greater taxation of trade is associated with negative NRAs for exportables but positive NRAs for importables, this test is divided into two subsamples. What we find is that governments in more monetized economies have lower levels of NRA in both samples: they tax exportables more, and tax importables less. On average in our sample, import taxes are associated with revenue motives (so they are smaller when other revenues are available), but export taxes are not.

Column 7 of Table 2 tests the entry-of-new-farmers effect, using an indicator variable set to one if there is demographic entry of new farmers, defined as a year-to-year increase in the "economically active population in agriculture" reported by the FAO. The variable is set to zero when the number of farmers remains unchanged or declines. With our usual controls, we find that observed policies remain less favorable to farmers as long as the farm population is rising. This result is quite different from the predictions of other theories, and offers a potentially powerful explanation for the timing of policy change and the difficulty of reform.

The explanations tested above all refer to country-level policymaking processes, and use data at the national level. These are value-weighted average levels of agricultural taxes or subsidies over all products. In Table 3, we test two additional kinds of explanations, time consistency and status-quo bias, that apply at the product level. Column 1 of Table 3 provides a benchmark regression, similar to column 1 of the previous table but estimated with 25,599 observations of policies for individual products in each country and year.

Columns 2 and 3 of Table 3 test for a time-consistency effect in policy, whereby perennials are taxed more than annuals. It turns out, however, that other differences across crops are also important. Column 4 of Table 4 shows that sugar and dairy are taxed more than other commodities at low incomes, and then as income grows, policies switch towards subsidization of these previously taxed commodities.

Column 5 and 6 of Table 4 test for status-quo bias, by regressing policy choices on the previous year's change in a product's world price or its domestic profitability, as measured by area planted. With our usual controls, we find support for status-quos bias in prices, as there is a negative correlation between policies and lagged changes in world prices. However, there is no remaining correlation between policies and lagged changes in crop area.

The OLS regressions presented in Tables 2 and 3 tested seven hypothesized explanations for policy choices, controlling for income, land abundance, and for individual products in Table 3 whether they are imported or exported. One important question is whether these explanations are explaining away the effects of income, land abundance and the direction of trade, or adding to those effects. As it happens, the specific mechanism mainly add to the explanatory power of our regressions: introducing them raises the equations' R-squared but does not reduce the magnitude or significance of the patterns we see with respect to national income, land abundance, or the direction of trade.

Considering each additional policymaking mechanism helps explain more of the variance in policies we observe, but three of the hypothesized determinants of policy choice partially replace income as an explanatory factor: these are the effect of peoples' rational ignorance from having larger transfers per person, the effect of a government's revenue motive from having greater monetary depth, and the effect on rent seeking behavior of having more checks and balances in government. Variables specific to these effects capture a share of the variance in NRAs that would otherwise be associated with per-capita income, suggesting that they are among the mechanisms that might cause the development paradox, while other results are additional influences on governments' policy choices.

5. Changes in global political economy: lessons from the 1995-2004 period

We can gain some insight into how policymaking might change over time by separating out the past decade of our data (1995-2004) from the previous years (1960-1994). This recent period includes a number of differences from the earlier era, notably the accumulation of bilateral, regional and multilateral trade agreements including the Uruguay Round, plus the completion of structural adjustment programs in Africa and elsewhere.

As shown in Figure 3 below, the most recent decade of our data has NRA levels significantly closer to free trade at most levels of national income, with smaller taxes on exportables in poor countries and lower protection for both exportables and importables in high-income countries.

Figure 4 below provides a breakdown of these results for only the African and Asian countries. Within Africa (the top panel), the effect is significant only in reducing the export taxes imposed by poorer countries. In Asia (the bottom panel), the significant difference arises through lower protection among the higher-income countries.

FIGURE 3.
National average NRAs by income level, before and after 1995
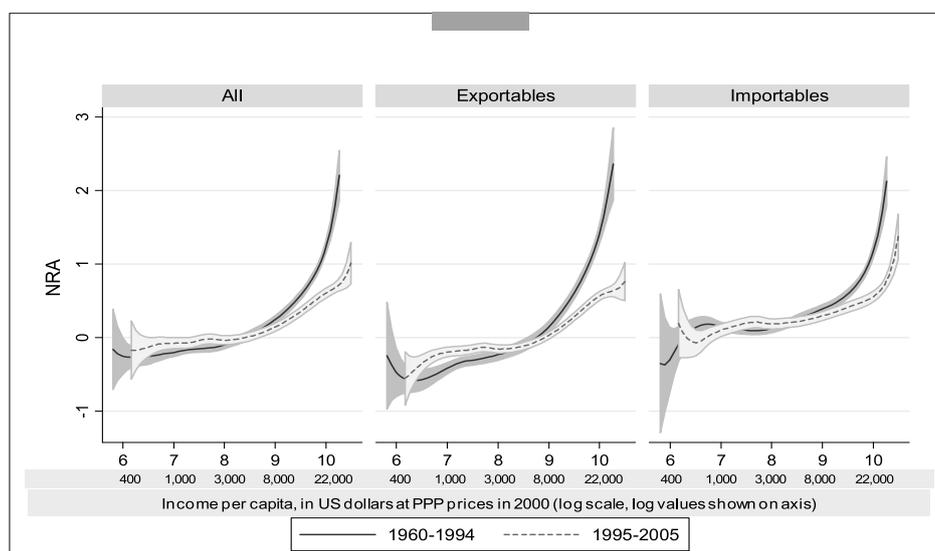
Note: Smoothed line and 95% confidence interval computed with Stata's lpolyci using bandwidth 1 and degree 4. Income per capita is expressed in I$ (2000 constant prices).

Comparable results are shown in Figure 5 for Latin American and the Caribbean (LAC), and for the high-income countries (HIC). In LAC, there is a small and typically not statistically significant difference between the periods, suggesting relatively little reform other than that which would be predicted by movements associated with changing per-capita income. For the high-income countries, there is a significant reduction in protection levels at every income level. In the post-1995 period there appears to be less of a positive correlation between income and protection for exportables, but that correlation appears unchanged for importables.

6.   Lessons for the future: Strategic policymaking

For political leaders whose goals include economic growth, poverty alleviation and sustainable development, existing agricultural policies are often a source of frustration and disappointment. These policies generate large benefits for some people, but the total burden imposed on others is far larger than the total gains. In 2004, the most recent year for which we have data, the policies analyzed in this study are estimated to have imposed a net burden on the world's people of about $168 billion per year (Valenzuela, van der Mensbrugghe and Anderson 2009).

FIGURE **4.**
National average NRAs by income in Asia and Africa, before and after 1995
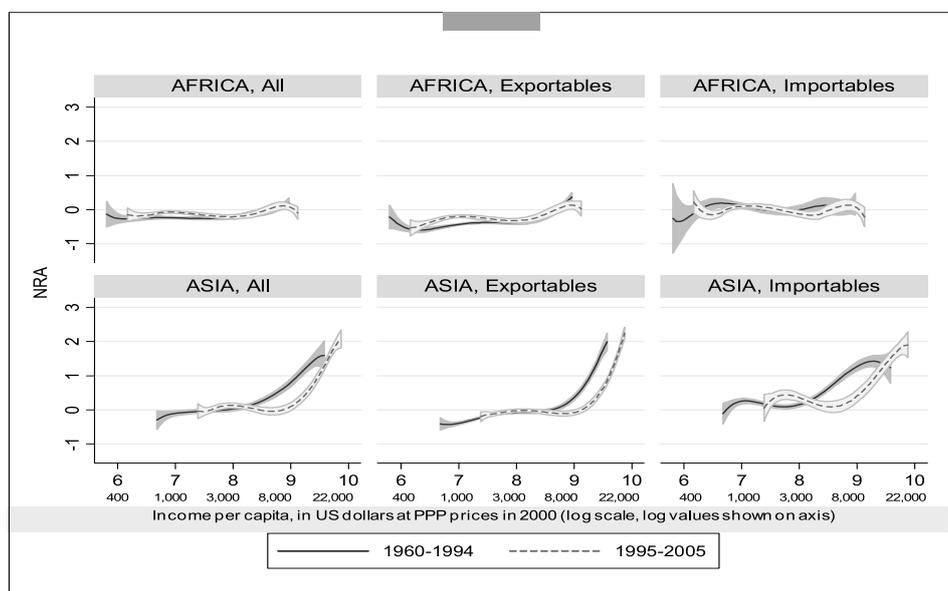
Note: Smoothed line and 95% confidence interval computed with Stata's lpolyci using bandwidth 1 and degree 4. Income per capita is expressed in I$ (2000 constant prices).

FIGURE 5.

National average NRAs by income in the LAC region and in High Income Countries, before and after 1995
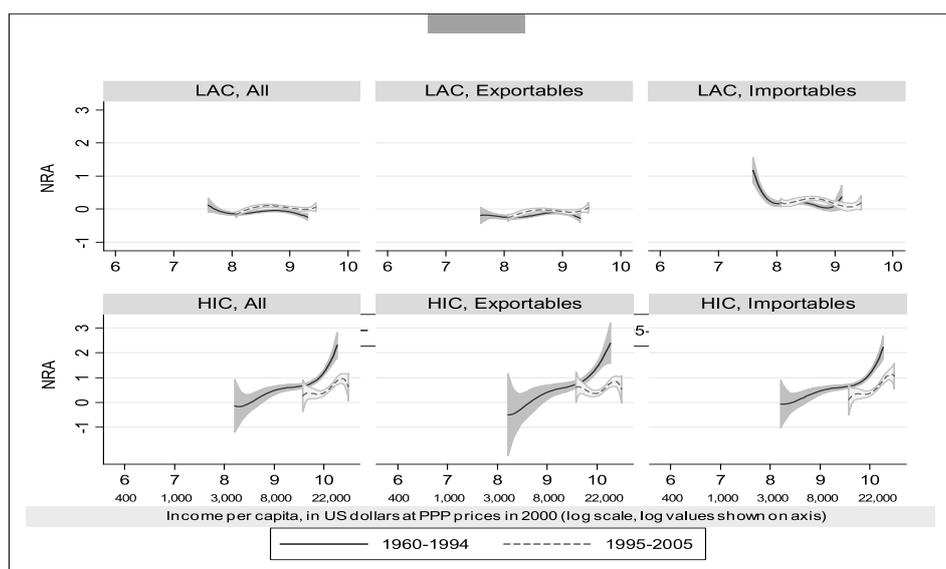
Note: Smoothed line and 95% confidence interval computed with Stata's lpolyci using bandwidth 1 and degree 4. Income per capita is expressed in I$ (2000 constant prices).

Existing policies are also highly inequitable, as beneficiaries have higher incomes than those who pay the costs, and may also be damaging environmentally as they encourage production in vulnerable areas.

Reforms may be desirable, and yet remain out of reach. In this chapter we have shown evidence consistent with several explanations for why inefficient or inequitable policies persist. Most fundamentally, although gains from moving to free trade might total $168 billion per year, on a per-capita basis with a world population of 6.4 billion in 2004 that was only $26.25 per person. Presumably, the cost per person of any large-scale political mobilization would far exceed these gains, given the much more intense economic motivation of those few who gain much larger sums per person from current policies.

Asymmetries and constraints on policymaking make reforms difficult, but some reform does occur. At a global level, the reforms shown in the post-1995 data on Figures 3-6 are estimated by Valenzuela, van der Mensbrugghe and Anderson (2009) to have reduced policy losses by about $233 billion per year. In other words, the glass is two-thirds full: the past 15 years of reforms have eliminated about two-thirds of the costs associated with the agricultural policies observed

in the 1980s, with another third remaining as a continued burden on the world economy.

Obtaining reforms requires some combination of changes in underlying conditions, and entrepreneurial innovation among policymakers. These occur both within and across countries. For example, one of the major areas of global agricultural policy reform has been reduced taxation of export crops in Africa. As shown in this study, domestic forces in favour of this trend include population growth within each African country, which reduced their land abundance and changed the relative number of people who were gaining and losing from these taxes. International forces also intervened, of course, including conditionality imposed by foreign aid donors. At least some of those donor conditions could have been designed mainly to increase total income or improve equity, because the donors were less subject to political pressure from local interest groups.

A key opportunity for policymakers to obtain more reform than would otherwise be feasible has been through international agreements, not only through multilateral negotiations in the WTO but also through regional and bilateral treaties. These allow policymakers to offer compensation, in the form of foreign governments' policy changes, for local interest groups whose losses from a purely national policy change might otherwise cause them to block those reforms. International treaties also allow governments to make long-term commitments, and overcome the time consistency problems that limit the credibility of otherwise favorable policies, and thereby inhibit private sector response.

Many policymakers are no doubt already be operating strategically, anticipating how interest groups will respond to their initiatives and seeking out the most desirable reforms and international agreements. The results presented in this chapter suggest several forces that could help guide such efforts, which we summarize here:

1. Economic development will continue to drive middle-income countries towards sharp increases in agricultural support, unless those countries now commit to maintain their current policies into the future. The Uruguay Round Agreement on Agriculture introduced some such commitments, but further commitments through a Doha Round agreement or other treaties would have increasing payoffs over time as more countries face greater domestic pressures to raise agricultural protection. All present governments – including the current leaders of countries whose political balance of power will eventually change – have a strong interest in obtaining these commitments as soon as possible.

2. Domestic political pressures will continue to push the lowest-income countries to tax their agricultural producers, however well-meaning their governments may be. Other countries can tip the balance towards more favorable policies

through their aid programs and trade agreements, thereby helping those governments overcome domestic political pressures and obtain faster, more equitable and sustained economic growth.

3. Revenue motives and other obligations will continue to drive cash-strapped governments to tax imports, imposing an otherwise unwanted anti-trade bias on their economies. Assisting those countries to implement less distorting forms of taxation can help them overcome administrative constraints and obtain desired trade policy reforms.

Anticipating these changes and acting strategically can help countries move towards less costly trade distortions, but reforms that focus only on trade policies may miss other opportunities to improve policy outcomes. Our focus in this chapter is squarely on agricultural protection (including *dis*protection when a sector is taxed), but at least three other kinds of policies clearly interact with trade policy and help account for the success or failure of a country's agricultural policies as a whole.

Most fundamentally, a country's technology policies determine the tools with which farmers might respond to prices and investment opportunities. The payoffs to public sector technology development and dissemination are well known to be on the order of 40percent per year, consistently larger than returns to other investments (Alston et al. 2000). New technologies can raise productivity directly, and can also increase the payoff to reforms thus making it more attractive for a government to improve trade policies – which further raises the return to new technologies, for example as described in McMillan and Masters (2003).

Second, a country's factor markets and property rights regime determine the resources available to each farmer. Land tenure systems and credit markets interact and influence technology adoption, price response, and use of natural resources as illustrated in Kazianga and Masters (2006). These interactions make it especially important for local governments and aid donors to invest in appropriate crop and livestock improvements, and simultaneously invest in land tenure and credit systems so that the synergies between those investments, other government policies, and private investments can be fully exploited.

Third, a country's safety nets and transfer payments can be cost-effective substitutes for trade policy in meeting the political needs of key interest groups. All kinds of conditional cash transfers and voucher programs are being introduced around the world, in addition to the food-for-work and cash-for-work programs of earlier decades. One of the most prominent new programs is probably PROGRESA/Oportunidades in Mexico, which has been subject to numerous cost-benefit studies that both demonstrate its impact and also helped improve its performance during implementation (Behrman 2007).

The three domestic policies described above can all facilitate trade policy reform, by meeting a country's political needs at lower economic cost than trade restrictions. What they have in common is to address underlying socioeconomic problems directly: in the terminology of Corden (1974), they offset a domestic divergence, and introduce fewer by-product distortions than would a trade restriction. Unlike trade restrictions, however, they require fiscal expenditure and a significant public-sector presence in the economy. The knowledge and institutional capacity needed to implement such policies may take decades to develop, which helps explain why countries may turn first to trade restrictions and then eventually develop domestic instruments to accomplish the same social goals.

7. Conclusions

This chapter uses a new World Bank dataset on agricultural protection to examine trends and patterns in past policy choices, test alternative explanations for those trends, and consider how forward-looking policymakers might use the results to obtain more desirable policy outcomes. Our tests are based on estimates of the tariff-equivalent effect on price of all types of agricultural trade policies across 74 countries from about 1960 through 2004. Policy impacts are measured for a total of 72 distinct products, chosen to account for over 70 percent of agricultural value added in each country, resulting in over 25,000 distinct estimates from particular products, country and year.

Our analysis begins by confirming three previously observed regularities: (i) a consistent *income effect,* as governments in countries with higher incomes per capita choose policies that make larger transfers to farmers at the expense of taxpayers and consumers, (ii) a consistent *resource abundance* effect, as governments in countries with more land per capita make smaller transfers to farmers, and (iii) an *anti-trade bias* as governments tend to tax international trade more than domestic transactions.

To help explain these effects, we find strong support for a number of mechanisms that could lead to empirical patterns of this type. Most notably, results support *rational ignorance* effects as smaller per-capita costs (benefits) are associated with higher (lower) proportional NRAs, particularly in urban areas. Results also support *rent-seeking* motives for trade policy, as countries with more checks and balances on the exercise of political power have smaller distortions, and we find support for *time-consistency* effects, as perennials attract greater taxation than annuals. We find partial support for *status-quo bias* as observed NRAs are higher after world prices have fallen but there is no correlation between policies and lagged changes in crop area.

Two of our results run counter to much conventional wisdom. First, we find no support for the idea that larger groups of people will have more *free-ridership*

and hence less political success. Our results are consistent with the alternative hypothesis of a *group-size effect* in which larger groups tend to be given more favorable levels of NRA. This does not contradict the basic idea of free-ridership, of course, because the groups in our study are defined as all rural or all urban people in a country, and so may all have similarly large degrees of free-ridership. Second, we find support for a *revenue motive* function of taxation only on importables, and find no such effect on exportables. In other words, when VAT or other forms of taxation are less feasible, governments impose higher taxes on imports to earn revenue – but that link does not fit the data on export taxes, suggesting that they have been motivated by other influences.

Looking forward to the prospects for agricultural policy reform in future decades, our results can be interpreted naively as a simple forecast, or used strategically as an opportunity to obtain improved outcomes. A naïve interpretation would focus mainly on the income and land-scarcity effects, which predict that future economic growth and greater land scarcity will drive more and more developing countries towards higher protection of local producers, at the expense of taxpayers and consumers. But forward-looking policymakers could anticipate these changes, and act strategically to obtain more efficient and equitable policies. These initiatives could take advantage of the other patterns in past policy choices, for example by using international treaties and other commitment devices to overcome time-consistency problems, domestic checks and balances to limit rent-seeking, and safety nets such as conditional cash transfers to meet political needs in a cost-effective manner.

The evidence presented in this study suggest that policymakers and interest groups have already taken advantage of such strategic opportunities to learn from the past and avoid repeating history. As illustrated in Figures 3-5, for example, distortions at each level of income are found to have been lower in the last decade than in earlier years. But there remain many opportunities for policy improvement – and considerable unexplained variance across countries in the historical data as well. Further study of the new World Bank data, and continued collection of even more detailed datasets on agricultural policy choices around the world, could help policymakers pursue their goals with increasing information about the opportunities and constraints ahead.

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APPENDIX TABLE A1.
List of variables

Variable name	Definition	Source
Border prices	Price at which a commodity could be imported (cif) or exported (fob), as applicable, in each country and year	Authors' calculation from Anderson and Valenzuela (2008) database
Crop area	The area from which a crop is gathered. Area harvested, therefore, excludes the area from which, although sown or planted, there was no harvest due to damage, failure, etc.	FAOSTAT (2007)
Checks and Balances	Measures the effectiveness of electoral checks on government decision makers or according to electoral rules that influence party control over members	World Bank Database of Political Institutions (Beck et al. 2008)
Entry of new farmers	Dummy variable which takes the value of one if the year change in the economically active population in agriculture is positive.	FAOSTAT (2007)
Exchange rate variation	Calculated as the standard deviation of the detrended ratio of the exchange rate between 1960 and 2004.	Penn World Tables 6.2
Importable (Exportable)	Indicator variable for commodity-level NRAs, equal to 1 if the NRA is observed in a year when the commodity was imported (exported) and 0 otherwise.	Authors' calculation from Anderson and Valenzuela (2008) database
Income	Real gross domestic product per capita, at PPP prices, chain indexed. Expressed in international dollars of 2000.	Penn World Tables 6.2
Income growth variation	Calculated as the coefficient of variation of the growth rate of real GDP per capita between 1960 and 2004.	Penn World Tables 6.2
Land per capita	Area of arable land as defined by the FAO, divided by the total population.	FAOSTAT (2007)
Monetary depth (M2/ GDP)	Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government	World Bank (2007), World Development Indicators
Policy transfer cost per rural (urban) person	The sum of each commodity NRA times value of production at border prices, divided by populations as defined above. Results are shown as costs of policy, so NRAs per rural person are multiplied by -1.	Authors' calculation from Anderson and Valenzuela (2008) database
Rural (Urban) population	Rural population estimates are based on UN Population Projection estimates of total population, minus urban population using varying national definitions of urban areas	FAOSTAT (2007)

Part 2

4

The nature and determinants of volatility in agricultural prices: An empirical study from 1962-2008

Kelvin Balcombe [1]

1. Introduction

There is now considerable empirical evidence that the volatility in agricultural prices has changed over the recent decade (FAO, 2008). Increasing volatility is a concern for agricultural producers and for other agents along the food chain. Price volatility can have a long run impact on the incomes of many producers and the trading positions of countries, and can make planning production more difficult. Arguably, higher volatility results in an overall welfare loss (Aizeman and Pinto, 2005)[2], though there may be some who benefit from higher volatility. Moreover, adequate mechanisms to reduce or manage risk to producers do not exist in many markets and/or countries. Therefore, an understanding the nature of volatility is required in order to mitigate its effects, particularly in developing countries, and further empirical work is needed to enhance our current understanding. In view of this need, the work described in this chapter, seeks to study the volatility of a wide range of agricultural prices.

Importantly, when studying volatility, the primary aim is not to describe the trajectory of the series itself, nor to describe the determinants of directional movements of the series, but rather to describe the determinants of the absolute or squared changes in the agricultural prices[3]. We approach this problem from two directions: First, by directly taking a measure of the volatility of the series and

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[2] For a coverage of the literature relating the relationship between welfare, growth and volatility, readers are again referred the Aizeman and Pinto, 2005, page 14 for a number of classic references on this topic.

[3] In order to model volatility, it may be necessary to model the trajectory of the series. However, this is a necessary step rather than an aim in itself.

regressing it against a set of variables such as stocks, or past volatility. Second, by modelling the behaviour of the series[4], while examining whether the variances of the shocks that drive the evolution of prices can be explained by past volatility and other key variables.

More specifically, we employ two econometric methods to explore the nature and causes of volatility in agricultural price commodities over time. The first decomposes each of the price series into components. Volatility for each of these components is then examined. Using this approach we ask whether volatility in each price series is predictable, and whether the volatility of a given price is dependent on stocks, yields, export concentration and the volatility of other prices including oil prices, exchange rates and interest rates. This first approach will be used to analyse monthly prices[5]. The second approach uses a panel regression approach where volatility is explained by a number of key variables. This second approach will be used for annual data, since the available annual series are relatively short.

On a methodological level, the work here differs from previous work in this area due to its treatment of the variation in the volatility of both trends and cyclical components (should a series contain both) of the series. Previous work has tended to focus on either one or the other. Alternatively, work that has used a decomposed approach has not employed the same decomposition as the one employed here. Importantly, in contrast to many other approaches, the framework used to analyse the monthly data requires no prior decision about whether the series contain trends.

The report proceeds as follows. Section 2 gives a quick review of some background issues regarding volatility. This report does not discuss the consequences of volatility. Its aim is limited to conducting an empirical study into the nature and causes of volatility, and to explore whether these have evolved over the past few decades. To this purpose, Section 3 outlines the theoretical models that are used for the analysis. Section 4 outlines the estimation methodology, and Section 5 presents the empirical results, with tables being attached in Appendix A. Section 6 concludes. Mathematical and statistical details are left to a technical appendix (Appendix B).

2. Background

2.1 Defining volatility

While the volatility of a time series may seem a rather obvious concept, there may be several different potential measures of the volatility of a series. For example, if

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[4] This is done using a 'state space form' which is outlined in a technical appendix.
[5] Data of varying frequencies is not used for theoretical reasons, but due to the data availability. These were provided by FAO.

a price series has a mean[6], then the volatility of the series may be interpreted as its tendency to have values very far from this mean. Alternatively, the volatility of the series may be interpreted as its tendency to have large changes in its values from period to period. A high volatility according to the first measure need not imply a high volatility according to the second. Another commonly used notion is that volatility is defined in terms of the degree of forecast error. A series may have large period to period changes, or large variations away from its mean, but if the conditional mean of the series is able to explain most of the variance then a series may not be considered volatile[7]. Thus, a universal measure of what seems to be a simple concept is elusive. Where series contain trends, an appropriate measure of volatility can be even harder to define. This is because the mean and variance (and other moments) of the data generating process does not technically exist. Methods that rely on sample measures can therefore be misleading.

Shifts in volatility can come in at least two forms: First, an overall permanent change (whether this is a gradual shift or a break) in the volatility of the series; and, second in a 'periodic' or 'conditional' form whereby the series appears to have periods of relative calm and others where it is highly volatile. The existence of the periodic form of volatility is now well established empirically for many economic series. Speculative behaviour is sometimes seen as a primary source of changeable volatility in financial series. The vast majority of the evidence for periodic changes in volatility is in markets where there is a high degree of speculation. This behaviour is particularly evident in stocks, bonds, options and futures prices. For example, booms and crashes in stock markets are almost certainly exacerbated by temporary increases in volatility.

While there is less empirical evidence that changes in volatility are exhibited in markets for agricultural commodities, there is still some strong empirical evidence that this is the case. Moreover, there are good a priori reasons to think that changes in volatility might exist. For example, Deaton and Laroque (1992) present models based on the theories of competitive storage that suggest, inter alia, that variations in the volatility of prices should exist. Moreover, market traders are to some extent acting in a similar way to the agents that determine financial series. They are required to buy and sell according to conditions that are changeable, and there is money to be made by buying and selling at the right time. However, agricultural commodity prices are different from most financial series since the levels of production of these commodities along with the levels of stocks are likely to be an important factor in the determination of their prices (and the volatility of these prices) at a given time. The connectedness of agricultural markets with other markets (such as energy) that may also be experiencing variations in volatility may influence the volatility of agricultural commodities.

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[6] That is, the underlying data generating process has a mean, not just the data in the sample.

[7] This definition is embodied in the notion of 'implied volatility', whereby futures or options prices relative to spot prices are used to measure volatility.

For a series that has a stable mean value over time (mean reverting[8]), the variance of that series would seem to be obvious statistic that describes the ex ante (forward looking) volatility of a given series[9]. More generally, if a series can be decomposed into components such as trend and cycle, the variance of each of these components can describe the volatility of the series. The use of the words ex ante requires emphasis, because clearly a price series can have relatively large and small deviations from its mean without implying that there is a shift in its overall variability. It is important to distinguish between ex post (historical or backward looking) volatility and ex ante (forward looking) volatility. One might believe that comparatively high levels of historical volatility are likely to lead to higher future volatility, but this need not be the case[10]. However, the variance of the series (or component of the series) may be systematic and predictable given its past behaviour. Thus, there will be a link between changes in ex ante and ex post volatility. Where such a link exists, the series are more likely to behave in a way where there are periods of substantial instability. It is for this reason that we are primarily interested in ex ante volatility, and whether we can predict changes in ex ante volatility using historical data.

A wide range of models that deal with systematic volatility have been developed since the seminal proposed by Engle (1982)[11]. Since then, the vast majority of volatility work has focused on series where the trajectory of the series cannot be predicted from its past. Financial and stock prices behave in this way. Simply focusing on the variability of the differenced series is sufficient in this case. However, for many other series (such as agricultural prices) this may not really be appropriate, as there is evidence that these series are cyclical, sometimes with, or without, trends that require modelling within a flexible and unified framework. Deaton and Laroque (1992), citing earlier papers, note that many commodity prices also behave in a manner that is similar to stock prices (the so called random walk model). However, they also present evidence that is inconsistent with this hypothesis. They note that within the random walk model, all shocks are permanent, and that this is implausible with regard to agricultural commodities (i.e. weather shocks would generally be considered transitory). In view of the mixed evidence about the behaviour of agricultural prices, we would emphasise the importance of adopting a framework that can allow the series to have either trends or cycles or a combination of both. Importantly, there may be alterations in the variances that drive both these components. Therefore, the approach adopted within this report allows

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[8] A mean reverting series obviously implies that an unconditional mean for the series exists, and that the series has a tendency to return to this mean. This is less strong than assuming a condition called stationarity, which would assume that the other moments of the series are also constant.

[9] If the series has a distribution with 'fat tails', even the variance may give an inaccurate picture of the overall volatility of a series.

[10] For this reason, some writers make the distinction between the realised and the implied volatility of a series.

[11] For a number of papers on this topic, see Engle R. (1995) and the Survey article in Oxley et al. (2005)

for changes in the volatilities of both components should they exist, but does not require that both components exist.

From the point of view of this study, it is not just volatility in the forecast error that is important. Even if food producers were able to accurately forecast prices a week, month or even year before, they may be unable to adapt accordingly. Aligned with this point, it may be unrealistic to believe that agricultural producers would have access to such forecasts, even if accurate forecasts could be made. Thus, we take the view that volatility can be a problem, even if large changes could have been anticipated given past information. This viewpoint underpins the definitions of volatility employed within this study.

The definitions of volatility employed within this study are also influenced by the frequencies of the available data (the data is discussed in Section 5). Since we have price data at the monthly frequency for the majority of series, but a number of explanatory variables at the annual frequency, we need to create a measure of annual volatility using the monthly price data. 'Annual volatility' should not just be defined by the difference between the price at the beginning of the year and the end. Any measure should take account of the variability within the year. Therefore, to create the annual volatility measures we take yearly volatility to be the log of the square root of the sum of the squared percentage changes in the monthly series. Admittedly, this measure is one possible measure among many. However, it is a convenient summary statistic that is approximately normally distributed, and therefore usable within a panel regression framework. This statistic is an ex-post measure of volatility. Changes in this statistic, year to year, do not imply that there is a change in the underlying variance of the shocks that are driving this series. However, any shift in the variability of the shocks that drive prices are likely to be reflected in this measure.

When focusing on the higher frequency data, this study then defines volatility as a function of the variance of the random shocks that drive the series, along with the serial correlation in the series. This volatility is then decomposed into components: 'cyclical'; and 'level'. Within this approach, volatility is not just defined in terms of ex-post changes in the series, but in the underlying variance of the shocks governing the volatility of series. The influence of other variables on these variances can be estimated using this method. Our approach is outlined at a general level in Section 3 (the decomposition approach), and at a more mathematical level in a technical appendix.

Before proceeding, it is also worth noting that there are some further aspects of price behaviour that are not directly explored within this report. Other 'stylised facts' relating to commodity prices are that commodity price distributions may have the properties of 'skew' and 'kurtosis'. The former (skew) suggests that prices can reach occasional high levels, that are not symmetrically matched by corresponding

lows, with prices spending longer in the 'doldrums' than at higher levels (Deaton and Laroque, 1992). The latter (kurtosis) suggests that extreme values can occur occasionally. Measurements of skew and kurtosis of price distributions can be extremely difficult to establish when the prices contain cycles and/or trends, and have time varying volatility. Some of the previous empirical work that supports the existence of the skew and kurtosis has been extremely restrictive in the way that it has modelled the series (e.g. such as assuming that the series are mean reverting). Moreover, kurtosis in unconditional price distributions can be the by product of conditional volatility and by conditioning the volatility of prices on the levels of stocks we may be able to account for the apparent skew in the distributions of prices. Thus, some of the other 'stylised facts' may in reality be a by product of systematic variations in volatility.

2.2 Potential factors influencing volatility

It has been argued that agricultural commodity prices are volatile because the short run supply (and perhaps demand) elasticities are low (Den et al., in Aizeman and Pinto, Chapter 4, 2005). If indeed this a major reason for volatility then we should see a change in the degree of volatility as the production and consumption conditions evolve.

Regardless of the definition of volatility, there is ample empirical evidence that the volatility of many time series do not stay constant over time. For financial series, the literature is vast. For agricultural prices the literature is smaller. However, changes in volatility are evident in simple plots of the absolute changes in prices from period to period. These demonstrate a shift in the average volatility of many agricultural prices, and this is further supported by evidence on implied volatility (FAO 2008). This is against the backdrop of a general shift towards market liberalisation and global markets, along with dramatic changes in the energy sector with an increasing production of biofuels. We consider the factors listed below, each with a short justification. Due to data constraints, we are unable to include all factors in the same models over the whole period. Therefore, a subset of these factors enters each of the models, depending the frequency of the data used in estimation.

Past Volatility: The principles underlying autoregressive conditional heteroscedasticity (ARCH) and its generalised forms (e.g. GARCH) posit that there are periods of relatively high and low volatility, though the underlying unconditional volatility remains unchanged. Evidence of ARCH and GARCH is widespread in series that are partly driven by speculative forces. Accordingly, these may also be present the behaviour of agricultural prices.

Trends: There may be long run increases or decreases in the volatility of the series. These will be accounted for by including a time trend in the variables that explain volatility. An alternative is that volatility has a stochastic trend (i.e. a trend

that cannot be described by a deterministic function of time). This possibility is not investigated here.

Stock levels: As the stocks of commodities fall, it is expected that the volatility in the prices would increase. If stocks are low, then the dependence on current production in order to meet short term consumption demands would be likely to rise. Any further shocks to yields could therefore have a more dramatic effect on prices. As noted earlier, the storage models of Deaton and Laroque (1992) have played an important role in theories of commodity price distributions. Their theory explicitly suggests that time varying volatility will result from variations in stocks.

Yields: The yield for a given crop may obviously drive the price for a given commodity up or down. A particularly large yield (relative to expectations) may drive prices down, and a particularly low yield may drive prices up. However, in this study we are concerned not with the direction of change, but with the impact on the absolute magnitude of these changes. If prices respond symmetrically to yields then we might expect no impact on the volatility of the series. However, if a large yield has a bigger impact on prices than a low yield, then we might expect that volatilities are positively related to yields, and conversely if a low yield has a bigger impact on prices than a high yield then volatilities are negatively related to yields. A priori, it is difficult to say in which direction yields are likely to push volatility, if they influence the level of volatility at all. For example, a high yield may have a dramatic downward pressure on price (downwards, increasing volatility). However, this higher yield may lead to larger stocks in the next year (decreasing volatility in a subsequent period).

Transmission across prices: A positive transmission of volatility of prices is expected across commodities. International markets experience global shocks that are likely to influence global demand for agricultural prices, and these markets may also adjust to movements in policy (trade agreements etc.) that may impact on a number of commodities simultaneously. Additionally, volatility in one market may directly impact on the volatility of another where stocks are being held speculatively.

Exchange Rate Volatility: The prices that producers receive once they are deflated into the currency of domestic producers may have a big impact on the prices at which they are prepared to sell. This also extends to holders of stocks. Volatile exchange rates increase the riskiness of returns, and thus it is expected that there may be a positive transmission of exchange rate volatility to the volatility of agricultural prices.

Oil Price Volatility: Perhaps one of the biggest shifts in agricultural production in the past few years, and one that is likely to continue, is the move towards the production of biofuels. Recent empirical work has suggested a transmission of prices between oil and sugar prices (Balcombe and Rapsomanikis, 2005). There is also likely to be a strong link between input costs and output prices. Fertiliser prices,

mechanised agriculture and freight costs are all dependent on oil prices, and will feed through into the prices of agricultural commodities. In view of the fact that the oil price has shown unprecedented realised volatility over the past few years, there is clearly the potential for this volatility to spill over into the volatility of commodity prices.

Export Concentration: Fewer countries exporting could expose international markets to variability in their exportable supplies, weather shocks and domestic events such as policy changes. Lower Herfindahl (the index used here) concentration would lead to higher potential volatility and vice versa.

Interest Rate Volatility: Interest rates are an important macroeconomic factor that can have a direct effect on the price of commodities, since they represent a cost to holding of stocks. However, they are also an important indicator of economic conditions. Volatility of interest rates may therefore indicate uncertain economic conditions and subsequent demand for commodities.

3.   Models

This section will outline at a general level the main elements of the models used for analysis. The mathematical details behind the models outlined in this section are contained in an appendix. As outlined in the preceding sections, there are two main methods of analysis used within this report. Each is dealt with below.

3.1   The decomposition approach

At the heart of this approach is the decomposition for the logged price y_t at time t as in equation (3) below.

$$y_t = Level_t + Seasonal_t + Cycle_t \qquad\qquad (3)$$

The level component may either represent the mean of the series (if it is mean reverting) or may trend upwards or downwards. The cyclical component, by definition, has a mean of zero and no trend. However, the level components are driven by a set of shocks (v_t), and the cyclical components are driven by shocks (e_t). Each of these are assumed to be random shocks, governed by a time varying variances h_{vt} and h_{et} respectively. Either one of these variances may be zero for a given price, but both cannot be zero since this would imply that the series had no random variation. For the level component, a variance of zero would imply a constant mean for the series, and therefore all shocks are transitory. If the cyclical variance was zero, this would imply that all shocks to prices were permanent.

The seasonal component is deterministic (does not depend on random shocks). Two different methods of modelling the seasonality were explored. First 'seasonal dummies' were employed, whereby the series is allowed a seasonal component in each month. Alternatively, the seasonal frequency approach from Harvey (1989 p.41) was employed. Here, there are potentially 11 seasonal frequencies that can enter the model, the first of which is the 'fundamental frequency'. The results were largely invariant to the methods employed. However, the results that are presented in the empirical section use the first seasonal frequency only.

The Level and Cyclical components have variance, which we label as follows:\

$$Var(\Delta Level_t): \; volatility \; in \; mean$$

$$Var(Cycle): \; volatility \; in \; cycle$$

Each of these are governed by an underlying volatility of a shock specific to each component, and can (within the models outlined in the appendix) shown to be

$$Var(\Delta Level_t) = Constant_L \times h_{v,t}$$
$$Var(Cycle_t) = Constant_C \times h_{e,t}$$

Having made this decomposition, then we can make h_{vt} and h_{et} depend on explanatory variables. In this chapter we consider the following explanatory variables for the volatilities, which we have discussed earlier in Section 2:

i.   a measure of the past realised volatility of the series ;

ii.   realised oil price volatility;

iii.   a measure of the average realised volatility in the other agricultural prices within the data;

iv.   stocks levels;

v.   realised exchange rate volatility;

vi.   realised interest rate volatility; and,

vii.   a time trend;

In each case where we use the term 'realised' volatility, the measure will is the square of the monthly change in the relevant series, as distinct from the ex ante measures h_{vt} and h_{et} respectively.

Using the approach above, we then produce:

i.   measures in volatility (mean and cycle) for each of the agricultural price series through time;

ii.   tests for the persistence in the changes in volatility for these series;

iii. tests for the transmission of volatility across price series; and;

iv.   tests for the transmission of volatility from oil prices, stocks etc to agricultural prices.

3.2   The panel approach

In order to complement the approach above, use of annual data is also made. A panel approach is used due to the relatively short series available (overlapping across all the variables) at the annual frequency. The following approach is employed[12]:

$$lnV_{it} = \beta_{0i} + \beta_{1i}t + \lambda_v lnV_{i(t-1)} + \lambda' z_{it} + e_{it} \qquad (4)$$

Where V_{it} is a (realised) measure of volatility of the ith commodity at time t, z_{it} is a vector of factors that could explain volatility, and e_{it} is assumed be normal with a variance that is potentially different across the commodities, serially independent, but with a covariance across i (commodities). We additionally estimate the model imposing $\beta_{1i} = \beta_1$ (a common time trend) across the models. Thus this model is one with fixed effects (intercept and trend) across the commodities[13].

Within z_{it} we consider the following:

i.   realised oil price volatility;

ii.   stocks;

iii. yields;

iv.   realised exchange rate volatility; and,

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[12] The distribution of the volatilities was examined prior to estimation, and the logged volatilities had a distribution that was reasonably consistent with being normal. Therefore, estimation was conducted in logged form.

[13] The issues of trends, stochastic trends and panel cointegration are not considered in this report. The volatilities are unlikely to be I(1) processes, and certainly reject the hypothesis that they contain unit roots. Stochastic trends could exist in the stocks, yield and export concentration data, and we recognise therefore these could have an influence on the results.

v.   realised export concentration (the Herfindhal index);

Where the price data is monthly, the realised annual volatility is defined herein as:

$$V_{it} = \sqrt{\frac{\sum_{j=1}^{12} (\Delta \ln(p_{i,j,t}))^2}{12}} \qquad (5)$$

Where $p_{i,j,t}$ is the price of the ith commodity in the jth month of the tth year. As noted earlier, there are a number of other potential measures of annual volatility. However, the statistic above usefully summarises intra year volatility into an annual measure. Alternative transformations (such as the mean absolute deviation of price changes) are very similar when plotted against each other, and are therefore likely to give similar results within a regression framework. The logged measure of volatility (as defined in 5) is approximately normally distributed for the annual series used in this report, which it attractive from an estimation point of view.

4. Estimation and interpretation

4.1 Estimation

The work in this study employs a Bayesian approach to estimation. The reason for using a Bayesian framework is that it is a more robust method of estimation in the current context. The estimation of the random parameter models can be performed using the Kalman Filter (Harvey 1989). The Kalman Filter enables the likelihood of the models to be computed, and may be embedded within Monte Carlo Markov Chain (MCMC) sampler that estimates the distributions of the parameters of interest.

   A full description of the estimation procedures are beyond the scope of this report as while many of the methods are now standard within Bayesian econometrics, a full description would run into many pages. Good starting references include Chib and Greenberg (1995) and Koop (2003). A brief coverage of the estimation procedures is given in the technical appendix (B2).

4.2 Interpretation of the parameter estimates and standard deviations

In interpreting the estimates produced, readers may essentially adopt a classical approach (the statistical approach with which most readers are more likely to be familiar). Strictly speaking, the Bayesian approach requires some subtle differences in thinking. However, there are theoretical results (see Train, 2003) establishing that using the mean of the posterior (the Bayesian estimate of a parameter) is equivalent to the 'maximum likelihood' estimate (one of the most commonly used

classical estimate), sharing the property of asymptotic efficiency. As the sample size increases and the posterior distribution normalises, the Bayesian estimate is asymptotically equivalent to the maximum likelihood estimator and the variance of the posterior identical to the sampling variance of the maximum likelihood estimator (Train 2003). Therefore, we will continue to talk in terms of 'significance' of parameters, even though strictly speaking p-values are not delivered within the Bayesian methodology (and for this reason are not produced within the results section). Broadly speaking, if the estimate is twice as large as its standard deviation then this is roughly consistent with that estimate being statistically significant at the 5percent level.

5. Empirical Results

5.1 Data

The data for this study were provided by FAO. A summary of the length and frequency of the data is provided in Table 1. The models discussed in the previous section will be estimated using this data. The first set of models outlined in section 3 will be run on the monthly series, and the panel approach will be used for the annual data. The annual price volatilities were calculated from the monthly data. There are 19 commodities listed in the tables.

Because some of the variables are recorded over a shorter period that others, the models were run using a subset of the data for longer periods and all of the variables for longer periods. Where stocks are used in the models, at a monthly frequency, they were interpolated from the quarterly data, but the models were estimated at the shorter frequency[14].

5.2 Results

5.2.1 Monthly results

We begin with the results for the monthly data run over the longest possible period for each commodity. In the first instance exchange rates were not included, since these were available only from 1973 onwards (see Table 1). The models using monthly data were then re-estimated including exchange rates (over the shorter period). When running the models, we imposed positivity restrictions on the coefficients of some of the explanatory variables. Without these restrictions, a minority of commodities had perverse signs on some of the coefficients, though in

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[14] Weekly prices also exist for a few commodities only. We did analyse this data, but the results were rather inconclusive. Our analysis of this data are not included in this report but are available.

nearly all cases these were insignificant. The monthly results are presented in Tables 2 to 21. In each case the results for the model with and without exchange rates are presented for each commodity. Importantly, the time period over which the two sets of results are obtained differs for the case where exchange rates are included, since exchange rates were only available from 1973 onwards. The difference in the parameter values will therefore differ due to this as well as the inclusion of exchange rates. Table 21 presents the monthly results for the three series for which stocks data are available.

In Tables 2 through 24, the error variance refers to the square root estimate of the intercept for h_e as defined in Section 3. The Random intercept variance is the square root of intercept estimate of h_v. The rest of the parameter estimates are the lambda parameters in equations b10 and b11 (in Appendix B) where these are the coefficients of the variables listed in the first column of each table. The last four coefficients in each table are: the intercept; estimates of the autoregressive coefficients; and, the seasonal coefficient (the first fundamental frequency) .

The estimates within the table are the means and standard deviations of the posterior distributions of the parameters. In each case the significance of a variable is signified by the estimate being in bold italics indicating that the standard deviation is less than 1.64 of the absolute mean of the posterior distribution. As noted in Section 4.2, this roughly corresponds to a variable being significant at the 5percent level (one tailed).

While the focus of our analysis is mainly on the determinants of the volatility of the series, it is worth nothing that the autoregressive representation of order two is sufficient to capture the serial correlation in the series. The first lag is significant for most of the commodities. In only a few cases is the second order coefficient significant. However having said this, the majority of the series have negative second order coefficients suggesting that the majority of the series contain cyclical behaviour. The seasonal components of the series are insignificant for nearly all commodities[15]. While the second order coefficient and seasonal components could be removed, an exploratory analysis suggested that inclusion of these components had not substantive impact on the results. Therefore, for consistency, these explanatory variables are included for all the series.

Table 23 summarises the results for the monthly data, from Tables 2 through 21. Each series has two sets of results in tables 2 through 20. The first is where the model is run on the longest possible period, excluding exchange rate volatility. The second is on the shorter series where exchange rate volatility is included. Therefore, the two sets of results will differ because an additional variable is included and they

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[15] This finding was supported when the series were estimated with higher seasonal frequencies and seasonal dummies.

are run over different periods. The stocks data was available for only 3 of the series (Wheat, Maize and Soyabean). Therefore, there is another table (21) which utilises the stocks data. Again, this is run over a shorter period than for all the previous results, since the stocks data is only available from the periods listed in Table 1. The rest of the column in in Table 1 is blacked out for the other commodities for which stocks data is unavailable. A tick (√) in a given cell indicates that the variable listed in the column heading is significant in influencing the volatility of the series for one of models in Tables 2 through 20. Two ticks in a cell indicate that the variable was significant for both the models (i.e. with and without exchange rates).

Broadly, the results in Table 23 (and Tables 2 through 21) can be summarised as follows:

i.   Nearly all the commodities have significant stochastic trends (as the variance in the random intercept is significant).   Pigmeat is the exception.

ii.   Most of the commodities have cyclical components with the exception of palm oil.

iii.   Past volatility is a significant predictor of current volatility for nearly all variables run over both periods (with and without exchange rate volatility). We therefore conclude that there is persistent volatility in commodity prices. That is, we would expect to see periods of relatively high volatility in agricultural commodities and periods of relatively low volatility.

iv.   There is evidence that there is transmission of volatility across agricultural commodities for nearly all commodities (except pigmeat). The aggregate past volatility is a predictor of volatility in most commodities. This is indicative of a situation where markets are experience common shocks that impact on many markets rather than being isolated to one commodity or market.

v.   Oil price volatility a significant predictor of volatility in agricultural commodities in the majority series. With the growth of the biofuel sector, commodity prices and oil prices may become more connected, so there is reason to believe that the role of oil prices in determining volatility may even be stronger in the future.

vi.   As with oil prices, exchange Rate volatility impacts on the volatility of commodity prices for 10 out of the 19 series.

vii. Stock levels have a significant (downward) impact on the volatility for each of the three series for which we have data on stocks. This is consistent with our expectations that as stocks become lower, the markets become more volatile.

viii. A number of commodity prices have significant trends. However, these trends are positive for some series and negative for others. Recent high levels of volatility should not lead us to believe that agricultural markets are necessarily becoming more volatile in the long run.

5.2.2 Annual results

The annual results were produced using the panel approach outlined in Section 3.2 and are presented in Table 22. Four sets of results are presented within that table. First, results are produced with and without the inclusion of stocks. This is because the stocks data was for a shorter period than for the commodity price data. Next, we allowed for the trends in the panel regression to be restricted to be the same across each of the commodities, and in another model they were allowed to vary, giving four sets of results overall.

Where stocks are included, stocks are significant for the model in which the trend is restricted, but becomes insignificant when the trends in volatility are allowed to vary for each of the commodities. Notably, the estimated trends are generally negative, and the restriction of common trends across the commodities seems reasonable. Thus, the results do suggest (as with the higher frequency data) that as stocks rise the level of volatility in the prices decreases.

As with the higher frequency data, there is strong evidence that there is persistence in volatility. This finding is robust to the specification of the model since lagged volatility is significant in all four specifications. Yields also appear to be a significant determinant of volatility. In each of the four specifications higher yields lead to larger volatility in the series. As argued in Section 2.3, there is no clear case for expecting yields to have a positive or negative influence on volatility in the first instance. Obviously, we would expect high yields to drive prices down, and low yields to drive prices up. However, this does not imply the volatility of the series should go up or down. Our results suggest that high yields have a tendency to drive prices downwards to a greater extent than low yields tend to drive prices up. While we do not investigate this further here, it is also possible that the response to yields is dependent on the level of stocks.

Finally, unlike the higher frequency data, there is only weak evidence that oil price volatility and exchange rate volatility have an impact on the volatility of commodity prices.

6. Conclusions

Several important findings emerge from our empirical study. First, there is strong evidence that there is persistent volatility in agricultural series. In nearly all of the series examined, there was evidence that the variance of the series was a function of the past volatility of the series, and this finding was robust to the choice of model and frequency of the data. Next, there was convincing evidence that there was some degree of transmission of volatility across commodities in the monthly data. Where stocks and yield data were available, these also appeared to be significant determinants of the volatility of agricultural commodity prices.

There is also convincing evidence that many of the candidate variables have an impact on volatility. In monthly series, oil price volatility had a positive impact on commodity price volatility. Thus, from the evidence available, the recent coincidental high volatility in oil and commodity prices is symptomatic of a connection between commodity price volatility and oil price volatility. As discussed earlier. The link between oil prices and agricultural commodity prices is likely to arise through the impact of energy prices on the costs of production, along with the alternative use of some crops for biofuel production. Therefore, we would expect the link between oil price volatility and agricultural prices to continue or strengthen as the biofuels sector grows. Likewise, exchange rate volatility was found to influence the volatility of agricultural prices. Thus, perhaps unsurprisingly, if the global economy is experiencing high levels of volatility these will also be reflected in agricultural prices. Although, in this study we could not identify any significant link between export concentration (as measured by the Herfindahl index) and oil price volatility.

Finally, the evidence produced in this chapter also suggests that the volatility of agricultural prices contained trends that were independent of the variables used to explain volatility. However, the evidence is mixed with regard to the direction of these changes. In the monthly data, these trends were positive for some commodities and negative for others. For the annual data, the evidence was that the trends were, having accounted for oil price volatility and other factors, negative. Thus, overall the results here do not suggest that there will be increasing volatility in agricultural markets unless there is increasing volatility in the variables that are determining that volatility. On the other hand, if factors such as oil prices continue to be volatile, then agricultural prices may continue to be volatile or become increasingly volatile.

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APPENDIX 1. TABLES

Table 1. Data Series Summary

	Frequency	Annual	Annual	Annnual	Monthly	Quarterly
	Series	Stocks	Yeild	Herfindel	Price	Stocks
Commodity						
Wheat	1	1962-2007	1962-2007	1961-2006	Jan 57-Mar 09	June 1977-Dec2008
Maize	2	1962-2007	1962-2007	1961-2006	Jan 57-Mar 09	June 1975-June2008
Rice, Milled	3	1962-2007	1962-2007	1961-2006	Jan 57-Mar 09	
Oilseed, Soybean	4	1962-2007	1962-2007	1961-2006	Jan 57-Jan 09	Dec 1990-Dec:2008
Oil, Soybean	5	1962-2007		1961-2006	Jan 57-Jan 09	
Oil, Rapeseed	6	1962-2007	1962-2007	1961-2006	Jan 70-Jan 09	
Oil, Palm	7	1962-2007	1962-2007	1961-2006	Jan 60-Jan 09	
Poultry, Meat, Broiler	8	1962-2007		1961-2006	Feb 80-Nov 08	
Meat, Swine	9	1962-2007		1961-2006	Feb 80-Nov 08	
Meat, Beef and Veal	10	1962-2007		1961-2006	Jan 57-Oct 08	
Dairy, Butter	11	1962-2007		1961-2006	Jan 57-Jan 09	
Dairy, Milk, Nonfat Dry	12	1962-2007		1961-2006	Jan 90-Jan 09	
Dairy, Dry Whole Milk Powder	13	1962-2007		1961-2006	Jan 90-Jan 09	
Dairy, Cheese	14	1962-2007		1961-2006	Jan 90-Jan 09	
Cocoa	15		1962-2007	1961-2006	Jan 57-Nov 08	
Coffee, Green	16	1962-2007	1962-2007	1961-2006	Jan 57-Nov 08	
Tea	17		1962-2007	1961-2006	Jan57-Nov08	

Appendix 1. Tables

Table 1. Data Series Summary (Cont.d)

Sugar	18	1962-2007	1962-2007	1961-2006	Jan 57-Nov 08	
Cotton	19	1962-2007	1962-2007	1961-2006	Jan 57-Nov 08	
Other Data						
	Frequency				Monthly	
Oil Prices					Jan 57-Mar 09	
Exchange Rates					1973-2007	
Interest Rates (US 6 month Treasury Bill)						

APPENDIX 1. TABLES
Tables: Monthly Data

Table 2. Wheat (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.02	0.007	0.029	0.01
Random intercept variance	0.037	0.005	0.035	0.011
Lagged Own Volatility	0.268	0.046	0.097	0.042
Lagged AggVolatility	0.24	0.095	0.351	0.092
Oil Volatility	0.054	0.037	0.196	0.076
Trend	0.3	0.078	0.06	0.064
Ex Rate Volatility			0.043	0.03
Mean Intercept	3.178	1.537	2.982	1.576
y(-1)	0.514	0.28	0.563	0.283
y(-2)	-0.099	0.255	-0.111	0.269
Seasonal	0.012	0.022	0.009	0.028

Table 3. Maize (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.035	0.009	0.04	0.015
Random intercept	0.016	0.011	0.021	0.018
Lagged Own Volatility	0.128	0.071	0.051	0.035
Lagged AggVolatility	0.3	0.041	0.155	0.049
Oil Volatility	0.163	0.054	0.163	0.057
Trend	0.431	0.059	0.068	0.041
Ex Rate Volatility			0.112	0.062
Mean Intercept	1.932	1.144	1.958	1.148
y(-1)	0.765	0.246	0.728	0.255
y(-2)	-0.145	0.242	-0.114	0.254
Seasonal	0.009	0.017	0.011	0.024

Table 4. Rice (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.025	0.007	0.026	0.009
Random intercept variance	0.039	0.007	0.038	0.009
Lagged Own Volatility	0.293	0.037	0.311	0.07
Lagged AggVolatility	0.079	0.025	0.118	0.071
Oil Volatility	0.095	0.037	0.301	0.071
Trend	0.064	0.043	0.053	0.056
Ex Rate Volatility			0.078	0.055
Mean Intercept	3.247	1.588	2.975	1.79
y(-1)	0.589	0.257	0.677	0.299
y(-2)	-0.099	0.236	-0.144	0.277
Seasonal	-0.004	0.023	0.005	0.027

Table 5. Soyabean (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.032	0.006	0.035	0.009
Random intercept	0.03	0.008	0.035	0.01
Lagged Own Volatility	0.199	0.032	0.232	0.073
Lagged AggVolatility	0.369	0.105	0.189	0.055
Oil Volatility	0.033	0.03	0.086	0.081
Trend	0.1	0.062	-0.236	0.057
Ex Rate Volatility			0.201	0.104
Mean Intercept	2.938	1.496	3.098	1.602
y(-1)	0.627	0.271	0.614	0.289
y(-2)	-0.129	0.255	-0.142	0.272
Seasonal	0.006	0.021	0.005	0.027

Table 6. Soya Oil (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.02	0.01	0.012	0.008
Random intercept variance	0.05	0.007	0.057	0.005
Lagged Own Volatility	0.226	0.033	0.134	0.069
Lagged AggVolatility	0.169	0.047	0.139	0.068
Oil Volatility	0.104	0.042	0.19	0.108
Trend	-0.076	0.057	-0.338	0.104
Ex Rate Volatility			0.358	0.113
Mean Intercept	3.936	1.592	4.621	1.78
y(-1)	0.521	0.229	0.469	0.244
y(-2)	-0.119	0.208	-0.168	0.223
Seasonal	-0.001	0.025	-0.009	0.031

Table 7. Rape (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.018	0.011	0.018	0.011
Random intercept	0.055	0.008	0.052	0.007
Lagged Own Volatility	0.107	0.039	0.111	0.052
Lagged AggVolatility	0.263	0.083	0.244	0.023
Oil Volatility	0.039	0.023	0.098	0.074
Trend	-0.296	0.075	-0.4	0.079
Ex Rate Volatility			0.16	0.12
Mean Intercept	4.428	1.75	4.412	1.844
y(-1)	0.522	0.242	0.528	0.256
y(-2)	-0.183	0.226	-0.187	0.239
Seasonal	0.003	0.028	0.002	0.03

Table 8. Palm (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.012	0.008	0.011	0.009
Random intercept variance	0.069	0.004	0.069	0.005
Lagged Own Volatility	0.266	0.044	0.209	0.068
Lagged AggVolatility	0.207	0.044	0.186	0.064
Oil Volatility	0.164	0.06	0.154	0.066
Trend	-0.212	0.065	-0.298	0.069
Ex Rate Volatility			0.259	0.084
Mean Intercept	4.616	1.553	4.67	1.541
y(-1)	0.433	0.228	0.437	0.225
y(-2)	-0.172	0.2	-0.184	0.199
Seasonal	0.017	0.032	0.016	0.033

Table 9. Poultry (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.005	0.003	0.005	0.003
Random intercept	0.02	0.002	0.02	0.002
Lagged Own Volatility	0.217	0.038	0.095	0.069
Lagged AggVolatility	0.115	0.034	0.037	0.025
Oil Volatility	0.031	0.015	0.037	0.018
Trend	-0.188	0.08	-0.149	0.111
Ex Rate Volatility			0.13	0.048
Mean Intercept	2.863	1.975	2.799	1.91
y(-1)	0.475	0.421	0.484	0.409
y(-2)	-0.118	0.387	-0.113	0.387
Seasonal	-0.012	0.022	-0.013	0.023

Table 10. Pigmeat (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.097	0.002	0.098	0.002
Random intercept variance	0.004	0.003	0.004	0.003
Lagged Own Volatility	0.124	0.068	0.087	0.029
Lagged AggVolatility	0.059	0.036	0.062	0.029
Oil Volatility	0.094	0.045	0.302	0.046
Trend	-0.141	0.096	-0.154	0.047
Ex Rate Volatility			0.06	0.036
Mean Intercept	0.887	0.541	0.895	0.54
y(-1)	0.868	0.189	0.862	0.18
y(-2)	-0.083	0.195	-0.078	0.186
Seasonal	0.025	0.027	0.025	0.026

Table 11. Beef (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.019	0.009	0.021	0.008
Random intercept	0.022	0.009	0.029	0.007
Lagged Own Volatility	0.197	0.049	0.259	0.098
Lagged AggVolatility	0.055	0.041	0.123	0.034
Oil Volatility	0.028	0.023	0.035	0.026
Trend	0.273	0.107	-0.176	0.058
Ex Rate Volatility			0.050	0.041
Mean Intercept	3.261	1.949	3.166	1.656
y(-1)	0.534	0.365	0.587	0.322
y(-2)	-0.150	0.346	-0.184	0.300
Seasonal	-0.003	0.024	0.004	0.024

Table 12. Butter (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.056	0.009	0.064	0.01
Random intercept variance	0.059	0.011	0.058	0.012
Lagged Own Volatility	0.397	0.107	0.326	0.108
Lagged AggVolatility	0.126	0.053	0.062	0.048
Oil Volatility	0.181	0.104	0.155	0.062
Trend	0.032	0.068	-0.288	0.097
Ex Rate Volatility			0.16	0.077
Mean Intercept	4.601	1.39	4.466	1.517
y(-1)	0.057	0.218	0.056	0.236
y(-2)	0.052	0.198	0.038	0.22
Seasonal	0.01	0.029	0.003	0.035

Table 13. SMP (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.037	0.015	0.033	0.009
Random intercept	0.05	0.012	0.038	0.009
Lagged Own Volatility	0.518	0.146	0.529	0.098
Lagged AggVolatility	0.234	0.092	0.12	0.07
Oil Volatility	0.377	0.129	0.283	0.097
Trend	-0.703	0.273	-0.477	0.147
Ex Rate Volatility			0.216	0.061
Mean Intercept	2.232	2.532	2.256	2.676
y(-1)	0.62	0.389	0.609	0.414
y(-2)	0.077	0.36	0.085	0.386
Seasonal	-0.001	0.029	0	0.031

Table 14. WMP (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.013	0.007	0.013	0.008
Random intercept variance	0.033	0.005	0.035	0.006
Lagged Own Volatility	0.507	0.1	0.46	0.174
Lagged AggVolatility	0.077	0.037	0.156	0.084
Oil Volatility	0.18	0.067	0.076	0.032
Trend	-0.148	0.097	-0.084	0.145
Ex Rate Volatility			0.337	0.213
Mean Intercept	2.682	3.261	2.883	3.289
y(-1)	0.588	0.45	0.566	0.444
y(-2)	0.051	0.401	0.047	0.394
Seasonal	0.002	0.034	0.003	0.034

Table 15. Cheese (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.014	0.006	0.016	0.007
Random intercept	0.027	0.005	0.026	0.006
Lagged Own Volatility	0.351	0.062	0.478	0.134
Lagged AggVolatility	0.163	0.052	0.068	0.045
Oil Volatility	0.18	0.026	0.226	0.037
Trend	-0.044	0.058	-0.068	0.105
Ex Rate Volatility			0.125	0.075
Mean Intercept	3.171	3.661	3.103	3.746
y(-1)	0.433	0.475	0.448	0.495
y(-2)	0.165	0.434	0.159	0.449
Seasonal	0.002	0.031	0.002	0.03

Table 16. Cocoa (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.031	0.013	0.03	0.014
Random intercept variance	0.041	0.012	0.046	0.014
Lagged Own Volatility	0.2	0.109	0.206	0.099
Lagged AggVolatility	0.088	0.048	0.037	0.032
Oil Volatility	0.311	0.22	0.089	0.06
Trend	0.082	0.14	-0.195	0.08
Ex Rate Volatility			0.083	0.059
Mean Intercept	4.633	2.945	4.499	1.984
y(-1)	0.436	0.36	0.527	0.254
y(-2)	-0.044	0.346	-0.116	0.242
Seasonal	-0.002	0.04	0	0.03

Table 17. Coffee (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	0.025	0.007	0.033	0.012
Random intercept	0.051	0.007	0.07	0.01
Lagged Own Volatility	0.496	0.1	0.492	0.077
Lagged AggVolatility	0.181	0.066	0.038	0.029
Oil Volatility	0.106	0.061	0.108	0.056
Trend	0.858	0.109	0.102	0.063
Ex Rate Volatility			0.076	0.057
Mean Intercept	2.025	1.645	2.487	1.318
y(-1)	0.468	0.266	0.393	0.262
y(-2)	0.088	0.235	0.065	0.228
Seasonal	0.011	0.021	0.027	0.036

Table 18. Tea (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	*0.046*	0.006	*0.037*	0.008
Random intercept variance	*0.044*	0.008	*0.055*	0.008
Lagged Own Volatility	*0.375*	0.06	*0.385*	0.1
Lagged AggVolatility	*0.085*	0.045	*0.161*	0.066
Oil Volatility	0.035	0.028	0.046	0.036
Trend	*-0.098*	0.031	0.03	0.08
Ex Rate Volatility			0.028	0.025
Mean Intercept	*3.935*	1.292	*3.982*	1.648
y(-1)	*0.568*	0.22	*0.503*	0.267
y(-2)	-0.277	0.206	-0.222	0.243
Seasonal	0.015	0.027	0.022	0.035

Table 19. Sugar (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	*0.056*	0.014	*0.047*	0.02
Random intercept	*0.06*	0.015	*0.064*	0.019
Lagged Own Volatility	*0.251*	0.043	*0.253*	0.08
Lagged AggVolatility	*0.099*	0.048	0.088	0.061
Oil Volatility	0.102	0.067	*0.141*	0.072
Trend	*-0.234*	0.047	*-0.38*	0.081
Ex Rate Volatility			*0.306*	0.111
Mean Intercept	*1.147*	0.513	*1.22*	0.654
y(-1)	*0.629*	0.183	*0.584*	0.219
y(-2)	-0.093	0.172	-0.078	0.205
Seasonal	0.013	0.029	0.006	0.035

Table 20. Cotton (Monthly)

Parameter	Mean	Stdv	Mean	Stdv
Error Variance	*0.017*	0.007	*0.039*	0.004
Random intercept variance	*0.023*	0.008	0.004	0.006
Lagged Own Volatility	*0.253*	0.12	*0.181*	0.043
Lagged AggVolatility	*0.203*	0.085	0.119	0.097
Oil Volatility	*0.133*	0.048	*0.219*	0.11
Trend	*0.364*	0.134	0.004	0.047
Ex Rate Volatility			*0.071*	0.037
Mean Intercept	1.523	1.205	0.741	0.606
y(-1)	*0.813*	0.288	*1.156*	0.254
y(-2)	-0.198	0.272	-0.338	0.254
Seasonal	0.005	0.017	0.007	0.016

Table 21. (Monthly with Stocks)

Parameter	Wheat		Maize		Soyabean	
	Mean	Stdv	Mean	Stdv	Mean	Stdv
Error variance	*0.019*	0.011	*0.04*	0.01	*0.016*	0.008
Random intercept	*0.037*	0.01	0.017	0.013	*0.043*	0.006
Lagged Own Volatility	0.1	0.071	*0.064*	0.039	0.076	0.066
Lagged Aggregate	0.02	0.017	0.109	0.07	*0.101*	0.054
Stocks	*-0.11*	0.031	*-0.128*	0.073	*-0.324*	0.111
Trend	*0.338*	0.164	*0.441*	0.164	0.045	0.035
Exchange Rate Vol	*0.238*	0.124	*0.34*	0.124	0.059	0.049
Oil Price Vol	0.1	0.071	*0.064*	0.039	0.076	0.066
mean intercept	*3.274*	1.773	1.538	1.569	*4.009*	1.86
y(-1)	0.459	0.293	*0.712*	0.365	*0.488*	0.287
y(-2)	-0.059	0.278	-0.02	0.366	-0.109	0.272
Seasonal	-0.014	0.03	0.015	0.031	-0.006	0.029

Table 22. Panel Results					
Stocks Included (9 Commodities)			**Stocks Not Included**		
(9 Commodities)			**(11 Commodities)**		
	Estimate	**Stdv**		**Estimate**	**Stdv**
Lagged price	*0.392*	0.064		*0.392*	0.063
Stock levels	*-0.103*	0.055			
Export	-0.07	0.104		-0.008	0.099
Yeilds	*0.414*	0.233		*0.487*	0.219
Exchange rate	0.301	0.283		0.297	0.278
Oil Price Volatility	0.081	0.054		0.077	0.055
Intercepts					
Wheat	*-0.834*	0.064		*-0.833*	0.07
Maize	*-0.764*	0.057		*-0.763*	0.061
Rice	*-0.85*	0.091		*-0.852*	0.093
Soybeans	*-0.793*	0.074		*-0.794*	0.08
Rapeseed	*-0.647*	0.076		*-0.649*	0.086
Palm Oil	*-0.454*	0.076		*-0.457*	0.086
Cocoa				*-0.549*	0.076
Coffee	*-0.363*	0.102		*-0.362*	0.108
Tea				*-0.458*	0.095
Sugar	*-0.148*	0.068		*-0.148*	0.07
Cotton	*-0.845*	0.078		*-0.845*	0.08
Pooled Trend	*-0.083*	0.042		*-0.116*	0.041
Trends varying					
Volatility					
Lagged price	*0.357*	0.066		*0.344*	0.065
Stock levels	-0.075	0.054			
Export	-0.01	0.136		0.042	0.125
Yeilds	*0.521*	0.366		*0.672*	0.337
Exchange rate	0.298	0.28		0.296	0.276
Oil Price Volatility	0.074	0.052		0.07	0.052
Intercepts					
Wheat	*-0.833*	0.067		*-0.833*	0.072
Maize	*-0.765*	0.06		*-0.763*	0.062
Rice	*-0.853*	0.093		*-0.854*	0.094
Soybeans	*-0.794*	0.075		*-0.793*	0.081
Rapeseed	*-0.647*	0.076		*-0.647*	0.082
Palm Oil	*-0.455*	0.077		*-0.455*	0.083
Cocoa				*-0.548*	0.075
Coffee	*-0.361*	0.101		*-0.364*	0.107
Tea				*-0.458*	0.093
Sugar	*-0.148*	0.068		*-0.148*	0.07
Cotton	*-0.843*	0.08		*-0.844*	0.084
Trends					
Wheat	-0.094	0.107		-0.122	0.105
Maize	-0.122	0.093		*-0.165*	0.089
Rice	-0.14	0.117		*-0.195*	0.111
Soybeans	-0.129	0.112		*-0.192*	0.102
Rapeseed	*-0.231*	0.123		*-0.313*	0.114
Palm Oil	*-0.22*	0.14		*-0.324*	0.125
Cocoa				*-0.232*	0.091
Coffee	0.027	0.115		0.012	0.117
Tea				-0.081	0.117
Sugar	*-0.164*	0.076		*-0.196*	0.075
Cotton	-0.098	0.103		*-0.146*	0.101

Table 23	Summary of Monthly Data							
	Summary of Monthly Data	Error Variance	Random Intercept Variance	Past Own Volility	Lag Aggregate Volatity	Oil Volatility	Trend	Exrate Vol	Stocks
2	Wheat	√√	√√	√√	√√		√(+)√(+)		√
3	Maize	√√	√	√	√√	√√	√(+)√(+)	√	√
4	Rice	√√	√√	√√	√√	√√			■
5	Soyabean	√√	√√	√√	√√		√(-)	√	√
6	Soya Oil	√	√√	√√	√√	√√	√(-)	√	■
7	Rape	√√	√	√√	√√	√	√(-)√(-)		■
8	Palm		√√	√√	√√	√√	√(-)√(-)	√	■
9	Poultry	√√	√√	√	√	√	√(-)	√	■
10	Pigmeat	√√		√√		√√	√(-)	√	■
11	Beef	√√	√√	√√	√		√(+)√(-)		■
12	Butter	√√	√√	√√	√	√√	√(-)	√	■
13	SMP	√√	√√	√√	√√	√√	√(-)√(-)	√	■
14	WMP	√	√√	√√	√√	√√			■
15	Cheese	√√	√√	√√	√	√√	√(-)	√	■
16	Cocoa	√√	√√	√√	√√				■
17	Coffee	√√	√√	√√	√	√√			■
18	Tea	√√	√√	√√	√√		√(-)		■
19	Sugar	√√	√√	√√	√	√	√(-)√(-)		■
20	Cotton	√√	√	√√	√	√√	√(+)	√	■

APPENDIX 2: TECHNICAL APPENDIX

A2.1 Random parameter models with time varying volatility

For a given price series y_t (or logged series which will be used throughout this report) where $t=1.....T$, it is proposed that the following autoregressive model with a random walk intercept is used:

$$\theta(L)y_t = \alpha_t + \delta' d_t + e_t \qquad (b1)$$

Where $\theta(L) = \sum_{i=0}^{k} \theta_i L^i$ (a lag operator of finite length) and:

$$\alpha_t = \alpha_{t-1} + v_t \qquad (b2)$$

where d_t is a vector of deterministic variables[16] that are able to capture the seasonality and e_t and v_t are assumed to be independently normally distributed. The series can then be decomposed into its components:

$$y_t = Level_t + Seasonal_t + Cycle_t \qquad (b3)$$
$$Level: \mu_t = \theta(L)^{-1}(1-L)^{-1}v_t \qquad (b4)$$
$$Seasonal: s_t = \delta'\theta(L)^{-1}d_t \qquad (b5)$$
$$Cycle: (y_t - a_t - s_t) = \theta(L)^{-1}e_t \qquad (b6)$$

Therefore, this allows the separate analysis of the non-stationary component μ_t and the stationary component $(y_t - \mu_t)$. The overall volatility of the series are governed by the two variances. $h = (h_v, h_e)$ along with the autoregressive parameters. The observed volatility are produced by the errors e_t, v_t (which are assumed to be iid normal).

The inverted lag operator has the representation:

$$\theta(L)^{-1} = \sum_{i=0}^{\infty} \gamma_i L^i \qquad (b7)$$

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[16] In this case we examined both standard seasonal dummies along with the seasonal effects variables in Harvey (1989, p.41). In virtually variables we found little evidence of seasonality. For the results presented in this report, we continue to include the first fundamental frequency. However, in nearly all cases this was not significant. We continue to include it for consistency across models. However, removing the seasonal dummies would make little difference to the results presented here.

In the absence of stochastic volatility, the volatility in each of the series is governed by:

$$Var(\Delta\mu_t) = \left(\sum_{j=0}^{\infty}\gamma_j^2\right)h_v \qquad (b8)$$

$$Var(y_t - \mu_t) = \left(\sum_{j=0}^{\infty}\gamma_j^2\right)h_e \qquad (b9)$$

For a stationary series $h_v = 0$, in which case only $Var(y_t - \mu)$ is of interest. The proposed framework is able to cope with stationary or non-stationary series, since there is no requirement that $h_v > 0$ within the model. For the purposes of this study, the distinction between two volatilities will be made as follows:

$$Var(\Delta\mu_t):\ volatility\ in\ mean$$
$$Var(y_t - a_t - s_t):\ volatility\ in\ cycle$$

The model can be extended by conditioning the variances on a set of explanatory variables in the following way:

$$lnh_{v,t} = \ln(h_v) + \lambda_v' z_t \qquad (b10)$$
$$lnh_{e,t} = \ln(h_e) + \lambda_e' z_t \qquad (b11)$$

Where z_t is a vector of variables as outlined in the main text in Section 3.1.

The two measures of volatility at a particular time then become:
(where these can be aggregated to overall measure of volatility).

$$Var(\Delta\mu_t) = \left(\sum_{j=0}^{\infty}\gamma_j^2\right)h_{v,t} \qquad (b12)$$

$$Var(y_{\{t\}} - \mu_t) = \left(\sum_{j=0}^{\infty}\gamma_j^2\right)h_{e,t} \qquad (b13)$$

Restrictions and Identification

In the framework outlined above, equations *b*12 and *b*13 imply that the underlying volatility is governed by :

$$h_{v,t} = h_v \exp(\lambda_v{}' z_t) \qquad (b14)$$
$$h_{e,t} = h_e \exp(\lambda_e{}' z_t) \qquad (b15)$$

If λ_v or λ_e are equal to zero then the volatility in the long or short run component are constants. However, in the situation where h_v or h_e are zero then the associated parameters $\lambda_v \ or \ \lambda_e$ become unidentified. This does not in itself preclude estimation within in a Bayesian framework. However, unless the posterior densities of h_v and h_e are both heavily concentrated away from zero, then the standard error of the lambda coefficients will be very large. If a series can be modelled in a way where the variance could be attributed either to stationary or non-stationary shocks, then the associated standard deviation in the estimates of the lambda coefficients will be large, and determining whether the shocks in the variable in question are significant will be very difficult. In this work we avoid this problem by assuming $\lambda_v = \lambda_e = \lambda$. This implies that the long run and short run variances are proportional, but these variances can vary across in t. Since the values of h_v and h_e will not be close to zero simultaneously (since the all the series have variation) the standard errors in the lambda coefficients will be smaller. This is obviously at a cost. If the shocks to volatility (z_t) impacted differently on the long and short run components, then clearly there would be bias in the results. However, arguably, it is reasonable to assume that shocks in volatility are likely to co-vary across both the permanent and transitory components (should they both exist). Thus, while this assumption is essentially required for identification, it is highly plausible from an economic point of view.

A2.2   Estimation

Denoting the parameters that are to be estimated as Ω, the data to be explained as Y and the explanatory data as X, the likelihood function can be viewed as the probability density of Y conditional on X and Ω. Therefore, the likelihood function can be denoted as $f(Y|\Omega,X)$. For prior distributions on Ω, $f(\Omega)$, the posterior distribution is denoted as $f(\Omega|Y,X)$ and obeys:

$$f(\Omega|Y,X) \propto f(Y|\Omega,X) f(\Omega) \qquad (b16)$$

Where $\propto$ denotes proportionality. For the random parameter models, the parameters of interest are:

$$\Omega_* = \left(\{\theta_j\}, \lambda_v, \lambda_\varepsilon, h_v, h_\varepsilon\right) \qquad\qquad (b17)$$

Normal priors are adopted for the parameters $\{\theta_j\}, \lambda_v, \lambda_\varepsilon$ where the mean is zero, with a large variance so as to reflect diffuse prior knowledge[17]. For the parameters $h_v \, and \, h_\varepsilon$ inverse gamma priors can be used, as is standard in Bayesian analysis.

For any values of $\Omega = (\lambda_v, \lambda_\varepsilon, h_v, h_\varepsilon)$ the Kalman Filter can produce optimal estimates of $\{\theta_j\}$, and standard errors for these parameters, along with the value of the likelihood function. Thus, in effect $\{\theta_j\}$ are ignored in the estimation of Ω since they are viewed as latent variables that are generated for any given values of Ω but are not required for the likelihood function. Estimation of the posterior distributions are then obtained using a random walk Metropolis-Hastings algorithm (see Koop, 2003, p97) to simulate the posterior distribution. The estimates of Ω that are then produced are the mean of the simulated parameters and the standard deviations for the simulated values can likewise be obtained. The estimates for $\{\theta_j\}$ along with the standard errors are then obtained using the values $\overline{\Omega}$ within the Kalman Filter[18].

For the Panel Data a Bayesian approach to estimation is also used. In this case we use Gibbs Sampling[19]. The parameters are simply,

$$\Omega = \left(\{\beta_{oi}\}, \{\beta_{1i}\}, \lambda_v, \lambda, \Sigma\right) \qquad (b18)$$

Where Σ is the variance covariance matrix associated with the errors in equation (4) within the main text.

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[17] Note that the priors for the autoregressive coefficients are set within the Kalman Filter.

[18] Note that these point estimates are therefore conditional on the plug in estimates and strictly speaking do not reflect the mean and variance of these parameters from a Bayesian perspective.

[19] A good coverage of Gibbs Sampling is given in many textbooks. The estimation procedure of this panel can be viewed as a seemingly unrelated regression with cross equation restrictions. The details of how to estimate this model are in Koop (2003) Chapter 6.

Economic growth and the distributional effects of freer agricultural trade in the context of market concentration

Jamie Morrison and Sophia Murphy [1]

1. Introduction

The implications of freer agricultural trade for poor and vulnerable populations have been the subject of vigorous debate recently. These debates have been shaped by the on-going negotiations at the WTO and the plethora of regional and bilateral trade and investment agreements of the past decade. They have been shaped by growing concerns that globalisation, characterised in part by increasing concentration of trading activities along commodity chains, may be exacerbating inequity within and between countries. The debates have also been shaped by questions as to countries' ability to manage change in their economies to ensure positive outcomes for growth, employment and poverty eradication.

The discussion in this chapter is prompted by the following analysis: There is a strong public policy push, particularly but by no means only from developed countries, in support of trade liberalization. That push is supported by a large body of academic and expert literature, which contends that open markets and trade liberalization is the surest path to improved human welfare. Food systems, which historically have been relatively protected in most developed countries, and mostly confined to very local markets in the rest of the world, have been subject to the same push to liberalize. At the same time, it is worth noting that many non-staple

agricultural commodities, particularly tropical commodities, have been traded for several hundred years and, in their unprocessed form, have faced relatively few trade barriers.

The theory that drove much of this push to liberalize trade was derived mostly from developed country experiences and mostly from non-agricultural sectors. The applicability of this theory to developing countries in all their heterogeneity, and to agriculture, which has several unique economic characteristics, has been called into question. The interest in this chapter is therefore to consider the possible implications of freer trade for the agricultural sector in developing countries in the context of increasingly concentrated agricultural markets.

Several factors that tend to be "left out" of standard approaches to policy analysis are explored in the paper. First, there is the tendency of global agricultural trade to be dominated by either oligopolies, or by closed chains in which trade is carried out within a firm. Indeed, globalization more generally (not just in agriculture) seems to be associated with increasing concentrations of market power. Second, is the fact that exporting firms are both a tiny minority of all firms, and that they are different from the rest. Even before trade is liberalized, there are firms with particular traits that make them much more likely to thrive in an open trading context than the rest. This seems to be true of small producers, too; globalization has bifurcated rural communities, with a few producers successfully producing for the new markets that open up, and many others doing less well than they did before in the changed environment (Reardon et al, forthcoming). Analysts have struggled to account for the increasingly rapid changes in the structure and conduct of global agricultural commodity markets and in the commodity chains supplying these markets. The depth and breadth of the global financial crisis triggered in September 2008 further complicates the picture.

This chapter draws on recent insights generated by a range of theoretical and empirical approaches to the question of the implications of agricultural trade liberalization. It reviews some of the studies that have been used to investigate the growth and distributional effects of freer international trade, highlighting a number of issues that need more attention in analyses of agricultural trade reform because they may significantly influence public policy decisions about the direction and shape that trade regulations should take, and the possible supportive measures that could be required.

The objective is to inform a discussion to help ensure that countries better understand the likely distribution of any gains and losses from freer trade in agricultural products in the rapidly evolving context of today's markets, and the types of policies and regulations that could be promoted to ensure that net gains are maximised.

The chapter is structured as follows: Section 2 reviews some of the main theoretical and empirical approaches to exploring the implications of freer trade[2]. Section 3 considers issues that arise in adapting insights from the more general review to the agriculture sector specifically, particularly in the context of the degree of market concentration that typifies many areas of agricultural production and marketing. Section 4 discusses the implications of market structure and investment patterns in determining the effects of freer trade. Section 5 concludes by considering the policies and regulations that may be required to secure strong, positive outcomes for economic growth and poverty eradication as a result of further openness to international trade in the context of market concentration.

2. Measuring the effects of freer trade: Theoretical and Empirical Approaches

A wide array of approaches, levels of investigation, and types of indicators have been used to investigate the effects of freer trade. It is hardly surprising that the debate as to whether freer trade is the optimal policy approach in a specific situation remains very much unresolved: the results are all too often not even comparable because of differences in the methodology used.

Government regulations are distorting by definition from a free trade perspective. Building on the ideas of economists such as Adam Smith and David Ricardo, trade reform, the common shorthand for policies that free trade from regulatory barriers such as tariffs, export taxes, and quantitative restrictions, will allow a shift in resources towards the production of goods that the country can produce most efficiently. One of the dominant assumptions, based on the experience of developed and many developing countries, is that modernization of the economy will be associated with increased agricultural productivity, reducing the sector's demand for labour and increasing the pool of labour available for non-agricultural sectors.

In a simplified world of two or a few countries producing two or a few products, the effect of reforms on border policies may be conceptualized and tracked relatively easily. Stopler and Samuelson (1941) explain that freer trade can have strong effects on income distribution because it involves a reshuffling of resources between industries. Traditional economic theory predicts that trade liberalization in developing countries will reduce income inequality through an increase in demand for unskilled labour (for instance in manufacturing sectors). Agricultural workers tend to be categorized as unskilled because they generally lack formal education.

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[2] The review focuses on approaches most likely to shed light on impacts of freer agricultural trade. A far more comprehensive review of approaches to analyzing the impacts of greater openness to trade is provided in the WTO World Trade Report 2008

Any attempt to assess the effects of a policy change requires assumptions, baselines and definitions of what is being assessed. There are two broad ways to make the assessment. First, prospectively, termed ex ante, in which a model is constructed based on a series of assumptions and variables that then can be manipulated to look at how changes to one or more of the variables affects the whole. Secondly, retrospectively, or ex post, in which the analyst looks at how one or more variables actually changed when one or more policies were changed.

To be useful, models need both to be accurate and to measure something the policy-maker is interested in. In other words, the results need to be pertinent. The ex ante models can at best indicate likely results or tendencies. Yet not every decision can wait for empirical evidence and ex ante models therefore offer an important tool for informing policy changes in advance. Ex post results can feed into the design of future ex ante models, allowing a continual process of improvement and ensuring the prospective models continue to be useful. Ex post analyses, in attempting to investigate or explain the relationship between actual changes in policy and the variables of interest can shed significant light on both the interpretation and design of ex ante approaches.

Policy makers charged with regulating trade are interested in the immediate impact of reforms on specific sectors, for example whether the sectors, and households dependent on these sectors, will become more susceptible to external shocks following reform. They are also interested in longer-term impacts, for instance on aggregate employment levels. Policy makers don't just want to know to what extent the benefits of reform might outweigh the losses at the national level, but also which segments of the population are expected to make gains and which might lose.

2.1 Difficulties with predictive approaches

Most real world situations are more complicated than the two or few country examples. When multiple countries with vastly different levels of technological development, different resource endowments, different levels of market distortions and widely different sets of preferences, undertake complex sets of reforms simultaneously, it becomes very difficult to determine where the gains and losses will fall, let alone their relative magnitudes. Economies are dynamic and sectors interact with one other in sometimes unpredictable ways. Debates over whether and how to liberalize agricultural trade provide a rich source of examples of the difficulty of assessing the impacts of a policy change; the studies undertaken to inform the current Doha negotiations alone number in the 1000s (Hess and von Cramon-Taubadel, 2008).

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[3] See FAO Trade Policy Technical Note No. 13 (2006) for more discussion.

Global trade simulation models have been widely used in debates on whether and how to liberalize trade in agriculture. In attempting to synthesize the implications of complex trade policy reforms across widely differing country and commodity specific context, analysts have been forced to make simplifying assumptions. These mean that modeling has at best been shown to be a blunt tool of analysis. At worst, it has been widely criticized for its potential to produce misleading results[3]. For example, if the starting assumption is that agricultural markets tend to chronic oversupply rather that balance between price and demand at a price that satisfies both, then the points of equilibrium on which the models rely to generate their conclusions are actually pointing to disequilibrium instead (Koning & Pinstrup-Andersen, 2007, p.9).

There has been considerable criticism that too many of the most commonly used ex ante models fail to meet accuracy and/or pertinence criteria. The problems are linked to the assumptions that shape the model, assumptions about what it is important to measure, the accuracy and relevance of the datasets used and the political context that shapes both the creation of the model and how researchers' findings are interpreted and presented.

This chapter does not provide a comprehensive review of ex-ante approaches. Instead, we look at some different approaches and highlight some of their weaknesses. A recent study by Hess and von Cramon-Taubadel (2008) attempts to provide a systematic explanation for the varied outcomes that result from liberalisation in different simulations. The authors consider the characteristics of the model in question; the outcomes measured (changes in welfare, GDP, trade flows, etc); the different liberalisation scenarios used; the different specifications (partial or general equilibrium, the level of aggregation); the different data sets used; and, the research context (in particular, the affiliation of authors and whether the study was independently reviewed). The authors develop estimates of the degree to which such factors affect the results. The categorisation of factors and the insights reported are consistent with those developed in FAO Technical Note No 13 (2006). Both papers inform the following discussion.

2.1.1 Assumptions on what to measure

Ex-ante models often use an estimate of net consumer welfare as the principal indicator to judge whether a policy change was positive. Any gain in net consumer welfare is assumed to be desirable. While the welfare measure is a useful indicator for comparing the relative efficiency of different policy options, it may not be the indicator that most interests policy makers. Government officials are likely to be more interested in the possible impacts on employment, wage levels, and/or on both absolute and relative poverty. *Ex ante* models can measure these, too, but only by making a number of further assumptions that then have to be considered alongside the results, so as to ensure the results are interpreted correctly.

2.1.2 Assumptions that shape the outcome

As Charlton and Stiglitz (2004) state, "(T)he standard argument that trade liberalization makes all countries better off is predicated on a set of assumptions that may not be satisfied in many developing countries: full employment, perfect competition, perfect capital and risk markets. In many developing countries, unemployment is high and markets imperfect, so trade liberalization may have different effects to those anticipated in simple models."

In most models, full (or at least fixed) employment of labour (and other resources) is assumed. This is not because analysts firmly believe this to be the case, but because for a model to reach a solution, certain assumptions must be made as to how a model "closes". At its simplest level, the labour market can be characterized by one equation, where the demand for labour equals the given supply of labour in equilibrium. However, this equation relies on two variables, the amount of labour demanded and the wage rate. The analyst must make a choice as to which variable will be endogenous (determined within the model by changes to the variables factored there) and which will be exogenous (independent of the variables considered by the model). That is, the analyst must choose whether to assume a labour market with full employment or a labour market with involuntary unemployment. In the context of understanding the impacts of trade reforms the full employment assumption can be problematic as it means that agricultural producers who lose work as a result of trade liberalization are assumed to find employment in other sectors, limiting any possible decrease in welfare. If the agricultural producer (or worker) does not actually find another job, their (calamitous) loss of welfare remains invisible. Consumer benefits, if they are used as a proxy for the population as a whole and if the importance of employment in overall welfare is ignored, can be a misleading indicator and hide what is a perfectly common - and strongly negative - outcome: namely, unemployment and increased poverty.

If governments are interested in the employment effects of policy reform, models that assume away the possibility of involuntary unemployment may be largely irrelevant. Policy-makers tend to see trade policy as a source of change in how jobs are distributed across sectors. The possibility that unemployment might be the result is often not allowed for in the model.

In developing countries, where the immobility of labour is generally significant, trade reforms often move workers in or out of underemployment in agriculture and small-scale trading. An assumption of flexible employment (fixed wage) may be more realistic since it allows for the employment of unemployed labour to increase with the demand for consumer goods.

Assumptions about market structure and scale economies are also important in estimating reasonable expectations on how large the gains from liberalization will

be. Often, the effects of perceived market imperfections are captured in models in a broad-brush fashion by inferring an assumption about the returns to scale. Agriculture, because it is made up of millions of small producers, is generally characterized as having constant returns to scale (CRS), while manufacturing is assumed to have increasing returns to scale (IRS). In models where the returns to scale assumption differs across sectors, e.g. CRS agriculture and IRS manufacturing sectors, agricultural liberalization tends to produce small gains and even losses. In contrast, CRS-only models tend to show that the largest welfare gains come from agricultural liberalization.

The case for freer trade supported by most global trade models is based on the assumption of perfect competition, with CRS assumed across all sectors. However, the modernisation of agriculture may be associated with IRS. If in reality there is a situation of IRS characterized for example by oligopoly, theory suggests that government intervention may be optimal. This contention is also consistent with the extensive historical experience of successful agricultural-led development behind high tariff walls and with active government intervention.

2. 2 Findings of empirical studies

Clearly, the assumptions and structural characteristics of models largely predetermine the impacts that are generated as a result of policy reform. It is therefore critical that these assumptions and characteristics are as accurate as possible. *Ex post* empirical work can inform analysts about the relationship between trade liberalization, economic growth and poverty alleviation. Of course, such approaches are also subject to assumptions and context specificity, but this section attempts to shed light on some aspects that might be better incorporated into *ex ante* approaches.

2.2.1   Impacts on growth

Kneller et al (2008) argue that evidence at the empirical level does not support the contention that the relationship between openness and growth is always positive. Some studies do suggest a positive relationship (increased growth as economies become more open), for example Edwards (1998) and Greenaway (2002). But others find a negative relationship, for example Rodriguez and Rodrik (1999).

Rodriguez and Rodrik argue that the case that more open economies are more likely to perform better than more closed economies has been too strongly put. They start by asking whether countries with lower policy induced barriers to trade grow faster than countries that are relatively more protected. Their findings suggest there is little evidence that open trade policies are significantly associated with economic growth. They conclude it is better to look for contingent relationships between trade and growth: for instance, do trade restrictions operate differently in poor

than in richer countries; or in countries with a comparative advantage in primary products compared to those with a comparative advantage in manufacturing?

Interestingly, even 10 years ago, Rodriguez and Rodrik pointed to the need to reorient theoretical and empirical work (both *ex ante* and *ex post)* to look at firm level data to determine how trade policy influences production, employment and technical performance of firms. They suggested that efficient producers tend to self-select – i.e. that firms first achieve a certain level of productivity and then they start to export rather than exposure to the export market creating the change in productivity. They called for a better understanding of the connection between trade policy and economic growth to test these findings.

In trying to sort through the evidence, Kneller et al focus attention on whether the mixed effects reported in different studies are conditional on factors being omitted from regression analysis and/or whether they are related to ways of measuring openness. They note especially that when a simple one-zero indicator of openness is used (i.e. a country is judged to be open or shut with no indicator for partial opening), the indicator may miss important information on the timing of liberalisation, the types of trade policy variables in place and/or degrees of openness.

In analysing evidence from reforming countries, Kneller et al find that the effect of greater openness, while positive at the mean, differs considerably across countries. For example, in comparing periods five years after liberalisation with periods five years before liberalisation in a set of 48 countries, they estimate an average increase in growth rate of 0.87 percentage points per year but find that the difference between the maximum and minimum increases in growth rates is 18.64 percentage points, and that while growth rates increased in 28 countries, they fell in 20 countries. Extending the post reform period to ten years increases the proportion of gaining countries, but a still significant proportion of countries were found to be worse off. The authors suggest therefore that the estimated effects in previous studies are highly sensitive to the selection of countries in a sample – essentially, the effect on growth can be negative, zero or positive depending on the countries selected and the period under study.

Kneller et al also note that there is a positive correlation between the rates of growth before and after reform such that if a country is successful before reform it is more likely to be successful afterwards. This further limits the conclusions that can be drawn from regression analyses.

2.2.2 Impacts on equality

Just as *ex-post* analyses have provided mixed and inconclusive evidence on the impact of openness on economic growth, so have they on the impact of openness

on inequality. A recent article in *The Economist* (2008) draws attention to a change in the opinion of a prominent economist in this field. They note that earlier work by Paul Krugman had convinced economists that increased trade openness was not a significant factor behind subsequent increases in inequality. Instead, Krugman asserted that so-called Skill-Biased Technical Change (SBTC) was far more important in explaining inequality. This was the term coined to describe how new technologies tended to favour higher skilled workers, and to increase the premium that skilled workers could earned as compared to unskilled workers. Today, Krugman has changed his mind. He now says, on the basis of the evidence from the United States, that the impact of trade on inequality is greater that previously thought. He suggests that this is in part because more of America's trade is with developing countries, for example China, and that the growing fragmentation of production means that more tasks are tradable, increasing the universe of labour intensive jobs in which countries such as China can compete. He also says that researchers have ignored the fact that the data they use to determine the relationship between trade reform and inequality is out of date. Krugman goes so far as to say that given current data, it is not possible to quantify the effect of increasing trade on wages. The combination of vertical integration, concentrated horizontal market power, and emergence of global value chains for a number of agricultural products is worth reviewing from this perspective.

Despite Krugman's criticism that the data is out of date, it is instructive to review conclusions drawn by existing studies on trade openness and inequality. Many recent studies use the data set constructed by Deininger and Squire. This led to a number of studies, which can be broadly divided into two. One set evaluates the relationship between openness to trade and income inequality. The other set models the relative factor endowment of countries and looks at how that affects the impact of increased openness to trade on inequality. Factor endowments include arable land, capital, and labour, including the relative share of skilled workers.

Results in the first group, looking at trade openness in relation to relative income inequality, are mixed. In the former set, perhaps the most cited study is Dollar and Kraay (2004) who found no statistically significant impact of trade on the income of the poor in a sample of 72 developing and 24 developed countries. Commentators such as Perry and Olarreaga (2006) suggest that it is unsurprising that global studies have not found a statistically significant negative effect of openness to trade on wages or on household income inequality given the differences in initial conditions and factor endowments. It is often contended on this basis that increased openness to trade does not seem to create increased inequality among household income levels. However, the results actually indicate that there isn't a simple homogenous relationship between reform and income levels. The same observation is made by Perry and Olarreaga of most country level studies. For example, they report that Nicita (2005) finds that trade liberalisation increased income inequality in Mexico and that Galiani and Porto (2005) find similar results for Argentina.

Perry and Olarreaga's study provides a rich source of evidence that brings together insights on the effects of trade openness on growth, inequality and poverty. The study investigates how trade liberalization in different Latin American countries affected wage inequality, income inequality and poverty. Their key finding was that—in contrast to the cases of the Asian tigers, where trade openness was associated with decreased or constant wage inequality but where income inequality at the household level tended to increase—in Latin America, wage inequality tended to increase, as to a lesser extent did income inequality. The poverty effects varied widely when households' consumption expenditure patterns were brought into the analysis.

These results are "unexpected" because they do not conform to what theory would predict, especially with regard to wage inequality. The authors explain the deviation as the result of the relative factor endowments of Latin American countries, which tend to be rich in natural resources, which, in turn, complement existing capital and skill levels. The authors also note that initial conditions and contemporary events, different impacts of consumption patterns, and imperfectly functioning labour markets make it difficult to draw generalised conclusions from the findings.

The consequences of similar trade reforms are therefore very different in countries with different factor endowments. Land is heavily concentrated in most of Latin America providing significant returns to landowners. The effects on income distribution depend critically on the complementarities with capital and skills. These complementarities are apparent in countries exporting agricultural raw materials, but are lower for countries specialising in foodstuffs (where supply chains are shorter and producers generally receive a larger share of the final selling price).

It is important to note that most studies did not observe large labour reallocations across industries after trade liberalisation in Latin American countries. Several studies find that the share of skilled workers has increased substantially in most industries in the last two decades and that intra-industry effects dominate inter-industry effects in explaining increased demand for skilled labour after trade reform. Increased competition leads to a significant reallocation of labour towards more productive (and skill intensive) firms within industries subject to trade liberalisation.

Initial conditions also matter. Latin American countries used to protect sectors that used relatively more unskilled labour. So opening trade reduced protection more sharply in these sectors, making the reduction in demand for unskilled labour sharper than for skilled labour. For example, in Brazil protection of unskilled labour intensive sectors fell by 27 percent, compared to a reduction in protection of skilled labour intensive sectors of 16 percent. The respective numbers in Mexico were reductions of 24 percent and 17 percent. Perry and Olarreaga (2006) point out that labour market rigidities may have mitigated or delayed the reallocation of labour in response to price changes and that they may also have added to unemployment and/or increases in informal employment.

2.3 How has the empirical evidence changed the theories?

Critical to the conclusions drawn from ex ante studies, but not always adequately picked up on in ex post studies, is the extent of resource reallocation across sectors. Hoekman and Winters (2005) conclude that the short-term impacts of reform generally involve reallocation within sectors. The more productive firms expand while those that are less competitive with imports contract. They contend that the simple trade theory that predicts that trade results in a redistribution of employment away from import substituting sectors and towards export production assumes a world of homogenous firms and products and of inter-industry specialisation and trade. However, in practice, sectors do not contain homogenous firms. Indeed, there is an increasing degree of concentration in many sectors. In addition, most trade is intra-industry. The exchange is composed of differentiated products between countries with similar factor endowments. This is important because the empirical evidence suggests that most adjustment occurs within industries. That is, it is not simply that, for example, the garment industry declines while commodity production expands, but rather that trade liberalization transforms both the garment and commodity sectors, as one or several firms expand and thrive, while other firms fail to remain competitive in the changed environment.

The role of firms in determining gains and distribution of gain from freer trade is not generally discussed in modelling exercises. The fact that the latter is missing is increasingly seen as a major limitation. The inclusion of a "heterogeneous firm" rather than "representative firm" assumption can affect modelling results and interpretation significantly.

The following discussion draws on Bernard et al (2007) to highlight different ways in which reallocation of resources can be induced and gains generated, and the associated "new" distributional stories associated with trade reforms.

The starting point for Bernard et al is that the representative firm assumption, whilst helping with the tractability of CGE analysis, is rejected by the data and could be potentially misleading. Bernard (2006) notes that traditional trade theory explained the flow of goods between countries in terms of their comparative advantages and saw welfare gains as being due to specialisation in line with comparative advantage. New trade theory retained the characterisation of the representative firm, even while it added differentiated varieties, increasing returns to scale, and the potential to measure welfare gains arising through a combination of economies of scale and expansion of product varieties available to consumers.

Bernard suggests that action at the firm level provides an additional source of gains. This is the aggregate productivity growth driven by the contraction and exit of low productivity firms and the expansion and entry of higher productivity firms in sectors facing increased competition.

A number of issues related to firm level decisions are highlighted in the literature:

2.3.1 Small numbers of exporters

Evidence (primarily based on US manufacturing firm level data) suggests that a small number of firms export and that these are substantially different from non-exporting/importing firms. Even in sectors where the United States is thought to have a comparative advantage, the majority of firms produce only for the domestic market (Bernard et al 2007). Of the 5.5 million firms operating in the US, just 4 percent are exporters and the top 10 account for 96 percent of total exports. International trade is therefore very concentrated across firms. Economies of scale in overseas distribution and marketing favour the concentration of trade in a small number of producers.

The absence of trade flows are usually explained by traditional trade theory in terms of prohibitive trade costs and complete specialisation. However, the theory doesn't explain why some firms export and others don't; or why most firms export to one destination and/or export a single product, but account for a small percent of the overall value of exports from the country.

2.3.2 Implications for firm survival

One explanation is that as trade costs increase, lower productivity firms no longer find it profitable to serve these export markets, but as size of market increases and fixed costs fall, they enter. A key constraint to more firms acting as exporters is the cost of being an exporter. Bernard et al identify an *ex ante* productivity advantage, with exporters being more productive before exporting, not as result of exporting. This means certain firms self-select as exporters. While firm level productivity is not improved by exporting, exporting does benefit the firm in other ways. For example, failure is less likely for exporters.

Exporters are substantially and significantly different from non exporters in same industry. In the United States, they are larger with 97 percent more individuals employed, more productive by 11 percent for value added per worker and by 3 percent for total factor productivity, they pay higher wages by 6 percent; and they are more capital and skill intensive.

When trade barriers fall, high productivity exporting firms in an industry survive, and lower productivity non-exporting firms tend to fail. High levels of import competition from low wage countries can threaten growth and survival, but are especially problematic for low capital low skill firms in any industry. Firms in high wage countries facing increased competition from low wage countries are more likely to change their output mix towards products made with more capital and more skilled labour.

2.3.3   Implications for resource shifts

There is therefore, an important role for trade liberalisation in enhancing aggregate productivity through reallocation across firms, as opposed to the *ex ante* analyses which generally assume that reallocation is across industries.

The result is reallocation of resources *across firms within sectors* (and this is far more important than across industries/sectors). Therefore net changes in employment of resources between industries implied by theories of comparative advantage are small compared to changes within industries. The shift of resources from lower to high productivity firms generates improvements in aggregate productivity. Exporters grow more rapidly than non exporters therefore reductions in trade costs are likely to benefit the largest, most productive, most skill and capital intensive firms in any given sector.

2.3.4   Implications for inequality/poverty

The recognition of intra-industry resource reallocation has implications for the distribution of benefits across factors of production. For example, increased wage inequality can be associated with changes in employment across firms in an industry. There can be changes in the output mix of firms (towards more capital, skill intensive goods) as they face increased competition from low wage imports, and as a result, increased wage inequality is largely associated with changes in employment across firms in the same industry

The discussion above highlights a number of issues to take forward into the review of the impact of trade reforms on agriculture in developing countries. First, the ex ante models are useful, but tend not to be used carefully enough. Without sufficient understanding of the assumptions, datasets, and potential political pressures on the authors (or on those using the model to support their arguments), it is easy to make serious policy mistakes. Second, the evidence on how trade liberalization affects, and is affected by, economic growth, relative poverty and absolute poverty, and employment is mixed. Third, issues such as concentrated market power, are seldom accounted for in any of the models, and not often commented upon in the ex post literature either. A clearer understanding of the intra industry firm level decision making processes and the associated power and pressures behind global food and agriculture trade will help officials to make better policy decisions.

3. Implications for impacts of freer agricultural trade

3.1 Is agriculture different?

The previous sections draw insights from a literature primarily based on manufacturing sector responses to reform to trade policy and the associated reduced costs of trade. How can these insights be applied to what we know about agriculture, trade and economic growth? Agriculture has a long history of being managed in different ways than industry. Food security is closely linked to national security for many governments. For many developing countries, agriculture is also the primary source of employment and the only safety net if the formal economy suffers a downturn. South East Asia in the wake of the 1998 financial crisis and the former Soviet states when the USSR collapsed each provide examples of countries in which urban populations returned to the country in response to economic hardship. Some developed countries have protected their agriculture ferociously and all of them have long histories of interfering significantly in agricultural markets, using a variety of policies including price supports, variable levies on imports, public storage programmes, and export subsidies.

A number of commodities, particularly tropical commodities for which there was significant demand in developed countries and strong supply capacity in developing countries (tea, cocoa, tropical fruits, as well as non-food crops such as cotton and rubber), have been widely traded for centuries. These crops face few trade barriers: import duties on unprocessed tropical commodities are low, except where one producer might seek to protect itself from a neighbouring producer. The big exceptions to this pattern are the so-called rice pudding commodities (rice, sugar and milk) and a handful of other products that can grow in more temperate climates and therefore compete with developed country production (tobacco, peanuts, cotton).

Agricultural commodity trade has faced two problems historically: price volatility and declining prices relative to manufactured goods. In short, countries that export commodities do not know from year to year how much money the exports will earn, and regardless, each year it takes slightly more grain or tea to buy cars or machine parts. Both problems relate to inelastic demand, but less discussed in the literature, but as important is the tendency of agricultural commodity chains to concentrate market power. The problem is not new. To take the simplest example, a village is likely to have one mill and one baker but possibly dozens of wheat farmers. Commodity processing is inherently more capital and less labour intensive than the production. The Canadian Wheat Board, for example, was founded in the 1930s as a government-led response to popular demand from farmers that they were not getting a fair deal from the private grain firms. The Australian and New Zealand commodity boards have a similar history. Some of these oldest examples of government-managed trade are located in countries with a big exportable agricultural surplus.

3.2 Globalization and developing country agriculture

There is no doubt that globalization has changed the context underlying the established understanding of commodity markets. Since the first structural adjustment loans of the early 1980s, much of the world (both developed and developing) has engaged with a relatively deep and long-lasting economic experiment that can be (simplistically) characterized as a reduced role for the state in direct management of the economy, more open borders to increase both export and import flows, and deregulated currency movements. Coupled with these policy changes, and to some extent driving them, are new technologies, particularly in information management, communications and transportation, which have opened considerable new possibilities for globalized production chains. The technology required to establish global supply chains that stretch the globe and supply non-traditional commodity exports such as seafood and fresh vegetables did not exist thirty years ago. Nor were there supermarkets with sufficient capital to build those chains.

Noting the importance of this profound shift in economic orientation in a forthcoming special issue of *World Development*, Reardon et al (2009) divide the past 60 years of food and agrifood processing in developing countries into two stages: the 1950s through early 1980s, which they characterize as "public-sector governed food system transformation" (including state-owned retail stores and marketing boards, and parastatal processing firms) and the 1980s through to today, dubbed "liberalization/globalization."

This second stage has seen a doubling in food trade. Yet the authors argue that the structural transformation of food systems within developing countries has been much more significant than the growth of trade: there has been a huge influx of foreign direct investment (FDI), linked to building and consolidating food processing and retail. This investment is associated with the emergence of fast food outlets and supermarkets (and the processed foods they stock), pushed by demand from urban consumers in developing countries (in many cases with increasing disposable income) and made possible by the changes to both internal and external economic policies. The authors argue economic liberalization has transformed food and agriculture, and that trade has been less important than changes to FDI flows and regulations.

3.3 Reactions of agriculture sector firms

Hoekman and Winters (2005) note that adjustments to agricultural price shocks or to increased competition maybe quite different to the types of adjustment that occur in manufacturing, with greater inter-sectoral allocations of labour than expected. FAO's prospective report on food and agriculture, (2003) attributes this to the growth in trade of manufactured products, assisted by the rapid expansion

of intra-industry and intra-firm trade, exploiting a division of labour within companies operating across various countries and continents. Much of this trade is in components or semi-processed products. It is part of the shift of unskilled and semi-skilled jobs from developed to developing countries.

However, the FAO report also notes that there has been very little intra-industry or intra-firm trade in food and agricultural products and that the nature of agricultural trade is more often largely determined by agro-ecological conditions and by investment barriers that make international sourcing more difficult for agriculture. For example, a number of countries prohibit or limit the right of foreign entities to own land. Where these barriers have declined the exchange of processed and semi processed agricultural products has increased considerably and brought about levels of intra-firm trade close to those in non-agricultural products. Much of this trade is in response to the demand of global food companies and traders.

3.4 Concentration in global agricultural commodity markets

There is a long history of commodity trading firms with monopolistic or oligopolistic control of a country's trade in one or more commodities. Some of the firms were established by the state: the Canadian Wheat Board (CWB), which dominates the world market in durum wheat sales, for example. Some are publically listed, such as Archer Daniels Midland (ADM), Nestlé and Unilever. A third important group is privately held, such as Cargill, Bunge and Louis Dreyfus. Most have long histories: the big grain traders (apart from ADM) were founded in the middle of the 19th century. Nestlé and Unilever are 19th century firms, too. The CWB is a product of the Great Depression of the 1930s (and in part was a reaction to the market power of the private grain traders).

Food companies are notable for their longevity and their remarkable profitability. In its 144 years of operation, Cargill has only posted an annual loss three times: in 1921, 1936 and 1938 (Morisset, 1997).

The industry is not just stable: profits continue to grow. While 2008 was a difficult year, with prices setting record highs before falling dramatically, the large multinational agribusiness firms are sufficiently diversified to have shown strong, and in some cases astonishing, profits. Most livestock producers suffered, for instance, because feed prices are roughly 50 percent of the cost in that industry and feed prices hit record highs in 2008. On the other hand, those firms like Cargill that sell the grain as well as feeding it to cattle, made money elsewhere. The biggest profit-maker for Cargill in 2008 was its share in Mosaic, a fertilizer firm it helped start in 2005. Bunge, too, showed huge profit rises based on its fertilizer business. As Table 1 shows, Cargill almost doubled its revenue in just four years, from fiscal year 2004 to 2008.

T<small>ABLE</small> 1.
Cargill's revenues and profits (Million US $)

Year	Sales And Other Revenue	Profits
2001	48,631	
2002	50,398	
2003	54,390	
2004	62,907	1,330
2005	71,066	1,530
2006	75,200	1,540
2007	88,300	2,340
2008	120,400	3,640

Source: Cargill's financial statements (available at www.cargill.com)

Perhaps more staggering, Cargill was not far off doubling its profits in that same period. Net earnings in the second quarter of fiscal year 2009 are up 25 percent over the same period a year ago. Earnings in the first six months of fiscal 2009 were up 43 percent over the year before, apparently based entirely on the profitability of Mosaic: Cargill's public statement said earnings for the period were otherwise slightly lower than the same period a year ago. The presence of dominant firms at the global level of commodity trade is not new. But although they have always been large, they have been getting still larger with the opportunities afforded by globalization.

Bill Vorley with the International Institute for Environment and Development (IIED) documented market structures for a series of agricultural commodities (including oil seeds, grains, dairy, tropical commodities, fruits and vegetables, and meat) in a report for the UK Food Group (Vorley, 2004). In the report, he illustrates a clear pattern: most global commodity markets are characterized by an hourglass shape, with a large number of producers and an even larger numbers of consumers on either side of a narrow band of relatively few traders, processors and retailers. The distribution of the retail price of a banana sold in a UK supermarket (in pence) offers a stark but not untypical view of the financial implications of this hourglass shape:

For each £1 of bananas sold in a UK supermarket:

- The plantation workers receive 1.5p
- The plantation owner receive 10p
- The international trading company receives 31p (includes 5p EU tariff)
- The ripener/distributor receives 17p
- The retailer receives 40p

(Source: Banana Link. Based on June 2003 prices; cited in Vorley, 2004).

The dominance of a small number of firms was reported in the World Bank's *World Development Report 2008*, using the measure of concentration ratio (CR). If the top four firms control 40 percent of the market, the phenomenon is expressed as CR4 = 40 percent. At that level of concentration, most economists agree that competitiveness is undermined, although it is important to pay attention to how the sector is defined as well as to ease of entry into the market.

The scale of the market studied (local, regional, national, or global) as well as the definition of the sector (all grains, cereals, wheat, durum wheat, or durum wheat grade 2) matter. It is also useful to remember that when a firm such as Cargill looks at the market for competitors, it is not looking at the same market as the millions of individual farmers who grow gain, nor even, where they exist, the same market as farmer-owned marketing firms. At the local grain elevator, a U.S. farmer might be lucky to have even two firms to choose between who will buy his or her grain. Globally, however, the grain giants see plenty of competition (not many firms, but the few that are there are powerful). Moreover, the grain giants are constantly looking for ways to capture more of the value-added from the commodities they trade, and compete in those businesses with existing specialist firms (for instance, Barry Caillebaut in the cocoa grinding business) or with the food processors. Governments need to pay attention not just to the level of competition in the global markets where global firms operate but also the competition in the markets in which small producers engage. A firm might have a local monopoly in a business that is not typically characterized by monopolies, affecting how policy interventions would play out.

Nonetheless, the CR is a useful measure. The work of academics such as Bill Heffernan and Mary Hendrickson illustrate that not only are a number of CRs at or above the 40 percent mark, but that concentration is increasing, and has been for some years. Most of the following statistics are for 2004, and measure concentration in global markets:

- CR4 for agrochemical companies is 60 percent.
- CR4 for coffee traders is 40 percent, while for coffee roasting, it is 45 percent
- CR4 for cocoa trading is 40 percent, for grinding 51 percent and for confectionary manufacturers 50 percent.
- CR5 for bananas is over 80 percent
- One company, Monsanto, is estimated to control roughly 90 percent of all genetically engineered seeds in commercial distribution.

A number of the largest agribusinesses and food companies have global profits larger than the GDPs of the poorest countries. In 2008, Cargill reported net earnings on sales of USD3.95 billion, which is greater than the GDP of some 44 countries in 2007, as measured by the World Bank. In 2007, the food processor Nestlé posted a profit of USD9.7 billion, greater than the 2007 GDP of the 65 poorest countries by

the World Bank's measure. Wal-Mart, the world's largest company and the world's largest private sector employer, with an estimated 20 percent of all grocery sales in the U.S. and over 6 percent of the global total, posted profits of $13.3 billion over the fiscal year ending January 31, 2009. That is more than the 2007 GDP of almost half the countries in the world (88 in total) in profit alone - total revenue was several hundred billion dollars.

In the past decade, the "retail revolution" in food has dominated much of the discussion about investment and trade in agriculture. Food retail has undergone dramatic consolidation in many markets, not least in developed countries. A number of the biggest retailers are now global firms. Wal-Mart, by a wide margin the world's largest supermarket operator, opened its first store abroad—in Mexico City—in 1991. The biggest supermarkets not only sell food to millions of households but increasingly invest into procurement, sometimes as far as individual farms, to guarantee their supply of own-brand foods and fresh produce. The retailers are buying commodities (most often horticulture, but also for meat and fish) straight from developing country producers or intermediaries, for export to their stores in both developed and, increasingly, developing countries. The retailers are also transforming food distribution within especially higher income developing countries by taking over parts of the local retail sector and establishing supermarket-style shopping where it had not existed before.

A range of studies suggest that oligoplies, oligopsonies, two to three dominant firms with a "competitive fringe," market leaders (where one firm dominates), are all common in commodity sectors (UNCTAD, 1999; Hendrickson et al, 2001; Vorley, 2004). Most commodity markets have significant barriers to entry, so the competition—while real—is confined to a (very) small number of firms. Recent reports that look at both the scale of concentration and the trend towards increasing concentration include ETC Group's 2008 study, *Who Owns Nature?* and a report by Hendrickson et al for Oxfam USA in August of 2008. Bill Heffernan and Mary Hendrickson have a series of reports, mostly written for the U.S. National Farmers Union, that document trends and changes in corporate concentration since the mid-1990s. The table 2 shows the steady increase in concentrated market power in a number of agricultural sectors in the United States.

That transnational agribusiness is powerful is not really in question. Yet the fact of this power is simply ignored in most models looking at how trade liberalization will unfold in developing countries. This gap is lamentable, especially given the importance of intra-firm trade, the development of private standards that rival tariffs as a barrier to trade, and the dismantling of a number of state-run services on the assumption that a competitive private sector would do a better job.

Is concentrated market power a problem? One of the first concerns that comes to mind—that dominant firms could manipulate prices—is probably the least likely

TABLE 2.
Concentration in US agricultural markets (Historical CR4)

	1987	1989	1990	1995	1997	1998	2000	2001	2004	2005
					%					
Beef Packers			72	76		79	81			83.5
Broilers			44			49		50		
Pork packers	37	34	40					59		64
Flour Milling	44		61							63
Soy Bean Crushing	71									80
Food Retail					24			38	46	48

Source: Hendrickson et al (2007).

to arise. Market power means the ability to affect prices in one's market. Ideally each actor in a market will have some degree of market power, to avoid gross exploitation, although power is seldom absolutely equally divided. But excessive market power creates the possibility of charging more than is fair (or more than conditions warrant). For the most part, outright price fixing is rare, in part because it is difficult to put in place and maintain. It does happen, however, even in the by and large well-regulated markets of developed countries. Several firms with oligopolistic power have colluded to fix prices—perhaps most notoriously on lysine and citric acid (Lieber, 2000). Such cases are at the expense of the consumers (in these cases, food processors), who were the ones that prosecuted the cases. But producers, too, lose out because the inflated prices stifle potential demand.

For the most part, such collusion is illegal, difficult to implement, and too risky to attract firms that anyway have such a strong market presence. The possibility of collusion is in itself troubling, however, as it undermines the confidence of other actors that the market is working as it should. Even in the absence of collusion, competition is weak. The capital required to finance commodity trades are huge (and often underwritten by the public, in the form of export credits, for instance). The biggest commodity traders run financial services divisions, so they can offer clients the financing required to buy grain or other products from the firm. As the number of firms in a sector diminishes and as important parts of agrifood supply chains become vertically integrated, simple but essential functions such as price discovery no longer work effectively. Markets become opaque and subject to failure.

A forthcoming book edited by Clapp and Fuchs (2009) considers the political implications of this economic predominance. In most of the countries in which they operate, developed or developing, the firms are significant enough to merit a place

at the national decision-making table, where discussions on food standards, tariffs and export taxes, investments in transportation infrastructure, labour legislation, and land use are made. In any one of the 160 or more countries where firms such as Cargill or Nestlé operate, any national stakeholder consultation on trade and agriculture is likely to include them, or their local subsidiary.

4   What do these commodity market structure and investment patterns imply for freer trade?

McCorriston (2007) has previously noted how agricultural economics seems to have missed the challenge to classical economics presented by so-called new trade theory of the 1980s. He writes, "As such, there is a significant gap in the understanding of how imperfect competition affects the outcome of trade liberalisation in commodity markets, not because of a widespread belief that commodity and related markets are necessarily competitive (though this view is still common among some researchers) but because the links between market structure and trade policy have typically been ignored."

Some of the concerns that concentrated market power give rise to include: inequitable distribution of the benefits of production and trade; reduced opportunities for the development of a domestic industry; and the development of infrastructure to serve export markets or large urban centres at the expense of other areas within the country or region. There are also differences in what happens to a horizontally concentrated market (few firms at a given point in a commodity production chain) and in a market that is characterized by vertical concentration (where a few firms dominate a number of different points along the chain).

Given the prominence of market concentration, the following discussion looks briefly at some of the key development indicators from an economic perspective—export revenues, import bills, foreign direct investment (FDI), employment, equity, capital formation and location—and considers the effects of trade liberalization policies in the context of concentrated market power.

4.1   Export Revenues

Much is still unresolved in discussions on whether and how concentrated market power affects countries' export revenues. What is clear is that commodity-exporting countries have steadily been losing their share in the final value of the commodities their farmers grow. In 1970-72, developing countries received around 60 percent of the value-added on commodities. Today that share is around 28 percent.

Some of this is about changes to the processing of commodities, in which more value is added upstream (when you sip a latte in midtown Manhattan, for instance,

the costs of what you are sipping are likely to list rent, staff, and maybe even milk before coffee). Producers of a raw commodity are not in a simple relationship with processors who use the commodity as an ingredient in their processed food or drink. Coffee or tea is a relatively straightforward production chain, where the final product is processed (roasted or cured) but not otherwise much transformed before sale to the final consumer. Most primary commodities, however, are only one ingredient in a more complex product: cocoa is essential to making chocolate, but sugar and dairy products are also key costs for the processor. Any analysis has to factor in the quite distinct cost and profit constraints on the processor from those on the producer (Gilbert, 2008).

But some of this is also about the market power of the large traders, who have been able to source raw commodities at less than cost of production prices in many cases, and then been able to charge much more for the finished commodities. A World Bank economist, Jacques Morisset, documented the average spread between twelve pairs of raw and finished commodities, using a five-year moving average to smooth out annual variations caused by seasonal or climate-related shocks (Morisset 1997). The pairs of commodities were deliberately chosen for requiring minimal processing so as to limit the impact of exogenous factors. They included bananas/bananas, coffee/coffee, wheat/bread and crude oil/gasoline (the only mineral commodity, as many of these are generally processed into many different goods). Morisset found the spread between raw and finished commodity rose from 51 to 117 between 1975 and 1994.

The analysis is strong: price rises for raw commodities are almost perfectly transmitted to the final consumer price of the processed good, while price declines are not. Indeed, prices may rise while the price of the raw commodity falls. While it is true that other factors are at play, it is striking both that price falls are not reflected in lower prices and price increases universally are. If other factors are indeed so important, and if the markets are truly competitive, why should price increases in the raw commodity so faithfully be transmitted to the final price? Manufactured goods do not show the same pattern: the companies are more preoccupied with securing and expanding market share than in ensuring that every increase in their costs is reflected in the final price of the goods they sell. Morisset's review included countries with a variety of trade and domestic policies and was conducted before the Uruguay Round created more homogenous trade regulation. His findings suggest that domestic policies are not decisive but rather that it is the global firms that create the observed outcome.

Morisset also documents the variations in commodity price spreads (raw to finished) with variations in the trading companies' profits, where that the data is available. The wheat market mark-up increased by 50 percent between 1977 and 1997, during which time Cargill's profits rose five-fold. In that time, the U.S. government policy of floor price interventions was abolished. The government had

been a kind of buyer of last resort, providing some market power for farmers who could chose to take the government price if grain companies were offering too little. When that system ended, prices fell to below cost of production, and farmers grew increasingly dependent on various forms of direct income support. The grain companies reduced their costs significantly.

One of the patterns that has emerged with trade liberalization in developing countries is the need to export ever more commodity to earn the same or even diminishing returns. That is, not only are the producer countries earning a smaller share of the growing pie, but they are losing money per unit of product exported as well. Inelastic demand for commodities has been more resilient than globalization advocates expected and that it has been easier to increase supply (difficult though certain sectors and countries have found this) than to find new uses for the supply abroad. The explanation Morisset proposes is market power: as the number of global firms buying, processing and reselling commodities diminishes, their power to set prices goes up. This power was intensified by the elimination of national commodity boards and the break down of various international commodity agreements, whether on coffee or rubber or cocoa.

4.2 Import bills

At the same time, globalization has been a period during which developing countries have significantly increased the volume of food imports (Clapp & Fuchs, p.4, 2009) and recently, those imports have come at enormous expense. Import of bulk commodities such as rice or wheat is also in highly concentrated markets. Cargill alone is estimated to control 45 percent of the global grain trade, and ADM another 30 percent (Vorley, 2004). Bunge is the third major global player. Rice, staple food for more than half the word's population, is an especially thin market. Somewhere between five and eight percent of total production crosses an international border. Of that, production is concentrated in a handful of Asian countries: China and India together grow more than half the world's rice crop. As exporters, Thailand, Viet Nam, China the U.S. and India are the dominant sources of exported rice (Calpe, 2002).

Any discussion on the implications of freer trade has to take account of both import and export patterns. The question of imports has been overshadowed in the development literature by the focus on exports. The exports have been seen as essential to developing countries to raise foreign exchange, attract investment, improve technology and know-how, and to benefit from the larger (and often wealthier) markets of other countries. Most trade liberalization policies are premised on the assumption that reduced tariffs and other policies to open markets to increased imports will enhance welfare by reducing prices for consumers. In any case, there is little market access to be gained by trading partners if none is offered in exchange; most developing countries have been strongly advised that to attract

investment and secure market access, they need to open their own economies as well. That is how most trade negotiations work; the notion of unreciprocated market access is decidedly out of fashion.

The literature that encourages this liberalization has not looked in much detail at the effects of concentrated market power on the import side. As Hazell et al have pointed out, the domestic demand for food staples in Africa is estimated to be worth USD50 billion per year, an amount that is expected to almost double by 2015 (cited in Morrison and Sarris, FAO 2007). Even given that a large part of this demand is met from households' own production, the market represents a huge opportunity. Some 25 percent of the grain consumed in Africa is imported, at significant cost to government budgets. Carney points out (Curran et al, 2009) how West and Central Africa have increased their rice imports 8-fold in the past 30 years, at a cost of USD 1 billion.

4.3   Foreign Direct Investment

In the 1990s, many development economists pushed the importance of foreign direct investment (FDI) as a way to "jump-start" the economy in countries where domestic capital was limited. Between 1987 and 2007, FDI as a share of GDP worldwide leapt from 8.1 percent to 27.9 percent (UNCTAD, WIR statistics). In the poorest countries, foreign assistance (ODA) plays a leading role in financing the economy, but over the 1990s, the FDI available globally dwarfed ODA levels. Yet the money was very unevenly divided. A lot of development agencies focused on policies they thought would make countries more attractive to foreign investors. UNCTAD organized sessions at which trade ministers of different developing countries would promise never to nationalize foreign investments, and offering extraordinary tax breaks on any profits made. Industry voices at such sessions were matter-of-fact: political stability and the rule of law were important in their decision-making but perhaps not so important as the size (and wealth) of the local market, the quality of the roads and ports, and the proximity of significant global markets.

At the same time, too little effort went into thinking through what kind of investment would be useful to the realization of the kind of economic growth governments—and their citizens—wanted. Public investment, particularly ODA, comes through a large (sometimes even contradictory) web of regulations, obligations, and normative targets that reflects the thinking of development agencies, the decisions of world leaders at different UN summits, and obligations under international treaties. The process is far from perfect, but there is scope for public input.

Private investment is different. The firms are motivated by the need to make a profit, and constrained only by the regulations in place in the host country and, where they exist, in the firm's home country. FDI is not likely to contribute to poverty alleviation or to reducing inequities in a society without laws and regulations that

encourage those outcomes. It is perfectly possible to have investment with very little economic growth let alone a reduction in poverty statistics. In their book, *Fatal Indifference: The G8, Africa and Global Health*, Labonte et al conclude, "Private sector growth may occur [with increased FDI flows], but whether or not this translates into benefits for the poor is moot. This is not to claim that FDI is inevitably disadvantageous, but rather that its advantages are not without significant development costs."

One of the fears surrounding the debate on the recent wave of land lease and land purchase agreements in developing countries links to what benefits can be expected for local economies. The policy brief published by IFPRI on the subject (von Braun & Meinzen-Dick, 2009) highlights a number of the concerns. The brief says, "These land acquisitions have the potential to inject much-needed investment into agriculture and rural areas in poor developing countries, but they also raise concerns about the impacts on poor local people, who risk losing access to and control over land on which they depend." The concerns listed by the report include protests over the land acquisitions, contract terms that stipulate importing labour from outside the region, the very unequal status of the two parties to the contract and the lack of transparency on the contract terms, which leave governments unaccountable for the deals they sign. A number of the host countries are recipients of World Food Programme (WFP) assistance: as *The Economist* points out, Ethiopia's food aid program from WFP between 2007 and 2011 is worth just a little bit more than the USD 100m the country received from a group of Saudi investors to grow wheat, barley and rice on land leased from the Ethiopian government (*The Economist*, 23 May 2009).

Agriculture can be broadly divided into food production, which in many of the poorest countries is still predominantly subsistence production; traditional commodity exports, and newer, often high-value, products (processed dairy products, horticulture, seafood) that can be destined for internal or export markets. Colonial agriculture set in place much of the basic infrastructure for export-oriented production, and the products are those (typically) that cannot be grown in temperate climates: coffee, tea, cocoa, rubber, tropical fruits. This production largely takes place in the developing world for export to world markets (both to industrialized and other developing countries). These crops have historically faced little or no trade barriers, although some preference schemes favour specific trading partners. The dominant firms are well known and long-established: Cargill, Dole, Chiquita, ADM, and others.

The introduction of high value exports (sometimes called non-traditional exports) is more recent. The actors were not global players even a decade ago. The phenomenal growth of some sectors, such as green beans in Kenya and Ethiopia, or shrimp farms across much of South East and South Asia, has attracted a lot of attention. Much of this production is for export, made possible by developments in cold storage and transportation that allows perishable products to travel the

globe with relatively little loss. Supermarkets have been big investors in this kind of production. The investment and job opportunities created have brought praise, but there are also concerns that the contracts are discriminatory (leaving small farmers carrying the principle burden of risk) and that natural resources are stressed by the activity (the demand for freshwater, for example, is often high in the production of horticultural crops).

Increasingly, FDI has also looked for opportunities to transform domestic food economies within developing countries. The markets are in countries that have seen significant economic growth in the past decade or more: China and India; the Asian "tigers" such as Malaysia, Singapore or Thailand; or, the emerging markets in Latin America (Brazil, Chile, Argentina). But the effects are felt everywhere, because of patterns of production that push certain labour-intensive tasks to the cheapest sites. For instance, Laotian farmers are contracted by the C.P. Group (a multinational based in Bangkok) to raise chickens as part of a vertically integrated supply system that ultimately leads to C.P. Group's 7-11 stores in Bangkok, which sell cooked chickens as a take away supper. Significant investment by firms such as U.S.-based Smithfield, a meat processor, in countries in Eastern Europe reflects a similar pattern of using a relatively low wage base (usually with low environmental standards as well) to produce goods for a lucrative market, in this case, Western Europe.

A number of countries have seen their dairy sectors transformed by TNC investment. For example, in Brazil, the dairy industry was transformed in the 1990s. Nestlé, a long-time presence in the country, and Parmalat, a relative newcomer in 1986, between them transformed dairy production in Brazil over a decade or so. The firms see an opportunity for profit in capturing the domestic market through centralized and industrial scale production, and have transformed what had been a predominantly a small-scale and disparate production system. A number of factors associated with the globalization of food production are transforming domestic agriculture in developing countries.

Nonetheless, the importance of trade liberalization in transforming domestic *food* production perhaps needs underlining, because trade debates and much of the development literature seems to overlook this dimension, focused as it is on opportunities to increase foreign exchange revenues and to boost economic growth through exports. The flip side of liberalization (increased imports) received far less attention from policy-makers: the rapid increase in imports and the transformation of a number of countries' food retail and distribution systems with the advent of foreign investment, in particular from supermarkets but also from food processors.

4.4 Employment

Reardon argues that retailers have brought three significant changes to food systems in developing countries: i) a shift from either no standards or public standards to

private standards; ii) a shift from prices set on spot markets to contracts; iii) a shift from local to centralized procurement systems. Each of these has implications for which farmers will benefit and which will lose.

In almost every rural area in developing countries, it is common to find subsistence farmers mixed with commercial farmers. Barrett notes that the tendency is for farmers to split into two groups with the advent of liberalization: one group "retreats into subsistence" while other households, perhaps favoured with more capital, or access to irrigation, or a truck, or just less risk-averse, take a chance on the new opportunities that global markets present (Barrett, 2008). Some farmers will be able to take advantage of the new opportunities that TNCs bring, while others—often the majority—will not. The presence of even just one commercial farm in a village links local to global market prices (Dyer, Boucher & Taylor, 2006). The link is largely through labour markets. The supply of labour to subsistence agriculture (and therefore its output) is in inverse relationship to the market price of commercial crops. If that price drops, demand for labour falls and production of subsistence crops increases. This implies lower prices for subsistence crops as well. On the other hand, strong prices for the commercial crops will attract higher wages and reduce production of subsistence crops, raising local food prices.

Overall, increased money flowing through the local economy is positive as it supports off-farm employment and creates opportunities to diversify, reducing the risks of dependency on one or two products. However, if the links to external markets are significant, the effect will also be to introduce new levels of volatility and risk into all markets. Five good years followed by two bad could be very disruptive to the production of food staples, which take on the role of a residual sector (and shock absorber) because the remuneration is not usually as good as in the commercial markets.

Farmers face a number of inherent disadvantages in the market that interfere with the "normal" exchange between buyer and seller. Farmers are numerous, cash poor and in business for themselves (not employees with a common employer). They typically sell to intermediaries who provide vital services for the producer: storage, transportation, credit, sometimes seed or other inputs, and who in return for these services can offer less than a fully commercial price. It would be prohibitive for the majority of farmers to finance these services themselves. There are examples of contracts that provide some of these kinds of services and which provide farmers with secure income. A market with one or two dominant firms might offer more scope for this kind of contract than a perfectly competitive one in which margins were small.

There is also some debate as to how small farmers fare in the vertically integrated, centralized systems that modern firms have created under liberal trade and investment regimes. Reardon et al describe a number of relationships between the

modern food sector (itself the product of both trade and investment liberalization as well as new technologies associated with globalization) and small producers. Clearly small farmers face disadvantages, including their relative lack of capital, difficulties in meeting volume and quality demands, and, often, the relative remoteness. By insisting that all its milk suppliers have on-farm cold storage units, Parmalat and Nestlé effectively knocked out tens of thousands of dairy farmers from the commercial milk market. On the other hand, small farmers also have some advantages, including their relative lack of market power which makes them less likely to break contracts should higher paying opportunities arise. A number of companies have found it worthwhile to provide small producers with services to facilitate their production, securing the resulting harvest.

The World Bank's *World Development Report 2008* on agriculture says clearly, "Market forces do not guarantee competitiveness, nor do they guarantee smallholder participation, both essential to link agricultural growth to development." (p.135). That is, the desired public policy outcome cannot magically emerge from market forces alone. Nor is competitiveness a magic solution. Indeed, historically, agriculture has often been exempt from anti-trust laws, a direct acknowledgment of the importance of collective action to help producers overcome inequitable market power relations in food supply and distribution chains (Markelova *et al*, 2009).

Production for exports creates jobs, especially if there is some handling before shipping—processing and packing horticultural products or cut flowers, for instance. It is important to consider not just the employment created for farmers through opening markets, but also the employment for wageworkers. Berdegué gives the example of the less than one thousand grape farms in Chile that employ (directly or indirectly) tens of thousands of people[4]. In Tanzania, ten flower farms growing flowers for export employ some 3,000 workers, mostly women (Riisgaard, 2009).

Very few farm households, and all but none of the poorest, rely solely on food production to survive. They supplement their income with wage-labour either on other farms or in non-farm activities[5]. For a number of rural households, remittances from absent household members are also important, whether from within the country or from abroad.

One of the areas to explore further is the extent to which foreign firms invest in processing and other activities that generate employment off-farm. For a variety of reasons, Africa in particular has lost considerable processing capacity over the period of trade and investment liberalization. A number of commentators and

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[4] http://www.ifpri.org/events/seminars/2005/smallfarms/sfproc/SO4_Berdegue.pdf.
[5] Ellis at http://www.ifpri.org/events/seminars/2005/smallfarms/sfproc.asp

TABLE 3.
Non-Farm Share of Rural Income (%)

Region	Total non-farm earnings	Local non-farm employment	Transfers & remittances
Africa	34	28	6
Asia	51	40	11
Latin America	47	41	6

Reproduced from Haggblade, Hazell & Reardon (2009)

governments describe this as deindustrialization (see UNCTAD & UNDP's policy brief on the Africa Group's view of the non-agricultural market access negotiations at the WTO, for example. UNCTAD & UNDP, 2006). The new wave of investment, however, is focused on serving the domestic economy and therefore has the potential to create jobs in the host country.

Some supermarkets, like Pick 'n' Pay in South Africa, have specific initiatives targeting small, local producers. Some supermarkets avoid larger, better-capitalized producers because the latter can be unpredictable, reneging on contracts to find better prices in world markets if the opportunity arises. Smallholders cannot access alternative markets and so make a more dependable prospect.

4.5 Equity effects

In their overview of the contribution of agriculture to development, Byerlee, de Janvry and Sadoulet (2008) say the overwhelming pattern of recent economic growth, even where rural poverty reduction has been rapid, is for the gap between rural and urban incomes to grow. "In a sample of almost 70 countries, the median urban income (measured by consumption) is at least 80 percent higher than the median rural income in half the countries." (p. 7). Urban poverty declined much faster than rural poverty in China, Indonesia and Thailand—all countries that have made significant reductions in their rural poverty figures in the past several decades. At the same time, the best agricultural performances are often unequally distributed within a country, so that some regions lag even as overall the country does well (northeast Brazil, Bihar in India and the highlands of Peru are all examples where rural poverty levels remain stubbornly high).

It is not clear what role corporate concentration plays in this finding. Agriculture often provides a safety net: a refuge for people when the formal economy fails. This is true in Africa, where high levels of HIV/AIDS infection and limited public health facilities have sent people with the illness back to rural areas to seek help from family members. If the sector attracts the most destitute, then it is not surprising that poverty is also concentrated in rural areas.

One typical pattern, common in most developed countries, is that concentrated market power among suppliers and processors is associated with low net farm incomes and a diminishing number of farms. Farm size tends to bifurcate, with the most productive units growing larger while very small, often part-time or highly specialized farms, also increase in number. The family-operated commercial farms gradually disappear. In developed countries, the small farms are those of either "hobby farmers" who grow some grapes for wine or own a few horses, or new entrants experimenting with labour-intense production methods, such as organic horticulture for urban markets. Some of this small-scale production is destined for export, but the production of bulk commodities for world markets tends to favour farmers already endowed with relatively more capital. This is to do with meeting standards, in large part: production for an industrial food chain depends on quality controls and production in sufficient bulk that small-scale, low technology approaches are not likely to be adequate.

The arrival of new investors looking at new crops, whether destined for export or domestic markets, has mixed effects. Diverting land that was used for subsistence production, or even for food to be sold in markets in the region, can decrease food security but create jobs. It can re-order complicated webs of relationships within households, especially where there is a gender-based disaggregation of tasks. If women produce the household's food while men grow cash crops, then increasing the land given over to cash crops will tend to improve men's welfare but make women's tasks harder. Empirical evidence shows that the net result cannot be assumed to be positive for the household; even if the cash intake rises, household nutrition and other indicators of well being sometimes suffer (Immink et al, 1995). This is especially true if the cash crops require purchased inputs.

As Byerlee et al also point out, gender imbalances have also been exacerbated by the way development planning has been conceived of and implemented. Because women are concentrated (in many places) in subsistence production for household consumption, with little or no formal right to land, water, collateral for loans, or equal pay for equal work, they are not favoured by the pattern of development that has come in the wake of trade liberalization. There are exceptions, but not many. On the whole, where sectors attract investment and produce higher returns, women often end up displaced. This is less true in certain aspects of processing, where lower average wages and occasionally social norms, mean women can overwhelmingly dominate the labour pool for certain jobs. A number of researchers have documented how slow the social and cultural adjustment to new production patterns can be, and how successive waves of change have left some women at a disadvantage for decades. (Carney in Curran et al, 2009)

Nonetheless, women have found employment in a number of the newer industries (for instance in the processing of flowers and vegetables), and for many the jobs offer economic independence for the first time. While there is also some social and cultural dislocation associated with this, the importance of that independence for

poverty reduction and women's empowerment is hard to overstate. A number of studies emphasize the importance of these opportunities for women's status in the household and the wider community, with important benefits in reducing gender-based inequity.

4.6 Capital formation and location

There is not much in the literature that discusses the effect of corporate concentration on capital formation and location. The globalization of the food system has clearly shifted the once dominant pattern of developing countries concentrating their agricultural production on exports to developed countries. Not only is there now significant South-South trade, but there is also significant FDI in a number of developing countries that is transforming how food is produced.

Predominantly agricultural economies depend on a marketable agricultural surplus to create capital for all sectors. If the surplus is too small, as it is in most LDCs and a number of other poor countries, then the financing has to come from elsewhere. Credit is another option, but many developing countries do not have a private banking system equipped to serve agriculture and the public sector financial mechanisms were shut down (some of them anyway bankrupt) under structural adjustment reforms. Agricultural finance in many developed countries has been a specific sub-sector of the financial services sector, filled by banks (often co-operatively owned) dedicated to agriculture. This leaves the poorest countries in a serious, poverty-creating bind: too poor to grow, they instead shrink, increasing levels of immiseration in the process. External resources are then essential to invest in agricultural productivity, with a view to raising the marketable surplus and the possibilities for local capital formation that can be invested in agriculture and other economic sectors.

One of the trends to watch is the push to raise productivity that is often accompanied by support for investment in biotechnology. Modern biotechnology, unlike Green Revolution technologies, is owned and patented by the private sector. Indeed, Monsanto owns an estimated 90 percent of the genetically engineered seed in commercial distribution. The sector is extremely concentrated and competition is anyway severely hampered by the application of restrictive intellectual property laws, reinforced at the multilateral level through the Trade Related Intellectual Property Rights Agreement (TRIPs). The research and development, as well as the royalties on the use of biotech seeds, is overwhelming concentrated in developed countries. The approach to both the seeds and the technologies used in their propagation and cultivation runs counter to farming culture in most of the world, where seed saving and seed sharing are common norms.

5. Conclusions and Recommendations

The paper has developed an argument that standard approaches to the analysis of the implications of freer agricultural trade and of the role for trade policy in agricultural development strategies, tend not to incorporate critically important dimensions which are likely to determine the growth and equity impacts of trade reform. In particular, the issues linked to concentrated market power have not received sufficient attention.

The concluding section tries to draw some tentative conclusions on the drivers of further concentration in agricultural markets, the associated concerns and potential benefits, and the policies and regulations that may be required for trade in agriculture, with a view to securing strong, positive outcomes for economic growth and poverty eradication.

5.1 What might drive further concentration of agricultural markets?

Some of the common drivers of concentration include: mature markets because expansion requires mergers and acquisitions because demand is more or less stable; the pressure to increase efficiency and profits by streamlining production (working with fewer subsidiaries or contractual partners); and, growing concerns over quality control that require systems and oversight only available to heavily capitalized firms and that push a more centralized procurement system (Sparling & van Duren, 2002).

Other reasons for consolidation include technological developments. For example, the advent of genetic engineering techniques expanded chemical companies such as Monsanto into the seed business. Companies also look for acquisitions to acquire intellectual property: the WTO agreement on intellectual property and the accompanying tightening of national patent laws has made it harder than before for companies to benefit from publically accessible research. Nestlé has built its global operations by acquiring local firms around the globe that make foods for local markets. The fast food chain, McDonald's, similarly, makes a point of procuring its food from (relatively) local sources and changes its menu to satisfy local cultural norms.

Trade liberalization, and, with it, the liberalization of investment, is intimately linked to all of these changes, both driving change and shaped by the other factors in play. It is widely accepted that trade liberalization, modelled by the Uruguay Round Agreements agreed to in 1994, has been an important driver of globalization. The multilateral agreements of the WTO have been echoed and amplified in regional and bilateral agreements that now number in their hundreds. Coupled with the liberalization of capital flows, the freer movement of many goods and services has undoubtedly transformed agriculture in most of the world.

The food system today is marked by growing concentration. In addition to the long-standing grain traders, commodity brokers and food processors (all of them marked by increased transnationalization, mergers and acquisitions, and vertical concentration), there is now a concentrated global food retail sector that is affecting every continent, and most countries in every continent, both with their demand, and as a new factor in national food distribution. At this point, the retail sector stands apart from the commodity brokers and food processors.

Reardon et al (2009) give the following description of what they call the globalization and liberalization phase of the food system (starting in the 1980s): "The transformation has been characterized by consolidation, multinationalization, specialization/differentiation, and organizational and institutional change via the rise of vertical coordination (via contracts and market linkage arrangements) and private grades and standards." In particular, the food and agri-processing sectors showed a transition from concentrated (dominated by public sector involvement), through decentralization and increased competition, as liberalization allowed numerous private enterprises to emerge, back to concentration, but this time by one or two of the private sector actors, often multinationals. UNCTAD, too, has documented how liberalization of agricultural sectors has generated flurries of private sector activity followed by take-overs from foreign firms with limited benefits for the host country. (UNCTAD 1999 & 2008).

The relationships between trade liberalization and corporate concentration are not everywhere alike. Countries such as India, Brazil and the Philippines seem likely to continue with the trend towards more processed foods sold in supermarkets rather than traditional wet markets, which collect many sellers of a few products in one place. The same trend is evident in Africa but the phenomenon remains much smaller. There, more than half of the food produced continues to be eaten without ever being sold (Ellis, 2005). In Africa, the value of non-traditional agricultural exports, too, remains small and growth projections are modest. The projected effects on real per capita agricultural income are even more modest: 6 percent annual growth in non-traditional exports (NTEs) is predicted to produce only 0.2 to 0.3 percent more growth than would occur without the NTEs (Morrison and Sarris, p. 30, 2007).

5.2 Potential and pitfalls

A brief summary of the concerns raised in the discussion of concentration as a result of trade liberalization includes:

1. The technology is not always appropriate; it tends to be capital-intensive, encourages monocultures, and externalizes real costs, such as depletion of freshwater supplies and soil productivity.

2. The dynamic of a globalized food system, facilitated by the integration that freer trade promotes, diminishes competition. In most developing countries that have dismantled their state-led agricultural extension, marketing and distribution services, there is either no or limited private sector activity (particularly in the most remote areas) or a few dominant TNCs control most of the trade, and, increasingly, the domestic market as well. The demands of the market in wealthy countries is pushing tighter quality control and traceability, which runs counter to open competition. The intellectual property protection wrapped into many hybrid and genetically engineered seeds and their cultivation also depresses competition.

3. The emphasis on the urban centres with large populations, or port cities, and the marginalization of the rest of the economy.

4. The lack of employment opportunities in the non-agricultural economy, leaving under and unemployment in the rural areas. Similarly, there are fewer opportunities to emigrate, which has historically provided a hugely important outlet for surplus rural labour.

5. The dependency on one or two firms which can create economic vulnerability and political risks as the dominant firms become a voice that cannot be ignored in the policy mix.

6. FDI in agriculture remains relatively small and does not generally attract much matching domestic capital unless the state plays a significant role in directing such investment.

7. The private banks do not fill the credit gap left when the state (or parastatal) ceases to play this role. On the other hand, there are appear to be some advantages to concentration.

- TNCs do invest, and can fill the credit gap;
- Contract farmers can earn more on average than the rest of the smallholder sector
- Significant potential for productivity gains, and TNCs can help to realize that:

Understanding the interest of the companies involved is important in making sense of what kinds of opportunity their presence creates. Companies will only invest if they see an opportunity to profit. They are not in the business of development, and a number of economic priorities from a public policy perspective are not in a private company's purview, except as they might impinge on profitability. For example, investment in worker education is likely to pay off in a more productive, and possibly a more loyal, workforce; risk-sharing with producers who grow commodities on

contract can similarly ensure loyalty and possibly secure a reliable supply at lower than prevailing market prices. But issues of uneven development, or inequitable distribution of benefits among different sectors are not usually a concern.

Both the concerns and the potential benefits need to inform public policy frameworks for accepting investment and determining how open to world markets food systems should be.

5.3 What are the implications for trade policy setting and regulatory mechanisms?

Two simple but useful steps are proposed here:

1. Formulate multilateral investment guidelines. These would not be rules, as it is not clear what added value a multilateral process for new rules would bring, but a forum to which interested governments could bring new ideas or concerns, and where they might test proposed investment for unintended consequences before signing a contract. Some governments impose much more stringent demands on FDI than others, yet do not seem to lose investment as a result. The push for lease agreements whereby wealthier countries seek to grow food or other crops on land in Africa, Pakistan or other developing countries makes the need for guidelines and some kind of reference for interested parties to consult especially urgent. The processing sector has strong incentives to look for low cost supplies and to lobby governments for the ability to import these supplies from world markets so as to stay competitive with firms located in countries where prices are lower.

2. A better understanding of what is going on: documentation, transparency, improved reporting mechanisms. The market needs to be transparent to function, and one of the common tools to manage oligopsony is increased demand for transparency to ensure the perception as well as the fact of good practice. It should be easy and cheap for interested citizens and organizations to access an on-line database that gives a view of how large different companies are in different countries, and across different parts of the food chain (both horizontally and vertically). Countries need to know how the sectors that are of interest really work—beyond the possible tariffs, domestic support programmes and export subsidies, is there actually an open market, or will negotiations with one or two firms also be needed?

    Where subsistence agriculture is still predominant, a country might well decide to pursue import substitution policies to capture the value of the local demand for food staples (and thereby save the unpredictable costs of importing that food instead). It would be possible to simultaneously encourage FDI in export sectors, or in food processing sectors, if that looked promising. However, the

indirect effects on staple food production, through labour, capital investment choices, and pressures on the natural resource base should not be ignored. A combination of clear investment rules combined with some level of tariff protection on food staples could combine to create the right climate; there is no reason that an all or nothing approach is necessary for the best results to obtain.

The World Bank's *World Development Report 2008* on agriculture acknowledges some of the issues related to concentrated market power in the face of globalization (eg. in Focus D, pp 135-137) but does not really propose an answer. Some of the voluntary initiatives that exist, along the lines of corporate social responsibility, are interesting but they are even less important than fair trade for the amount of trade they actually affect. This work is valuable but limited.

Improved understanding of firm level decision making in the agriculture sector is therefore critical in predicting how greater openness to trade might play out in terms of economic growth, employment opportunities and in the distribution of gains and losses. Questions that still need to be researched include how to measure (and eventually model) vertically integrated global commodity chains. Do global firms discriminate among countries on the basis of their trade policies (favouring those that are more open to trade) or do other considerations have more weight in determining sourcing decisions? Given the essential role of freshwater and arable land (both fixed factors of production) in agricultural production, it might be presumed that trade policy would have some bearing without being a definitive consideration. Does the empirical evidence bear this out?

Governments might also want to explore further the question of whether it makes sense to pursue a policy of escalated protection, leaving commodities relatively unprotected but protecting processing and value-added activities while these industries establish themselves. In light of the vertically concentrated production chains, government may decide to invite the large transnational firms to play a role, but to require technology transfers, investment in local staff capacities and the like to support the development of a local industry in the longer-term.

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6

Technical regulations and trade: Current issues, trends and long-term prospects

Michael T. Roberts [1]

1. Introduction

Governments often require imported food products to conform to the regulations they have adopted to protect the health of human beings, animals and plants and to dispense information to consumers. Regulations stipulate conditions that have to be met to gain access for a food product to a particular market. Some regulations apply specifically to food safety, such as determining what level of pesticide residues can remain on fruits. Other regulations relate to the information concerning the food or its packaging, such as country-of-origin labeling or package-size requirements. All these regulations can be grouped under the general category of "technical regulations".

Technical regulations have an important effect on international trade. With the gradual liberalization of trade over the past three decades, traditional trade barriers such as import tariffs and quotas have been reduced. Conversely, technical regulations have become increasingly important as potential barriers to trade. They have received growing attention in international trade forums and have been the subject of intense multilateral negotiations. The conclusion of the Uruguay Round of Multilateral Trade Negotiations in 1995 resulted in two separate agreements that brought technical regulations under the disciplines of the newly created World Trade Organization.

[1] Michael T. Roberts, FAO Consultant.

In view of the current debate, this chapter examines the issues arising from technical regulations and discusses the prospects for them to become a greater obstacle to trade in the future. It begins by reviewing the various categories of technical regulations and the related WTO provisions. It goes on to describe the main issues raised by these regulations. In particular, the chapter examines whether the role of regulations as trade barriers is increasing. Finally, it discusses the future prospects and suggests possible international initiatives that could help mitigate this role.

2.   Various categories of technical regulations

Countries adopt regulations on imported food products to protect the health of human beings, animals and plants and to dispense information to consumers. Some regulations apply specifically to food safety, such as determining what level of pesticide residues can remain on fruits. Other regulations relate to the information concerning the food or its packaging, such as country-of-origin labeling or package-size requirements.

Such regulations or provisions are commonly named technical regulations, sanitary measures, safety measures, quality standards, conformity assessment procedures, or simply standards. These provisions are characterized by their objective, attribute focus, breadth, and scope[2]. These characteristics help categorize regulations that are largely defined by international rules governing the trade in food goods. Determining the category for a food regulation is important as it helps determine under the international rules the treatment and enforcement of the regulation.

2.1   Characteristics

2.1.1   Objective

An important distinction is between risk-reducing regulations whose aim is to ensure an acceptable level of animal, plant, or human health and quality-related regulations whose aim generally is to provide consumers with information that distinguishes the quality of a product, but has little or nothing to do with risks to health or safety.

2.1.2   Attribute Focus

Regulations that target content attributes of a food product include those that establish requirements for existence or quantity. Examples include requirements for

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[2] See Tim Josling Roberts, Donna Roberts, & David Orden, "Food regulation and trade" 16-21 (2004).

fortification of enriched grain products with folic acid or for a minimum milk-fat content for "cream" products. Regulations that target process attributes might indicate the source or the origin of the product, such as mandatory country-of-origin labeling, or method of production (e.g. organic standards), processing, handling, or distribution.

2.1.3 Breadth

A basic choice in regulating food product is to adopt either "vertical" regulations, which apply to a single product or closely related products, and "horizontal" regulations, which apply across many products that are not closely related. Most countries have a mix of both vertical and horizontal regulations. Horizontal regulations generally address broad issues involved in achieving food safety, quality and consumer-information objectives. Vertical regulations tend to be used when a particular sub sector has unique problems or conditions.

2.1.4 Scope

The scope of food regulations refers the degree of coverage of the coverage. For example, the application of regulations may depend on where the product originates. Food regulations may apply to goods from all sources – domestic and imported. Other food regulations are specific and may only apply to imported goods.

2.2 Categories

International rules use these characteristics to help distinguish categories of food regulations. These international rules govern trade in food goods and are found respectively in the Agreement on Technical Barriers to Trade (TBT Agreement) and the Sanitary and Phytosanitary Measures Agreement (SPS Agreement).

2.2.1 Technical Regulations

The TBT Agreement uses the term 'technical regulation' to cover regulations that apply to product, process, or production methods or standards with which compliance is <u>mandatory</u>. Annex 1 of the TBT states as follows:

> "Technical Regulation" – Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is <u>mandatory</u>. It may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process or production method[3].

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[3] TBT Agreement, at Annex 1.

Technical regulations on product quality are regulated by the TBT Agreement. These regulations are based on measurable attributes that describe the value and utility of the food product. For example, beef quality regulations are based on attributes such as marbling (the amount of fat interspersed with lean meat), color, firmness, texture and age of the animal, for each grade. Quality regulations for each food product may describe the entire range of quality for a product, and the number of grades varies by commodity. Quality regulations that require that vegetables and fruits reach a certain size to be marketable are very common in certain developed countries.

2.2.2   Standards

In contrast to a "technical regulation," a "standard" is defined by the TBT Agreement as a provision that applies to product process or production methods with which compliance is <u>voluntary</u>, not mandatory. Annex 1 of the TBT states as follows:

> "Standard" – Document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for product or related processes and production methods, with which compliance is <u>not mandatory</u>. It may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process or production method[4].

2.2.3   Conformity Assessment Procedures

The TBT Agreement defines "conformity assessment procedures" as any procedure used, directly or indirectly, to determine that relevant requirements in technical regulations or standards are fulfilled. Conformity assessment procedures are technical procedures — such as testing, verification, inspection, and certification — which confirm that products fulfill the requirements laid down in regulations and standards.

2.2.4   SPS Measures

Another category of regulations that govern food product is defined by the SPS Agreement as a "sanitary and phytosanitary measure" or "SPS measure." The SPS Agreement Annex states that a sanitary measure is any measure

> "applied . . . (b) to protect human . . . life or health within the territory of the Member from risks arising from additives, contaminants, toxins or disease-

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[4] *Id.*

causing organisms in food, beverages or feedstuffs . . . [or] (c) to protect human life or health within the territory of the Member from risks arising from diseases carried by animals, plants or products thereof[5]."

This broad definition includes most of the food safety provisions. A measure is considered a SPS measure, therefore, where its objective is to protect: (1) human life from the risks arising from additives, toxins, and plant- and animal-borne diseases; (2) animal life from the risks arising from additives, toxins, pests, diseases, disease-causing organisms; (3) plant life from the risks arising from pests, diseases, disease-causing organisms; and (4) a country from the risks arising from damages caused by the entry, establishment or spread of pests.

2.3 Distinguishing Technical Regulations in the TBT Agreement definition from SPS Measures

The distinction between technical regulations, standards, and conformity assessment procedures under the TBT Agreement and SPS measures under the SPS Agreement is important, as the rules of the TBT and SPS Agreements, while similar in many respects, have some significant differences.

A "measure" may take the form of a law, decree, regulation, requirement, or procedure related to food safety[6]. Examples of common SPS measures include the regulation of foods derived from biotechnology, meat and poultry processing standards to reduce pathogens, residue limits for pesticides in foods, and restrictions on food and animal feed additives, toxic substances in food or drink, labeling requirements related directly to food safety, and sanitary requirements for imported pallets used to transport animals.

A technical regulation under the TBT Agreement, in contrast, covers all technical requirements, voluntary standards, and conformity assessment procedures, <u>except</u> when these are SPS measures as defined by the SPS Agreement – in other words, except when a measure is adopted to safeguard human, animal, or plant health. Examples of technical regulations include the labeling composition or quality of food and drink products; quality requirements for fresh food; and the volume, shape, and appearance of packaging of food products. The TBT Agreement is becoming increasingly important in the global food market as governments issue more technical regulations in response to growing consumer demands for products with specific quality attributes or for information about those attributes.

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[5] SPS Agreement, at Annex A, 1.

[6] See generally WTO, SPS Agreement Training Module: Introduction, What is an SPS Measure?, at http://www.wto.org/english/tratop_e/sps_e/sps_agreement_cbt_e/c1s3p1_e.htm.

The determination of whether the TBT or SPS is the applicable agreement depends on the objective of the regulation. If a regulation is adopted to safeguard human, animal or plant health, it would trigger an SPS provision and be considered a SPS measure; however, if the regulation is not a SPS measure, but is adopted to ensure the compositional integrity of a product, it would be governed by the TBT agreement[7].

3. Technical regulations and the WTO

3.1 WTO rules on Technical Regulations

The TBT and SPS agreements are designed to set out transparent and fair trade rules and to eliminate policies that distort and reduce trade among countries without justification. In their present form, the agreements were products of the Uruguay Round of multilateral negotiations concluded in 1994 that strengthened the GATT articles and agreements that had governed the use of technical barriers to trade over the past 50 years. Negotiations produced the SPS Agreement, which sets clearer, more detailed rights and obligations for food safety and animal and plant health measures which effect trade. The already-existent Standards Code was revised, reappearing as the TBT Agreement. Established in 1995, as a replacement body to the Contracting Parties of the General Agreement on Tariffs and Trade (GATT), the World Trade Organization (WTO) is responsible for administering the SPS and TBT agreements[8].

3.1.1 SPS Agreement

Entered into force on January 1, 1995, the SPS Agreement allows countries to adopt scientifically based measures in order to protect human, animal, and plant life or health (SPS measures). The SPS Agreement balances two main objectives: first, it recognizes the sovereign right of WTO Members to provide the level of health protection they deem appropriate; second, it ensures that SPS measures are not disguised restrictions on international trade.

To achieve these objectives, the SPS Agreement is governed by certain principles.

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[7] Note: In the remainder of this report the term "technical regulations" will be used in its broad meaning (including SPS measures) as opposed to its narrow definition of the TBT Agreement.

[8] See generally, World Trade Organization at http://www.wto.org/ (provides background, resources, and documents).

- *Harmonization*

To achieve both objectives, the SPS Agreement encourages Members to base their measures on international standards (from the Codex Alimentarius Commission, the World Organization for Animal Health, and the International Plant Protection Convention), guidelines, and recommendations, where they exist (Article 3.1). The SPS Agreement offers an incentive for the adoption of international standards by presuming that a national SPS measure that is based on an international standard is not only necessary to protect human, animal, or plant life or health, but also is consistent with GATT (Article 3.2).

- *Risk Assessment*

If international standards do not exist, or if member countries want to adopt higher standards, then they must be able to demonstrate that their SPS measures are based on an "appropriate" risk assessment (Articles 3.3 and 5). In cases where relevant scientific evidence is not available, a country may provisionally adopt SPS measures on the basis of available pertinent information (Article 5.7).

- *Equivalency*

Under certain conditions, member countries are required to recognize other member countries' equivalent SPS measures (Article 4).

- *Non-Discrimination*

Member countries should ensure that their SPS measures do not arbitrarily or unjustifiably discriminate between members where identical or similar conditions prevail. SPS measures should be applied only to the extent necessary to protect health and not in a manner that would constitute a disguised restriction on international trade (Article 2.2).

- *Transparency*

Member countries shall notify changes in their SPS measures by publishing and ensuring that an enquiry point exists. This enquiry point should be able to answer all reasonable questions from other member countries. (Article 7).

3.1.2   TBT Agreement

Like the SPS agreement, the TBT agreement strikes a delicate balance between the policy goals of trade facilitation and national autonomy in technical regulations. The TBT Agreement coverage is limited to technical regulations, standards, and conformity assessment procedures that are not covered by the SPS agreement (Article 1).

A fundamental principle of the TBT Agreement is no unnecessary restriction on international trade. Unnecessary obstacles to trade can result when a regulation is more restrictive than necessary to achieve a given policy objective, or when it does not fulfill a legitimate objective. A regulation is more restrictive than necessary when the objective pursued can be achieved through alternative measures which have less trade-restricting effects, taking account of the risks non-fulfillment of the objective would create. Legitimate objectives include national security requirements; prevention of deceptive practices; protection of human health or safety, animal and plant life, and the environment (Article 2.2).

The TBT Agreement also establishes fundamental principles that to a large extent mirror those of the SPS Agreement.

• *Harmonization*

Member countries are encouraged to use existing standards for their national regulations, unless their use would be ineffective or inappropriate to fulfill a given policy objective. Technical regulations in accordance with relevant international standards (such as those set by the International Standards Organization ("ISO") or by the Codex Alimentarius Commission on non-food safety matters) are presumed not to create an unnecessary obstacle to trade. (Article 2.4).

• *Equivalency*

Member countries should accept technical regulations different from their own that fulfill the same policy objectives even if through different means (Article 2.7).

• *Non-Discrimination*

With regard to technical regulations, imported products are supposed to be accorded treatment no less favorable than that accorded to like products of national origin or like products originating in other countries. If a measure is applied to imports of one source, it also has to be applied to imports from all other sources and to like domestic products (Article 2.1) (i.e., National Treatment and Most Favored Nation obligations).

• *Transparency*

All technical regulations and conformity assessment procedures that have been adopted must be published promptly (Articles 2.11 and 5.8). Enquiry points that are able to answer to all reasonable questions from other members must be established (Article 10.1). Member countries are only obliged, however, to notify the technical regulations of the local governments at the level immediately below the central government.

3.1.3   Differences between SPS and TBT Agreements

The fundamental difference between the SPS and TBT agreements lies in the nature of the measures that are the subject of the agreements: SPS measures are meant to reduce risk to human, animal or plant health, while TBT measures are aimed to protect legitimate policy objectives. From this framework that distinguishes the two agreements, additional differences in the agreements themselves are evident.

A significant difference between the SPS and TBT agreements is the use of the nondiscrimination principle to determine whether a measure is impermissibly protectionist in nature. The TBT Agreement relies on a strict nondiscrimination test, whereas the inquiry under the SPS Agreement is whether the measure has a scientific justification and is based on risk assessment. A strict requirement of nondiscrimination would not be practicable for SPS measures that discriminate against imported goods based on their origin. Goods may pose a risk of disease precisely because the goods come from a member where such disease is prevalent. The same situation might not be true for similar goods coming from another member.

Another difference is the use of scientific principles. The SPS Agreement applies to a defined range of health protection measures, but it places the strict requirement on these measures that they always be based on scientific principles. The TBT Agreement on the other hand applies to a wide range of technical requirements, and solely notes that available scientific information is one of the relevant elements of consideration in assessing risks. Some of these technical requirements are introduced for health or safety purposes, but others are introduced to standardize products, ensure quality, or to avoid consumer deception.

3.2   Treatment of Developing Countries

Both the SPS and TBT agreements contain provisions on technical assistance (Article 9 in the SPS Agreement and Article 11 in the TBT Agreement), and special and differential treatment (Article 10 in the SPS Agreement and Article 12 in the TBT Agreement) to help developing countries and least developed countries (LDCs) to implement and take advantage of the agreements. The main objective of such assistance is to strengthen the institutional capacity of developing countries in ways which would enable them to meet the obligations they have assumed under the agreements.

The special provisions include:

•   longer time periods for implementing agreements and commitments,
•   measures to increase trading opportunities for these countries,
•   provisions requiring all WTO members to safeguard the trade interests of developing countries, and

- support to help developing countries build the infrastructure for WTO work, handle disputes, and implement technical standards.

The rationale for these provisions is that institutional constraints impede the effective integration of developing countries in the multilateral trading system. Adopting liberalized trade policies does not automatically lead to capacity building to take advantage of the opportunities international trade provides. Problems and weaknesses in infrastructure and institutions often times thwart capacity building in developing countries.

Despite these provisions, developing countries encounter difficulties in the implementation of the SPS and TBT agreements. A concern of developing countries stems from the definition of standards, shaped largely by developed countries due to their strong backgrounds in science and ability to substantiate their positions. Another problem is with the non-binding language in the provisions. "Best endeavor" clauses express what might be termed a "moral" obligation on member countries to "try their best." For example, in Article 9 of SPS Agreement, "Members *agree to facilitate* the provision of technical assistance to other Members, especially developing country Members" with respect to SPS compliance. Article 10.1 dictates that Members "*shall take account of* the special needs of developing country Members" in the preparation and application of SPS measures. While "shall" is the classic word of binding obligation in international treaties, since "take account of" is not defined, the provision by itself attains no binding substantive legal effect.

3.3 Technical regulations in the Doha Round of Multilateral Trade Negotiations

The fourth WTO Ministerial Conference in November 2001 launched the Doha Development Round, which according to the WTO Director-General, "marked the beginning of a new era of negotiations which can and should provide real and lasting opportunities for developing countries to participate in the multilateral trading system[9]." The negotiations have addressed a myriad of issues underlying the SPS and TBT agreements, but particular emphasis has been placed on trade capacity building in order to enable developing countries to adjust to WTO rules and disciplines, and build up capabilities to deal with requirements in technically demanding areas, such as those with respect to SPS measures and technical regulations. In the Doha Declaration, member governments agreed that all special and differential treatment provisions should be reviewed with a view to strengthening them and making them more precise.

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[9] Mike Moore, Remarks at the WTO Symposium., "The Doha Development Agenda and Beyond" (April 29, 2002).

The original mandate agreed at the Doha Ministerial Conference in 2001 provided a longer time-frame – up to six months – for developing countries to comply with other countries' new SPS measures, for a "reasonable interval" between publication of a country's new SPS measure and its entry into force, and to adapt to new technical regulations in importing countries (except in emergencies, and subject to certain conditions). It was also agreed for the SPS Committee to help implement steps and programs to encourage developing countries to participate in the work of international standards-setting organizations and for all WTO members to provide adequate technical and financial assistance to least-developed countries so that they can respond to new TBT regulations and SPS measures that affect their trade.

This emerging emphasis in the Doha Round towards assisting developing countries integrate into the international trading system reflects the understanding that the livelihoods of hundreds of millions of the world's poorest people in developing countries are heavily dependent on food commodities. Food commodities are the foundation of the economies and account for the bulk of the export earnings of these countries. The development of these commodities in the international trading system is vitally important in the global struggle to alleviate poverty.

3.4 Technical regulations in a regional context

WTO members have increasingly engaged in bilateral, regional and plurilateral free trade agreements, and custom unions (referred to as "regional trade agreements" or "RTAs"). As RTAs have proliferated, a country may become a member of several different RTAs, creating overlapping arrangements. Debate has centred on whether or not RTAs are supportive of the multilateral trading system in the sense of contributing to the overriding goal of trade liberalization.

Protagonists assert that the majority of RTAs encompassing technical regulations converge towards and strengthen the multilateral trading system. The most common approaches RTAs pursue for addressing trade barriers are the mutual recognition of conformity assessment results, and transparency of standard-related measures, followed by harmonization of technical regulations, and acceptance of regulations as equivalent. It is also viewed that RTAs may help developing countries prepare to compete more effectively in the multilateral trading system.

Antagonists argue that the existence of different criteria for harmonization and the multiplicity of technical regulations can complicate international trading relationships. Another threat of RTAs is that resources are diverted away from multilateral liberalization efforts, to focus on regional efforts. There is also the concern that RTAs further marginalize developing countries, as the shortage of resources and lack of capacity to participate actively in international standardization activities is exasperated by demands on participation of developing countries in RTAs. There are also examples where the recommendations of international

standard-setting bodies served as a basis to facilitate regional trade agreements among developing countries. For example, the harmonization of food safety measures at MERCOSUR level was facilitated using some Codex guidelines and recommendations.

4. Main issues raised by technical regulations

Multiple issues are raised in the global food economy by technical regulations. The main issues cover a broad sweep of concerns about the creation, implementation, enforcement, and outcome of technical regulations and the treatment of developing countries.

Creation of Technical Regulations

A foundational issue for technical regulations is how should technical regulations be created? Article 2.4 in the TBT Agreement requires that when technical regulations are required, Members shall use international standards as a basis for the technical regulation. This issue of creation raises other issues concerning the factors involved in standard-setting. Should government entities and states and/or market forces and the food industry be the main standard-setting and -enforcing bodies? Should technical regulations be specific to the product or the process, or both? What should be the role of science in the setting of technical regulations? In the absence of clear scientific advice, what should be the role of precaution? How should ethical and other legitimate factors be used?

Assistance to Developing Countries

The most pressing of the main issues is whether the WTO and its members and the international community in general adequately and effectively provide technical and other assistance to help developing countries comply with WTO rules covering technical regulations. To this end, should the provisions on technical assistance (Article 11 in the TBT Agreement and Article 9 in the SPS Agreement and) and the provisions on special and differential treatment (Article 12 in the TBT Agreement and Article 10 in the SPS Agreement and) be made more specific and be mandatory? Can technical assistance alone deal with the heavy investment in both physical and human costs needed to build capacity in areas where developing countries have assumed WTO commitments? Do developed countries take into account the needs of developing countries when setting technical regulations? Do international standards and guidelines take into account the situation in developing countries?

Participation of Developing Countries

Related to the preceding issue is whether developing countries can participate more in the international standards-making process for technical regulations and in the WTO process related to technical regulation? This issue is multi-layered. It starts with the issue of limited participation of most developing countries in the mechanisms of the TBT and SPS agreements. For example, most developing countries lack the expertise to participate in dispute settlement procedures of the WTO, either as defendant or complainant. Next is the issue of limited participation by developing countries in international standards setting bodies (Codex, OIE and IPPC). The cost of participation is often a significant obstacle. Does this disparity in participation place developing countries at a disadvantage? Codex has recognized the barriers faced by developing countries and has undertaken some efforts to help mitigate these difficulties, including holding more meetings in developing countries, capacity-building activities and establishing a trust fund to help facilitate the participation of developing nations[10]. Another notable effort is the Advisory Centre on WTO Law, which helped Peru win a significant WTO dispute settlement in a case challenging an EC regulation[11]. Does more still need to be done to eliminate barriers to the equal participation of developing countries?

Consensus building in international standards setting

Are the international bodies (Codex, OIE, and IPPC) up to the task in setting standards? Do the TBT and SPS agreements make deliberation in these organizations less effective? International standards have certain status under the WTO construct, giving Members an incentive to build a consensus between these standards and domestic policy goals. How should the international bodies harmonize strongly held preferences among its participants? Inflexible positions are inimical to a deliberative process. How does the increase in the profile of Codex affect its ability to deliberate when dealing with ethical and other legitimate factors? An example of where issues subvert to a larger public debate is the difficulties over the labeling of genetically modified food. These kinds of issues are different than the technical issues that Codex and the other bodies were designed to address, including the safety assessment of biotechnology, which issue has been successfully dealt with under Codex. Will the introduction of sensitive issues such as biotechnology labeling, obesity and animal welfare strain the deliberative capacity of these international bodies?

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[10] See achievements and reports of the Codex Trust Fund, available at http://www.who.int/foodsafety/codex/trustfund/en/index4.html.

[11] See Gregory Shaffer & Victor Mosoti, The EC-Sardines Case: How North-South NGO-Government Links Benefited Peru, 6 Bridges No. 7 (2002).

Regional Agreements

Do RTAs support or detract from the trade-liberalization mission of the multilateral trading system? Do RTAs encompassing technical regulations facilitate convergence towards and strengthening the multilateral trading system? There have been examples where the adoption of regional standards facilitate trade and can prepare the final step for adoption of a global standard. Or, alternatively, do RTAs divert resources away from multilateral liberalization efforts? Do the demands made by RTAs further exasperate the shortage of resources and lack of capacity of developing countries?

Harmonization

How can improvements be made in the harmonizing of technical regulations among countries to help limit unintended trade-restrictive consequences of legitimate technical regulations? Are there limits to such harmonization? For example, are there differences among countries in tastes and risk attitudes that are rooted in disparate cultural norms and experiences that limit harmonization? Are these differences more readily standardized in RTAs?

Another harmonization issue is whether the WTO creates downward harmonization of standards? The WTO is complaint driven; in other words, a standard is scrutinized only if a member country brings a complaint to the WTO. As a result, there is concern that the WTO creates downward harmonization among standards. It is important to keep in mind, however, that downward harmonization to some degree is expected as the WTO is an organ designed to liberalize trade.

Product and Procedures

How can differences in product and procedures be accommodated? Though scientific analysis is essential, it alone may be inadequate to resolve disputes. Is it possible to create a procedural framework within the current TBT and SPS agreements that address the differences in and diversity among products and processes, as could be found in the case of food safety with new approaches from the farm to the table? Or, do the TBT and SPS agreements need to be revised to incorporate historical, social, cultural and ethical considerations and principles as well as scientific considerations? Are better processes needed to assess and characterize known and unknown risks and uncertainty as well as to avoid risk where possible, and to manage and communicate risk to all stakeholders throughout the process?

Public and Private Standards

Is it possible for private sector and governmental standards to co-exist? Can these standards complement each other? A related question is how should citizens be

educated? Knowledge of public standards (technical regulations and SPS measures) and the principles supporting these is generally lacking amongst citizens in member countries. What assistance should be rendered to groups working to promote equitable standards setting? Are studies needed to determine the interface between public and private standards setting, the role of science in standards setting and risk assessment, and the interface between concerns raised by groups in industrialized and developing nations? For example, there are interesting international and regional initiatives that need to be examined, such as systems of co-regulation, "de-minimus" rules or the new approach to technical harmonization as established by the EC Directive 98/34/ECC[12].

Enforcement

Is the enforcement capacity of the WTO sufficient to regulate technical regulations? The WTO currently has neither the mandate nor the capacity to enforce or reject national regulations. The WTO is not a *de jure* enforcer of regulations. The WTO enforces standards *de facto* because it responds to complaints brought by members and determines which national regulations are or are not in conformity with the rights and obligations of Members under the WTO rules. Is this capacity sufficient to regulate technical regulations consistent with the goals and objectives of the multi-lateral trading system?

Transparency

Is the international system regulating technical regulations transparent enough? The current context in which regulations are created may be seen as unclear, especially by individuals at some distance from the standards-setting process, such as producers, consumers and individuals in developing countries. Some claim that producers often are unaware of changes in regulations until long after they are made, despite the direct impact that such regulations may have on their livelihoods. Is part of the confusion in regulation creation and adherence due to the rapid pace at which they change and lack of coordination at the local level? Lack of participation of food producers in national food standardization committees is another likely cause.

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[12] See e.g., New Approach Standardisation in the Internal Market, at www.newapproach.org.

5. Are Technical Regulations Becoming a Barrier to Trade?

5.1 Is there evidence that technical regulations are increasingly used as Non-tariff Barriers?

A non-tariff barrier (NTB) is any provision or policy intervention other than a tariff that distorts trade. Tariffs on goods have been reduced to low levels through rounds of multilateral trade negotiations. Export subsidies have almost disappeared except in a few agri-food markets. Tariff-quotas have become less important.

While tariffs overall have been lowered, new NTBs, have been introduced[13]. Data compiled from WTO notifications show around one-hundred different types of NTBs[14]. Many of these new NTBs are technical regulations[15]. Measuring the frequency of NTBs is difficult[16]. Because many NTBs are applied at the product specific level, data are often highly disaggregated.

The main NTBs in the food sector are technical regulations. The evidence suggests that technical regulations are increasingly used as NTBs. A report by the International Centre for Trade and Sustainable Development in May 2008 specifically measures the increasing use of technical regulations as NTBs. The report reveals that imports of tropical and diversification products from African, Caribbean and Pacific (ACP) countries and some Latin American countries are particularly affected by TBT and SPS measures[17].

Additional studies have sought to measure the impact of technical regulations on trade. They discuss measurement approaches concerning economic and trade impacts. The aim is to help policy makers design technical measures that are least trade-restrictive[18]. A World Bank Technical Barriers to Trade Survey administered in 2002 to 698 firms in 17 developing countries, indicates the primacy of technical regulations as a hurdle in major OECD export destinations[19]. The business community corroborates that technical barriers to trade are a major detriment to exportation[20].

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[13] John C. Beghin, Nontariff Barriers (Dec. 2006).

[14] Non-Tariff Measures on Agricultural and Food Products, 14 OECD (2001).

[15] Id. at 15.

[16] UNCTAD, 2005, "Methodologies, Classification, Quantification and Development Impacts of Non-Tariff Barriers (NTBs)", Background Note TD/B/COM.1/EM.27/2, Expert Meeting 5-7 September 2005, Geneva.

[17] Anne-Cèlia Disdier et al., Trade Effects of SPS and TBT Measures on Tropical and Diversification Products, International Centre for Trade and Sustainable Development (May 2008).

[18] The Impact of Trade Regulations on Agro-food Trade, OCED (2003).

[19] WTO, Working Party of the Trade Committee, Analysis of Non-Tariff Barriers of Concern to Developing Countries, TD/TC/WP(2004)47/FINAL (2005).

[20] Id.

It is important to note that under the SPS and TBT agreements Members are required to provide notification of measures that have the potential to affect trade, are not based on international standards and fall under the scope of these Agreements. Although there was a comparable requirement under the GATT's Standards Code, data for the preceding period are far from comprehensive. This means that some of the reported increase in NTB use is likely to be due to improved information. Despite the data shortcomings, there is broad evidence that NTBs, including technical regulations, are applied widely to agricultural and food products by high-income countries, and increasingly by low and middle-income countries too[21]. Updated and comprehensive assessments of the growth of technical regulations as NTBs is necessary to more fully understand their prevalence and role.

5.2 What types of technical regulations (other than those covered by the SPS Agreement) are the most problematic?

The appropriate use of labels for food products to signal quality attributes and to add value to product by catering to consumer preference has been especially problematic among countries. Proposed regulations for standards of identity, country-of-origin labeling for perishable foods, eco-labeling, shelf life, nutritional labeling, nutritional and health claims, and labeling for genetically modified products and other labeling regimes continue to stir contention and divide countries. These disagreements arise to some extent over the uncertainty of the TBT Agreement's rules on labeling non-product-related processes and production methods – regulations that target process attributes not evident in the end product. These types of regulations are not referenced in Article 2 of the TBT Agreement, leading to a debate about their usage. This is a serious challenge because these types of technical regulations are growing in importance in global markets.

5.3 SPS rules and agricultural exports from developing countries

5.3.1 Main Constraints

Many developing countries find it difficult to meet the SPS measures of the developed countries, and are concerned that in practice, their access to export markets for some food and agricultural products is being hindered. Some available estimates already suggest that the magnitude of lost trade owing to difficulties in complying with SPS measures of developing countries can be quite large. The Department of Agricultural and Food Economics of the University of Reading in the UK evaluated several case studies for problems faced in meeting SPS measures

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[21] See studies by Ndayisenga and Kinsey (1994); Thilmany and Barrett (1997); Hillman (1997).

for exports of various food products to the European Union (EU): Indian meat and shrimp, Vietnamese fish, Egyptian potatoes, East African countries' fresh fish, Zimbabwean horticultural produce, etc. The authors concluded that there were significant trade losses because of failure to meet SPS requirements[22]. Additional studies that measure the impact of SPS measures on developing countries are listed in a 2007 FAO Commodity Studies publication[23]. For example, in a study by the World Bank gravity model results suggest that a 10 percent increase in regulatory stringency – tighter restrictions on the pesticide chlorpyrifos – leads to a decrease in banana imports by 14.8 percent[24].

The University of Reading study also noted that a number of factors limit developing countries' ability to meet developed country SPS requirements, the most important being the level of access to scientific and technical expertise and information, and the incompatibility of the SPS requirements with prevailing production and/ or marketing methods of developing countries. The study also revealed the wider resource and infrastructure constraints of developing countries and their inability not only to comply with the SPS requirements, but – just as important to the trading partners – to demonstrate compliance when it had been attained[25].

5.3.2 Costs of Compliance for farmers, processors and exporters

The cost of compliance in production, processing, or export with technical regulations and SPS measures is high, especially for developing countries. For example, African countries are estimated to have lost $670 million in agricultural exports because of the higher EU standard for aflatoxin as compared to the Codex Alimentarius standard. The ACP secretariat has estimated that the operational costs of complying with SPS rules represent 2% to 10% of the value of products exported by ACP countries[26]. These high costs for exporting developing countries restrict their export volumes.

Another factor that leads to higher costs is that SPS measures are diverse, complicated, and change rapidly. As a result, their implementation is difficult and highly costly. For example, for testing a product, there is a need for initial investment in equipment, training of laboratory personnel, and testing officers as well as the

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[22] Spensor Henson, et al., Impact of Sanitary and Phytosanitary Measures on Developing Countries, Centre for Food Economics Research. Reading: University of Reading (2000).

[23] FAO Commodity Studies No. 3, Private Standards in the United States and European Union Markets for Fruit and Vegetables: Implications for developing countries, pp. 87-89 (2007).

[24] Wilson, J.S., T. Otsuki, To Spray or Not to Spray: Pesticides, Banana Exports, and Food Safety, Development Research Group (DECRG), World Bank (2002).

[25] Id.

[26] Study of the Consequences of the Application of Sanitary and Phytosanitary (SPS) measures on ACP Countries, Technical Centre for Agricultural and Rural Cooperation (CTA, Brussels) (2003).

cost of accreditation. Then there are the operational costs in the maintenance, salaries, and cost of laboratory material. There is also the cost of compliance, which includes those necessary for adjusting various components of the supply chain, development of the necessary capacity in order to conform to the SPS measures, the administrative cost of control, inspection, testing and certification and the cost of delays in exportation (e.g. interest charges) caused by the procedures necessary for the compliance.

   The ability to cope with SPS measures varies with the size of the farmer, processor or exporter. In general, for small entities it is very difficult to comply with the most stringent SPS requirements from developed markets, while for big entities the difficulty is less marked. Thus, small entities often form cooperatives to reduce costs of compliance.

5.3.3   Strategies Adopted by Developing Countries to Cope

Several strategies have been adopted by developing countries to cope with the increasing use of technical regulations and SPS measures as NTBs by developed countries. The first strategy is to protest through the SPS and TBT agreements notification and complaint procedures. This effort may require little effort and cost for exporting countries, but it can take time for importing countries to respond. Second, is to increase participation in WTO Committees, although this also exacts a financial burden and requires scientific and technical resources in getting needs reflected in standards. Third, is to take remedial measures after being alerted that their product was rejected in the port of an importing country as a result of inspection by the relevant authorities. Again, the capacity to comply with SPS measures depends on a country's level of development and the organization of production. The lower the level of development, the bigger is the challenge for compliance. Similarly, the unit cost of compliance will be higher for small and scattered farm holdings and small exporters. However, while the cost of compliance is high, the cost of the lack of compliance is even higher. Thus, developing countries have little option but to comply with SPS measures and technical regulations. The question then becomes: what strategy for compliance should developing countries follow, to reduce costs and increase benefits?

6.   Prospects

6.1   Are technical regulations likely to become a greater obstacle to trade in the future?

As a result of a major shift in the pattern of world trade in recent years, technical regulations are likely to become a greater obstacle to trade in the future. This major shift is from trade in products to trade in tasks, which fragments production process

into stages. As a result, ability to access international value chains relies increasingly on specialization and capacity to deliver goods in terms of price, quality, time, and quantity. This specialization pressures Members to develop technical regulations to demonstrate conformity with specialized product standards. It is also likely that governments will continue to employ technical regulations to contain health or environmental risks.

Increased investment and sophistication is required to meet the demands of these new markets opened by this shift to specialization and capacity. Investments spawn improved productivity, technological capabilities, and the necessary facilities to engage in efficient testing, certification, and accreditation mechanisms to conform to the SPS and TBT agreements[27]. Due to a general lack of resources, developing countries struggle to comply with the myriad of technical regulations[28].

6.2 What initiatives could help reduce their potential for being NTBs?

Several initiatives could help reduce the potential for technical regulations from being NTBs[29]. These initiatives would include coverage at the international and national levels in developed and developing countries.   These initiatives could include the following:

Increase technical assistance to developing countries

Developing countries need access to scientific and technical expertise and information in order for their farmers and exporters to conform to technical regulations adopted by main developed and developing markets. Such assistance is currently provided by international organizations such as WTO, UNCTAD, FAO, WHO and the World Bank or by country members of these organizations through technical assistance programs; however, it may be that more assistance by developed countries and international entities in this area is required. To review the issues and means to address the inclusion of more experts and data from developing countries and countries in international scientific advice activities, FAO and WHO convened a workshop whose findings are published in a final report[30].

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[27] UNIDO, Trends and Challenges, http://www.unido.org/index.php?id=o72754

[28] UNIDO, Industrial Competiveness and Trade, http://www.unido.org/index.php?id=o18267.

[29] The First Triennial Review of the TBT Agreement raised a number of issues concerning developing countries and their participation in the agreement, and, as a result of this, a Workshop on Technical Assistance and Special and Differential Treatment in the Context of the TBT Agreement, organized by the WTO, was held on 19-20 July 2000 (WTO 2002d). This identified four main areas of concern: implementation of the TBT agreement, participation in international standard setting, conformity assessment procedures, and capacity building.

[30] See Food and Nutrition Paper 88 (2004), available at www.fao.org/ag/agn/agns/advice_countries_en.asp.

Target technical assistance to meet needs of developing countries

Technical assistance should not be viewed simply as a gap filler between developed and developing countries. Rather, technical assistance should be oriented to be more responsive to the needs of developing countries[31]. These needs vary considerably from country to country. The levels and types of needs depend on the country's infrastructure and access to resources.

Responding to these needs requires that the priorities of each country should be identified, evaluated, and quantified in terms of resources needed and the cost of technical assistance.

For example, training assistance may need to be complemented by financial resources to establish facilities, equipment, and other resources necessary to meet technical regulations. It may then be prudent to assess whether the recipient developing country has the requisite skilled human resources to make use of the resources. To this end, there needs to be greater cooperation among donor countries and international organizations to make these assessments and to align assistance with the needs of recipient developing countries.

A thoughtful and cooperative approach by international organizations and developed countries to target technical assistance to meet the needs of developing countries will also reduce waste and ensure a return on investment. An example of such an approach is the Standards and Trade Development Facility (STDF) programme, launched in 2002 by FAO, OIE, the World Bank, Codex, WHO and WTO. STDF seeks to enhance the capacity of developing countries to participate in negotiations and implement SPS measures. The STDF program acts as both a coordinating and a financing mechanism[32].

Focus on the development of infrastructure for developing countries

Despite their challenges, upgraded technical regulations can be beneficial for producers who are able to meet them. Many producers and exporters in developing countries believe that upgraded regulations help them to improve their competitiveness. A long-term plan of infrastructure development is imperative to enable these producers to compete in the global food markets, all with the aim of helping developing countries meet the increasing and demanding technical regulations. An example of such assistance is the WTO Negotiations and Aid for Trade, a WTO program created by the Sixth Ministerial Conference to help developing countries to build the supply-side capacity and infrastructure they

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[31] See The SPS Agreement: A Business Perspective, Information Pack, UNCTAD/WTO (Nov. 2006).
[32] See Standards and Trade Development Facility, at http://www.standardsfacility.org/.

need[33]. Extensive support is provided, both normative and field level, by the Food Quality and Standards Service of FAO, to build capacity in member countries in the field of food safety and quality. Information on the activities and tools developed is available at http://www.fao.org/ag/agn/agns/index_en.asp. The FAO capacity building programme on food safety includes strengthening member countries preparation and ability to participation in the international negotiations at Codex sessions on the development of international food standards. Tools and a report outlining the support provided to members in the last five years are available at http://www.fao.org/ag/agn/agns/capacity_elearning_codex_en.asp.

More efforts are needed. Long-term assistance is needed to develop for developing countries scientific and technical infrastructure, including laboratory facilities, research facilities, and access to scientific and technical journals and books.

Build a TBT capacity database

To assess needs and priorities and to provide effective and meaningful technical assistance to developing countries, a central source of information is needed. International organizations should consider the development and maintenance of a TBT capacity database. A questionnaire could be designed to assess TBT capacity amongst developing countries. An example or model for database development is the STDF database that provides an overview of planned and delivered SPS-related technical assistance, assist in the coordination of partners institutions of STDF, enables information sharing between institutions and minimizes duplication in the provision of technical assistance[34].

Hold workshops prior to SPS and TBT committee meetings

A WTO workshop on the application of SPS Measures suggested that technical workshops be held prior to SPS committee meetings. Although there are logistical differences between SPS and TBT committee meetings, the same could be done prior to TBT committee meetings[35]. Holding technical assistance workshops three to four days prior to the meetings of the technical committees would improve the participant's understanding of issues under discussion in the relevant technical committees. It would also facilitate attendance at meetings of the committees, as travel costs for coming to the workshops are met by technical assistance funds. The responsibility for arranging these workshops should rest with the international standard-setting organizations responsible for the formulation of standards.

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[33] See WTO Aid for Trade Background, http://209.85.173.104/search?q=cache:O1Z0jpFflhYJ:www.wto.org/ english/tratop_e/dda_e/aid4trade_e.htm+Negotiations+and+Aid+for+Trade+WTO+program+Sixth+Ministeri al+Conference&hl=en&ct=clnk&cd=2&gl=us

[34] See Technical Assistance to Developing Countries on SPS Issues, available at http://www.coffee-ota.org/ cd_hygiene/cnt/cnt_sp/sec_2/docs_2.2/Capacity%20Building.pdf

[35] Id. at 28.

Develop mentoring arrangements

Another suggestion at the WTO workshop on the application of SPS measures that could be applied to TBT measures is to employ a "mentoring and twinning arrangement" by international standard-setting organizations and by other international organizations[36]. This initiative would coordinate and bring together developed countries that can act as "mentors" and provide advice and mentor to developing countries that need technical assistance. This approach could be implemented on a needs-basis and allow developing countries the opportunity to shop around and select a mentor country that is best equipped to provide the type of assistance needed. As an example, FAO/AGN provides support where experts from experienced countries assist developing countries in the setting of national Codex teams. Care would need to be taken that such mentoring arrangements do not lead to undue influence on substantive and policy matters from the mentoring to the mentored countries when voting on draft standards.

Involve industry and trade associations

Trade, business, and consumer associations in developing countries should be engaged to take a more active interest in standardization activities at national and international levels. It should be noted that Codex has over 150 international NGOs in observer status, which can submit comments and speak in meetings as though they are full members. NGOs should also be more engaged at the national level. Also, international organizations could take steps to impress upon these associations a general awareness of the changing nature of technical regulations and the role of technical regulations on trade and market access.

Ensure compatibility of technical regulations with capacity of developing countries

In addition to the offer of aid, developed countries and international organizations should ensure the compatibility of technical regulations with prevailing production methods of developing countries. Technical regulations should not be implemented disproportionately to the level of risk and should not establish conditions beyond the TBT agreement. An important aspect of ensuring compatibility of technical regulations with prevailing conditions in developing countries is the use of data from developing countries in the risk assessment process, so that the international standards are based on science that incorporates their conditions. Nations have the sovereign right to protect their consumers. It is important to promote equivalence and the use of least trade-restrictive and least expensive measures.

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[36] Id. at 28-32.

Increase the level of participation of developing countries

Methods should be adopted to enhance the capacity of developing countries to participate in WTO committees and in the international standard-setting bodies. These methods should be geared to identify needs and develop sustainable projects. An example of effective steps is the Codex Trust fund and capacity building activities and projects implemented by FAO and other organizations.

Prioritize incremental and sustained development for developing countries

Given the large development gap between developed and developing countries in meeting technical regulations, developing countries may want to consider prioritizing their activities, at least for a short period of time. Participation in areas most relevant to their interests will allow developing countries to build expertise and garner experience that could then be parlayed into a larger role in other bodies where advanced technical expertise is needed.

Develop the capacity for the use of producer enterprises

The effective use of producer enterprises such as cooperatives may be a viable solution for small producers and exporters in developing countries to meet the requirements of technical regulations. Collective enterprises can help mitigate the costs of compliance with technical regulations, facilitate participation, develop infrastructure, and increase participation. A related aspect is the growing importance of export contracts (between producers and exporters) to establish long-term business relationships that ensure quality controls.

Encourage collaboration

Collaboration should be encouraged between industry and producer associations among trade partners in developing and developed countries. Such collaboration could cover the transfer of knowledge, good practices, and effective processes.

Develop a procedural framework for implementing technical regulations

A procedural framework could be created to cope with the multiple dimensions of products and processes. The TBT and SPS agreements could be revised to incorporate historical, social, cultural and ethical considerations and principles as well as scientific considerations. Key issues must be incorporated into the debate and recognized as legitimate aspects of standards, such as diverse process and production methods, animal welfare, ethical issues, and diversity of situations, needs, and cultures.

Facilitate dispute settlement mechanisms

Dispute resolution mechanisms should be modified to enable economically disadvantaged litigants to participate. Although the WTO Dispute Settlement Understanding (adopted as one of the outcomes of the Uruguay Round) has been quite effective, it is very expensive for both complaining and defending parties to have a dispute resolved through the WTO dispute settlement mechanism unless the matter is settled at an early stage. Proceedings involving panels are largely beyond the capacity of small developing countries to support individually. A means should be devised to reduce the cost barrier to participation by developing countries.

Improve communications infrastructure

Developing countries should be assisted in establishing systems for alerting exporters to forthcoming changes in technical regulations. Technical assistance may be needed to facilitate improvement of computing and communications infrastructure, including access to e-mail and the Internet and software packages to help facilitate engaging in remote meetings. A helpful example is where the computer and Internet has now been brought to all WTO enquiry points. The purpose of the notification procedure is to provide an opportunity for interested governments to comment on the draft regulations, so that the characteristics of products produced in their countries are adequately taken into account in adopting the final regulation. Many developing countries have not been able to make adequate use of this right to comment on the draft regulations because the government departments responsible for further processing such notifications simply do not circulate them to the industry and trade associations.

Strengthen regional laboratory capacity

International organizations, developed countries, and developing countries should explore the feasibility of strengthening regional capacity, including the establishment of regional laboratories or regional laboratory maintenance centers. Because of practical difficulties in the time needed to take to transport samples to a laboratory, it may be that regional laboratories are more likely useful in research than in conformity assessment. However, building regional laboratory capacity may be more sustainable than specific national capacity.

Strengthen technical assistance obligations

In order to assure adequate and meaningful technical assistance to developing countries, it may be prudent to consider proposals to make the provisions on technical assistance (Article 11 in the TBT Agreement and Article 10 in the SPS Agreement) more specific and more binding.

Entrust regulatory functions to a single global institution

If nations were to entrust a single global institution with the authority to promulgate uniform regulations, then many of the regulatory differences and transaction costs would dissipate. This initiative would face, however, severe practical, political, and administrative problems. Perhaps a more manageable approach would be to empower a global agency to use a mix of regulations and voluntary standards to choose an appropriate level of regulatory coordination. Even still, this more limited initiative would be fraught with barriers.

Engage additional research to measure scope and impact of technical regulations

International organizations should deploy additional and updated studies, surveys, and research to quantify the scope and magnitude of technical regulations in the global food sector and to measure impacts on trade. The changing nature of technical regulations and their complexity require data collection and relevant information. This task requires ongoing vigilance by the international organizations.

7. Conclusions

The evidence suggests that technical regulations are increasingly used as non-tariff barriers to trade. Despite the data shortcomings, there is broad evidence that technical regulations are applied widely to agricultural and food products by high-income countries, and increasingly by low and middle-income countries too. Developing country exports are particularly affected by the regulations adopted in industrialized countries. Due to a general lack of resources, they struggle to comply with the many technical regulations in these markets.

   As a result of a major shift in the pattern of world trade in recent years, technical regulations are likely to become a greater obstacle to trade in the future. However, several initiatives could help reduce the potential for technical regulations to become NTBs. These initiatives would include coverage at the international and national levels in developed and developing countries. Some of these initiatives are a continuation of existing activities while others are more innovative and challenging.

7

Private standards in international trade: Issues, opportunities and long-term prospects

Pascal Liu [1]

1. Introduction

Private standards are standards[2] designed and owned by non-governmental entities, be they for profit (businesses) or not-for-profit organizations. Whereas governmental standards (usually called 'technical regulations') may either be mandatory or voluntary, private standards are voluntary by definition. Private standards have always existed in the agricultural sector, but their number has risen markedly since the 1980s, with acceleration in the 1990s. With the advance of globalization this type of standards has increasingly applied to international trade. Although no figures are available, it is estimated that presently a substantial share of agricultural exports have to comply with various types of private standards. Yet, the multilateral trade rules that apply to technical regulations have so far not been applied to private standards.

This chapter examines the current situation of private standards and the prospects for further rise of their influence on trade in the long term. It begins by analyzing the causes for their emergence. As the term 'private standards' covers a wide and diverse array of standards, the paper proposes a simplified typology. Estimates of sales are provided for those standards for which data are available. The paper goes on to examine the benefits and challenges of private standards for various types of stakeholders, in particular developing country governments and producers.

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[1] Pascal Liu, FAO

[2] For the definition of standards and other technical terms used in this report, please refer to the glossary in Annex

Finally, the prospects for continued growth of the influence of private standards on agricultural trade in the long term are discussed[3].

2. Factors behind the rise of private standards in international trade

The main driving forces behind the rise of private standards are the globalization of trade, progress in information technology, concentration in the food processing and retail industries, changing consumer preferences and regulatory changes in major developed markets.

Firms increasingly source their raw materials, components and products from a large number of suppliers worldwide. In the past, backward integration through ownership was a favoured strategy to secure scarce supply and ensure product quality. For example, retailers would take over food processing companies while food processors would invest in agricultural production units. However, control through ownership is complex, costly and entails risks, especially for firms that are not experienced in the industry. The situation of surplus production that developed in the agricultural sector from the 1980s made it less important to secure access to supply. And progress in information and communication technology made it possible to control the supply chain through the use of standards. In a market situation of abundant supply, standards give a sufficient degree of control over product quality and do not require large investments and the involvement in the management of suppliers. Thus, backward integration through ownership has tended to be replaced by a lighter form of integration through standards. Such a trend has been observed in the banana industry, where multinational companies have sold some of their plantations and increasingly used standards since the 1990s (FAO 2003a, FAO 2009).

More importantly, retailers have used a similar approach. The retail sector has experienced unprecedented globalization and concentration since the 1980s. One of the consequences of retailers' increasing bargaining power is that they can impose higher requirements onto their suppliers. These requirements not only include price and product specifications, but also apply to production, processing and transport. Some technical standards, such as those for bar-coding, have been initiated by retailers to improve logistical processes. Many retailers have their own specifications that are communicated solely to their suppliers and of which the outer world has little knowledge. Yet, for certain categories of standards, notably those related to food safety, retailers and other buyers may implement standards as a group and require third party auditing and certificates.

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[3] The prospects for private standards to be brought under the disciplines of the multilateral trade agreements in the future are outside the scope of this paper, but are addressed in Chapter 10 of this volume.

Other requirements have been included to respond to new demands from consumers. Rising purchasing power, education level, urbanization and evolving lifestyles combined with the decline of food prices relative to other goods have led to changes in consumption patterns. While in the past price and visual aspect were the main purchase criteria, the *intrinsic quality* of food has become a much more important parameter. In addition to the physical quality of foods, consumers are increasingly demanding on the ethical dimension of food quality. This relates to the process of production and trade and its broad impacts on society and the environment. It includes a wide range of social, environmental or cultural issues such as the treatment of workers, a fair return to producers, environmental impacts and animal welfare. These concerns have developed partly as a reaction to the industrialization of agriculture, the concentration of food production and trade and the resulting globalization of food trade. They have been fuelled by non-governmental organizations (NGOs) campaigning for social and environmental goals such as the preservation of rainforests, labour rights, and the abolition of child labour or fair-trade. Some of these NGOs have developed voluntary standards that firms may choose to adopt to meet these concerns.

A third 'driver' of standard development has been a tightening regulatory environment, such as increased levels of liability for food companies in relation to food safety aspects. A series of food crises in the late 1990s and early 2000s had considerable media coverage and raised the awareness of governments, the food industry and consumers on the need for improving the monitoring of food production and distribution. Governments have tended to respond by adopting stricter legislation placing the liability for food contamination on the industry and retailers (e.g. the 'due diligence' requirements in the United Kingdom first and then in the whole EU). In turn, retailers and food manufacturers have sought to make their suppliers liable for the safety of their products, notably through the development of standards for good agricultural practices and good manufacturing practices, traceability and the requirement that suppliers be certified. In some cases, firms have developed standards individually (e.g. Carrefour's "filière qualité"), while in others they have acted collectively (e.g. some European supermarket chains formed the Euro-retailer Produce Group to develop the EurepGAP standard in the 1990s).

Finally, competition on quality provides another incentive to adopt "high" standards. Adopting a standard and publicizing it is a strategy to improve the corporate image, differentiate products and add value.

3. Typology of private standards and their conformity assessment systems

There is a wide array of private standards depending on what they relate to, their objective and scope, the customers they target, the type of companies and areas they may apply to, and the type of organizations that own and require them. There are also different modes of verifying that the standard is met. What follows is a simplified typology of private standards.

3.1 Objectives and scope of standards

As defined by ISO, standards are used to ensure that materials, products, processes and services are consistently fit for their purposes. Standards have different levels of objectives, ranging from the *ultimate objective* to the more operational and immediate objectives (see Table 1).

3.1.1 Ultimate objectives

The ultimate objective relates to the strategic goal that the organization aims to achieve by prescribing the standard. Section 1 has touched upon different types of ultimate objectives. They can be summarized under three types: regulating supply, differentiating products and advancing ethical goals. Standards aiming at regulating supply are exemplified by the supplier-oriented standards developed by large food manufacturing and retailing firms. The ultimate objective is to control procurement and beyond this, the whole supply chain. Product differentiation standards are usually defined by producer organizations, but some of them also originate from large-scale retailers. Their objective is to create specific market demand, thereby improving market access and possibly fetching a price premium. The third type responds to various concerns that have emerged in civil society since the 1980s and can be broadly termed as 'ethical standards'. It mainly consists of process standards with a wide range of objectives. Ethical standards aim to encourage the inclusion of various ethical values into production, trade and consumption by signalling to consumers those products which meet these values. This generates market rewards for the companies that adopt these values. A standard may have more than one ultimate objective.

3.1.2 Immediate objectives

The next level of objectives can be called the *immediate objectives*. The above first type of standards (regulating supply) includes ensuring food safety as an immediate objective. Private food safety standards have emerged in the wake of a series of high-profile food poisoning cases in the 1990s. Ensuring food quality is another frequent immediate objective of standards. It can also be found under both the first and second type of ultimate objectives (i.e. supply regulation and product differentiation).

Standards aiming to ensure food quality have long existed in the agricultural sector. These two types of immediate objectives include both product and process standards, and emphasize the traceability of products throughout the supply chain.

The third ultimate objective includes various immediate objectives (e.g. protecting the environment, promoting sustainable agriculture, advancing social goals, responding to cultural demands, etc.). Standards may have more than one immediate objective. For example, origin-linked standards generally include food quality, preservation of tradition and local natural resources in their immediate objectives.

3.1.3   Operational objectives

The final level of objective can be designated as *operational objective* and corresponds to what is directly addressed by the standard, in other words the expected outcome of the standard's implementation. For example, a food safety standard may aim at the adoption of good agricultural practices and at fully traceable products. An environmental standard may have various operational objectives (e.g. development of organic agriculture, preserving the natural habitat of birds, protecting rainforests, or limiting the contamination of the environment by GMOs). Similarly, a social standard may have as operational objectives ensuring the respect of labour rights and worker health and safety, reducing child labour, promoting social equity and fair-trade, or preserving the rights of indigenous communities. A cultural standard may have the preservation of traditional local know-how in food production as operational objective. A religious standard may have the mode of preparation of food as operational objectives (e.g. kosher and halal foods). Ethical standards may have ensuring animal welfare as operational objective.

It is important to bear in mind that some standards mix several immediate and operational objectives. For example, fair-trade standards include some environmental criteria.

3.2 Type of prescribing organizations

Private standards have been developed and promoted by both businesses and not-for-profit non-governmental organizations (NGOs). In the business sector, they respond to the first or second ultimate objective or even both (regulating supply or/and differentiating products). Usually producers set standards for product differentiation while retailers set standards for regulating supply. Yet, retailers also benefit from product differentiation standards and have launched own brands to this effect.

Standards may be set by different actors of the supply chain, individually or in industry groupings. The producers, generally in an association, cooperative or local consortium, may have an interest to set a standard in order to show a wide range of

TABLE 1.
Simplified typology of private standards and certification schemes in the food sector

	Business sector					Not-for-profit sector e)						
Standard owner a)	Food manufacturers and retailers (as single firm or industry group)			Farmer organizations, exporter organizations or trade associations		Advocacy NGOs						
Owner's objective	Supply chain management b)			Product differentiation, value adding, market access		Promote and reward sustainable/ethical business practices						
Designed for	Suppliers			Producers and the national industry itself		Producers and traders						
Standard's immediate objective	Food safety	GMO-free	Product intrinsic quality	Food safety, environmental & social issues	Product intrinsic quality	Environmental protection and sustainable agriculture		Addressing social issues		Responding to cultural demands		Other ethical concerns
Operational objective	Adoption of good practices Products are traceable		Nutrition Health	Adoption of good agricultural practices	Origin-linked trade marks, traditional production process d)	Organic agriculture c) (most developed countries have public standards)	Conservation of natural resources, protection of species	Fair trade	Labour rights child labour	Religious f)	Origin-linked trade marks d), traditional production process	Animal welfare
Examples	GlobalGAP, BRC, SQF, IFS, Tesco's Nature's Choice, MPS			KENYAGAP, Thai Q ChileGAP Colombia Florverde, Ecuador's FLorEcuador, KFC certif	Florida oranges	IFOAM Basic Std, Soil Association, East African Organic std	Rainforest Alliance, Bird-friendly, Dolphin-friendly, GMO-free Conservation Agriculture	FLO Bio-équitable Ecocert IMO	SA-8000	Halal, Kosher	Cotija cheese	Free-range chickens & eggs
Scheme type	B2B	B2B B2C		B2B	B2C	B2C		B2B		B2C		
On-product label?	No	Y/N		No	Yes	Yes		No		Yes		
Main benefits for producers	Maintain access to large integrated markets Improved farm management			Product differentiation, access to premium markets, added value		Product differentiation. Added value?		Higher prices & incomes, more stable markets		Better access to specific markets		Product differentiation
Main costs borne by	Producers, exporters			Consumers & producers		Consumers & producers		Consumers		Producers	Consumers & producers	Producers & consumers

Notes:

a) Some standard types may belong in several categories. For example, GMO-free may be owned by retailers, producers or not-for-profit groups. Also, the first organic standards were developed and owned by farmer organizations.

b) Beside supply chain management, retailers also have standards aimed at product differentiation and value addition (e.g. quality, GMO-free standards, etc.)

c) Private organic agriculture standards have become somehow marginalized by the subsequent development of governmental regulations in most developed countries, where certification to the public standard is mandatory if the product is to be labelled as organic. They continue to exist alongside public standards but are thought to account for a relatively small share of organic product sales.

d) Geographical Indications (GI) can be based on different legal tools, referring either to a public scheme (sui generis law that regulates the standard) or private property, within a trademark approach. Some trademarks can also be owned by public authorities (e.g. Idaho potatoes) as for traditional quality schemes (label rouge in France, Hungarian trademark HÍR,...). The objectives of governments when regulating GIs are not only regulation (intellectual property rights) in the market but also consumer response, traditions and diversity preservation

e) ISO standards are not included in this table, for the sake of concision and also because ISO is a hybrid body composed of public and private national standard-setting bodies

f) Private religious standards tend to disappear in those countries where the government has adopted an official standard.

buyers that they fulfil certain requirements generally in demand in the market. Such an assurance programme may save time and money, compared to assuring each buyer individually. Such producer standards include the standards set by national horticultural producer associations under the COLEACP harmonized framework or those set by Florida orange producers. Another example would be the first organic standards set by organic producer associations, which not only served to assure consumers but also functioned as a learning tool for the producers.

At the other end of the chain, buyers such as food processors or retailers may set a standard to ensure that procured products have a consistent level of 'quality' (in its broadest sense) without the need for inspecting all the suppliers. Large firms may choose to do this individually. Examples of retailer's own standards include Tesco's *Nature Choice* and Carrefour's *Filière Qualité*. On the other hand, if a group of buyers recognize that they have basically the same requirements for certain products, they may set a standard together. This would encourage producers to implement such standards more rapidly, as it becomes clear that a large number of buyers require them. An example of such a buyers' standard is the GlobalGAP (formerly EurepGAP) protocol that was developed by a group of European supermarket chains. The SAI-Platform and the Global Food Safety Initiative are initiatives by groups of large food manufacturing companies to harmonize food standards (FAO 2007b).

Not-for-profit NGOs have been very active in standard development. Such civil society organizations include environmentalist groups, faith-based associations, trade unions, animal rights movements and other organizations involved in social progress. Their ultimate objective is to promote and reward sustainable or ethical business practices. For example, the International Confederation of Free Trade Unions (ICFTU) has established a generic code for ensuring labour rights, and some trade unions are involved in coalitions that are setting standards. NGOs may be advocacy groups, but can also be broad stakeholder groups. Standard-setting NGOs may themselves be an umbrella organization of various smaller NGOs, each with their own constituencies. Standard-setting NGOs may be national or an international association of national NGOs such as the Fairtrade Labelling Organization International (FLO) and the Sustainable Agriculture Network (SAN). Whether a standard set by NGOs becomes generally accepted will depend on many factors. Among them, the public recognition of the NGO setting the standard; the standard-setting process, especially stakeholder consultation; the "implementability" of the requirements; and the publicity around the standard. As with governmental standard-setting bodies, NGOs may choose to do the verification themselves, or to accredit certification bodies.

Finally, the private sector and NGOs may form two-party coalitions to set standards, possibly with the participation of government. For example, governments, industry and consumer organizations are all represented among ISO members. ISO is a hybrid body composed of public and private national standard-

setting bodies. Another example is the Ethical Trading Initiative (ETI), a tripartite organization with government, businesses and trade union representation in the United Kingdom.

Some private standards have become somehow marginalized by the subsequent development of governmental standards. This is the case of organic agriculture standards in most developed countries, as governments have regulated the production, marketing and labelling of organic foods since the 1990s (EU) or early 2000s (USA, Japan). However, private organic standards continue to exist alongside public standards due to consumer preferences. In these cases, the food product is certified to two standards (the public and private ones). As for private religious standards (e.g. Halal or Kosher...), they tend to disappear in those countries where the government has adopted an official standard.

Unsurprisingly, there is a correlation between the type of standards and the standard-setting organization. Most of the standards developed by the business sector aim at food quality, food safety and traceability. Conversely, most ethical standards are set by not-for-profit organizations.

3.3   Targeted clients

Private standard schemes may target two broad categories of customers: corporate clients ('business to business' or B2B schemes) and final consumers ('business to consumer' or B2C schemes). Most of the food safety, traceability and good agricultural practice standards are B2B. Conversely, product quality and ethical standards usually belong in the B2C category. They signal the specific qualities of the product to consumers through the use of a label to be affixed on the product. Some of them target both corporate clients and final consumers (e.g. Rainforest Alliance).

3.4   Target companies for standard compliance

A private standard may be designed for self-application by the company (or group of companies) that has developed it or for other companies. It may apply to agricultural producers, food processors, traders or all the actors of the marketing chain. Also, it may apply to a specific type of farms or enterprises within these categories. Fair-trade focuses on small farmers organized in groups, although plantations may be eligible under certain conditions. While this is not clearly stated, in practice most of the supplier-oriented standards developed by retailers focus on large commercial farms and food processing firms. Similarly, historically environmental standards such as Rainforest Alliance and ISO-14001 or labour standards such as SA-8000 were developed for plantations and agro-industries. In a few cases, the owner of the standard has attempted to adapt it to the specific situation of small holders, but the rate of adoption among small holders remains generally low.

3.5   Geographical scope

Private standards and certification programmes may have a national or international scope. Due to the globalization process, they increasingly have an international scope.

While many international private standards apply to all regions worldwide, some are restricted to certain geographical or economic areas. For instance, FLO's fair-trade standard applies to developing countries only. The Rainforest Alliance focuses on tropical and sub-tropical countries. Finally, origin-linked standards apply to a specific well-delimitated sub-national production area.

3.6 Product vs. process standards

A product standard is a set of criteria with which a product or a family of products must comply. Typical product standards in the agricultural sectors include quality standards relating to the physical appearance (grade, shape, colour, absence of blemishes), the nutritional contents or the absence (or low level) of certain undesirable elements such as contaminants, pesticide residues, and genetically-modified organisms (GMOs). A p*rocess standard* is a set of criteria for the production process (e.g. prohibited use of agrochemicals and obligation to maintain soil fertility in organic agriculture).

Process standards can be further divided into *management system standards* and *performance standards*. Management system standards set criteria for management procedures, for example for documentation or for monitoring and evaluation procedures. They do not set criteria for the performance of the management system in terms of what actually happens in the field or the packing station. ISO-14001 is an example of management system standards. Performance standards, in contrast, set verifiable requirements for factors such as the non-use of certain pesticides or the availability of sanitary services. The Rainforest Alliance's sustainable agriculture standard is an example of performance standards.

3.7 Conformity assessment systems

There are three ways of verifying that a standard is met. In the first case, a company may decide to adopt the standard and appoint employees to verify that all its departments comply with it. This is called *first-party verification*. For example, in the early days of the organic farming industry, producer groups checked themselves that all group members complied with the standard chosen by the group. In the second case, a firm may demand that its suppliers meet the standard and control itself that they do so. This is *second-party verification*. Second party verification is widespread among food processors and retailers. Finally, a firm may require that its suppliers meet the standard and request an independent organization that is not involved in the business relationship to control the compliance of the suppliers. This

is *third-party verification*, also called *certification*. The International Organization for Standardization defines *certification* as "*a procedure by which a third party gives written assurance that a product, process or service is in conformity with certain standards*" (ISO Guide 2, 1996). Certification can be seen as a form of communication along the supply chain. The *certificate* demonstrates to the buyer that the supplier complies with certain standards, which can be more convincing than if the supplier itself provided the assurance. The rise of certification is to a large extent the result of trade globalization and progress in information technology.

It is important to underscore that certification is by definition done by a *third party* (named *certification body* or *certifier)* which does not have a direct interest in the economic relationship between the supplier and buyer. Ideally, the organization that has set and owns the standard should not carry out the certification operations itself. Rather, it should authorize competent independent certification bodies to do this work after checking their capabilities.

To ensure that the certification bodies have the capacity to carry out certification programmes, they are evaluated and *accredited* by an authoritative institution. Certification bodies may have to be accredited by a governmental or para-statal institute, which evaluates compliance with guidelines for the operation of such bodies set by, for example, ISO, the European Union or some other entity. In addition, standard setting bodies may accredit certification bodies for the scope of their particular standard.

4. Market demand for private standards

There is ample evidence that sales of foods certified to private standards have expanded rapidly since the late 1990s. However, there is a lack of official data on the volumes and values of sales, as national agricultural census data and official trade statistics usually do not distinguish between certified and non-certified products. Sales of certified foods that do not bear an on-product label are virtually impossible to track and companies consider the data as confidential commercial information. Even for the GlobalGAP standard, which has become widespread in Northern Europe, it has been impossible to collect reliable sales data. The situation is slightly better for some of the certification programmes which target final consumers with a label, although it is still far from ideal. In the case of organic standards, a few market research firms and NGOs have started publishing data. In the case of the Fairtrade standard, FLO and its member organizations monitor the marketed volumes and (sometimes) values. Data on total Rainforest Alliance (RA) product sales are not available, but this organization provides some estimates for the volumes of specific commodities (e.g. coffee, bananas). In order to guide decision-making and policy formulation, more reliable data on the market for certified products are necessary.

Developed countries are the main markets for certified products with more than 95 percent of sales, but there is a rapid increase in some other countries such as Brazil, Argentina and China. Similarly, the EU member countries account for the bulk of the European market (more than 90 percent), but increases have occurred in Central Europe (Czech Republic, Slovenia, Slovakia and Hungary). Switzerland has a very high per capita consumption. There is a large variation in consumption per capita across the different EU countries, with Germany, the United Kingdom and France leading by volume as the most important markets. The following describes the markets for organic and fair-trade certified products, which are those for which more complete sales data are available.

4.1 Organic standards

Based on estimates collected from various studies and industry sources[4], global retail sales of organic foods were estimated at some US$40 billion in 2006. Few final figures are available for 2007 yet, but the UK market research firm Organic Monitor (2009) estimates that sales reached US$46 billion. They have increased four-fold percent over a decade, growing from approximately US$11 billion in 1997 (Figure 1). Growth has slowed since the second half of 2008 due to the economic crisis.

FIGURE 1.
World retail sales of certified organic products (past and projected)
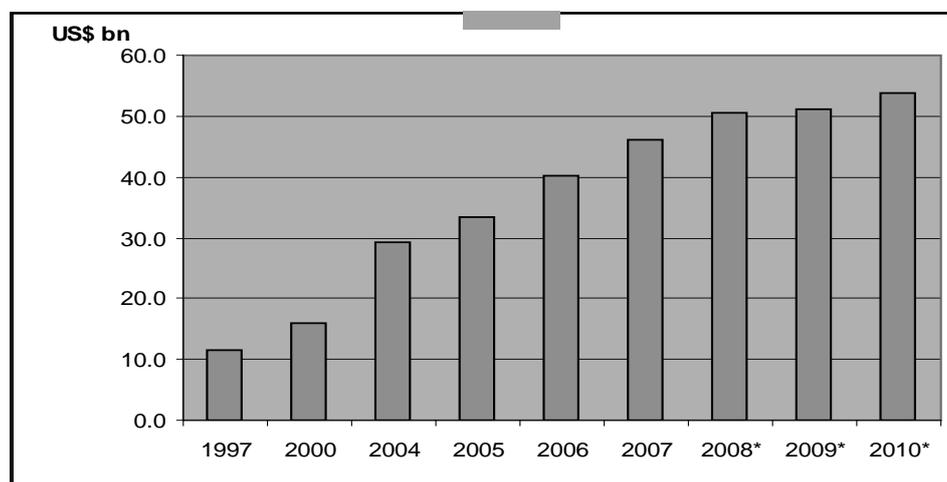
* forecast

[4] ITC, Eurofood, SÖL, Organic Monitor and other sources.

It is estimated that 98 percent of the sales of certified organic products take place in developed countries, where their market share usually ranges between 2 and 5 percent depending on the country (although some European countries have a share of over 10 percent). North America and Europe account for the bulk of retail sales as illustrated in Figure 2. Other markets are Japan, Australia and New Zealand. Although developing countries presently account for only a fraction of sales, consumption is rising steadily in some of them, in particular in the emerging economies of East Asia (Singapore, Malaysia, China, Republic of Korea) and Latin America (Argentina, Brazil, Chile). In these countries organic sales are overwhelmingly concentrated in the large cities and purchasers originate from the upper classes.

It is important to bear in mind that the above figures refer to all organic-labelled foods, be they certified to private or public standards. Most developed countries have adopted a public standard for organic products. In these countries certification to the public standard is mandatory if the product is to be labelled as organic. As a result, the bulk of organic-labelled foods are certified to public standards. However, some of these foods are also certified to a private organic standard in addition to the public standard of the country where they are sold. This may give them a market advantage where a certain private organic label is well regarded by consumers. The percentage of organic products certified to private standards is unknown.

4.2 Fair trade standards

Global sales of Fairtrade certified foods reached nearly €2.4 billion (US$3.5 billion) in 2007 according to the Fairtrade Labelling Organizations International (FLO, 2008)[5].

FIGURE 2.
Main markets for organic foods (in percentage of world retail sales in 2006)
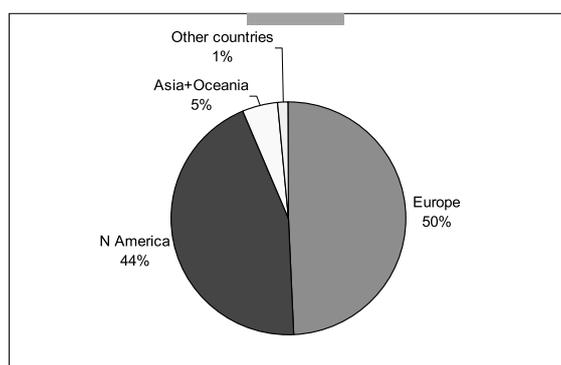
Sales increased by 47 percent (in euro terms) over their level of 2006 and further growth was recorded in 2008. Tropical products such as tea, cocoa, coffee and bananas enjoyed the fastest growth rates. On average, sales expanded by 40 percent annually over the period 1997-2007. By the end of 2007, 632 producer organizations in 58 developing countries in Africa, Asia, the Caribbean and Latin America were certified by FLO. FLO estimates that these organizations represent 1.5

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[5] Since this figure only reflects sales of FLO-certified foods and does not include sales by alternative trade organizations, the total market value of fair-trade food is slightly higher.

million farmers and farm workers, and when counting their families and dependents, overall 7.5 million people benefit directly from fair-trade. Since FLO was created in 1997, the number of certified producer organizations has trebled.

FLO-labelled products are available in more than 60 countries. The main markets for fair-trade products are the United States, the United Kingdom, France, Switzerland and Germany, accounting for nearly US$2 billion in 2007 (82 percent of global sales of FLO-labelled foods). Some NGOs that do not belong to the FLO system also sell fair-trade labelled foods, but the quantities are very small compared to those of FLO-labelled foods.

The market share of fair-trade foods is still very low. It is estimated to be much below 0.1 percent of global food sales. However, some products have a much higher share in some countries. For examples, fair-trade bananas were estimated to have a market share of 25 percent in the United Kingdom and 40 percent in Switzerland in 2008 (FAO 2009), while coffee was estimated to have a share of some 5 percent in the Netherlands and 3 percent in the United States (FAO 2008).

5. Advantages of private standards

5.1 For consumers and society

The advantages of standards for the companies (processors, distributors and retailers) that require that their suppliers comply with them have been discussed above. In addition, standards can also be beneficial to consumers. For example, food safety standards can reduce the number of food poisoning incidents. Relevant standards on nutritional contents may improve consumer health and well-being. Animal welfare standards might have a similar effect by providing higher-quality products. Beyond consumers, society as a whole can benefit from relevant standards. Environmental standards can help a country preserve its natural resources. They contribute to maintaining agricultural production factors (soil, water, forests, genetic resources) and conserving elements that are important to human well-being including landscape and amenities. Food safety standards can contribute to reducing government expenditure on food controls and the national medical care system. Similarly, labour standards help reduce incidents and sickness rates, which entails savings on public health care budgets.

However, whether private standards benefit consumers and society ultimately depends on the actual improvement that they generate with respect to the previous situation. Their requirements should be meaningful, science-based, relevant to the objective, relatively easy to implement and should not lead to discrimination against certain categories of operators. Also, the standards should be well enforced. For example, if a country already has a high level of public standards on food safety

with strong enforcement, introducing stricter private standards may not result in higher food safety. This issue is discussed more in details in the next section.

5.2 For farmers and developing countries

Private standards can benefit food producers in several ways. Traceability and better record keeping may improve the management of the farm or enterprise. They may help them rationalize production and cut input costs (for example through a more efficient use of agrochemicals). Complying with standards may improve market access through enhanced product quality and improvement in the image of the farm or company. Labour standards may reduce worker turnover, absenteeism and accident and sickness rates, thereby reducing costs and raising productivity. They may lead to better health conditions for farmers and farm workers. Compliance with environmental standards may improve the management of natural resources on which farmer livelihoods depend. They may enhance the farmer's relations with the local community, including its suppliers and lenders. Although they are difficult to quantify in financial terms, these benefits may be significant. A number of case studies by the World Bank, UNCTAD and other organizations have highlighted the potential benefits of private standards[6].

In addition to the above benefits, some standards may have a direct value-adding effect by enabling producers to obtain higher sale prices. In developed countries, a substantial share of consumers is willing to pay a price premium for products that can offer guarantees that their environmental, health and social concerns with regard to food production are addressed. However, consumers can seldom verify directly how their foods have been produced due to the large distances between them and the producers. In order to convey this information to the consumer, build trust and prevent possible frauds, some NGOs operating certification programmes have developed registered labels to be affixed onto the products. Some of these certification and labelling schemes lead to a price premium. Farmers and exporters increasingly view them as a tool to add value to their products.

This is an important strategy for developing country exporters of tropical products for which there is a situation or risk of oversupply. Under the pressure of declining commodity prices at the end of the 1990s, many agricultural producers have sought to differentiate their products from those of their competitors by targeting premium market segments. Traditionally, product differentiation has been pursued through improving the physical attributes of the goods, be they observable (e.g. grade, shape, colour, physical integrity, variety, packaging) or not (e.g. taste, acidity, sugar content). In addition, in recent years, farmers and processors have increasingly differentiated their products on the basis of the production process. Environmental and ethical standards offer an avenue for such differentiation.

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[6] For a literature review of the impacts of private standards in agriculture see FAO (2003) and FAO (2007a).

By adopting a standard and obtaining certification, agricultural producers have been able to participate in the new international value chains for agricultural products. These new chains tend to be shorter than conventional food chains. They usually include a group of farmers, an exporter, an importer-distributor and a specialized retailer. In some cases, the chain is even shorter when the group of producers exports directly to a retailer. This type of short chains is typical of the fair-trade sector, where the declared goal is to reduce the number of middlemen to increase the profit margin at farm-gate level. This integration, which has been facilitated by rapid progress in information and communication technology, leads to increased profit margins at both ends of the chain. A number of new value chains for certified products have been identified. The organic food market has proved extremely fertile in this respect due to its rapid and steady growth.

From the economic perspective of developing countries, some private standards may help add value to exports and therefore raise export earnings, generate employment, support small producers, improve food security and diversify the local economy. They may deliver public goods such as preserving natural resources. Cases have been reported where they help enforce national regulations in countries where the legal enforcement capacities are low (ISEAL 2008).

6. Challenges posed by private standards

6.1 The suitability of requirements and indicators

As noted in the previous section, the usefulness of a private standard depends on the improvements in the quality of the product or process resulting from its adoption. Of course, this depends on the operator considered. The standard is meant to benefit the prescribing organization. Whether it also benefits the company/farmer that must comply with it and society as a whole depends on its requirements ('criteria'). Generally, compliance entails investment of time and money from the producer if the standard is to lead to actual improvements, but these investments may be compensated by various benefits as seen in the previous section. Yet, if the criteria are irrelevant or not suited to the producer's situation, they may be a heavy burden. Here, it is important to make a distinction between prescriptive and result-based standards. Results-based standards state the results that have to be obtained, but let the implementing companies choose how to achieve these results. By contrast, prescriptive standards set precise requirements for how products should be produced. Such prescriptive requirements tend to pose more difficulties for producers in other production systems than those for which the standard was originally developed or with which the authors of the standard are familiar, as many of the criteria may be irrelevant. For example, the GlobalGAP (formerly EurepGAP) standard was primarily designed for European farmers and some of its requirements were found both irrelevant and excessively costly

for African smallholders[7]. In this respect, result-based standards are preferable because producers can implement them in a way that is consistent with the local circumstances (FAO 2007b).

By default, product standards are more results-based than process standards. Some prescriptive clauses in process standards are difficult to avoid (e.g. the prohibition of the use of synthetic pesticides in organic agriculture). However, process standards could be more results-based than often is the case. For example, many food safety oriented standards aim to create hygienic production environments. Yet, instead of prescribing the desired result, they prescribe the means to achieve such results, to such details as the number and type of toilets that have to be available at a food processing facility.

Generally, compliance with product standards can be verified by examining the product. Verification of adherence to process standards is however more difficult. That is why certification companies require extensive documentation in addition to the inspection of the production facility. Many standard developers already prescribe documentation requirements in the standards themselves. This makes it difficult for certification bodies to be creative in situations where documentation is problematic (e.g. due to high illiteracy rates). Overall, the need for documentation tends to make process standards more prescriptive.

6.2   Overlap with technical regulations

Private standards may be problematic when they address areas that are already covered by adequate technical regulations. Two problems may arise: they may be more restrictive than technical regulations, or they may be more prescriptive, or both, without objective reasons. The benefits of a private standard to society depend on the extent to which the objective of the prescribing organization meets the collective public interest. The problem with standards set by businesses is that they may be used as a tool to differentiate the company from its competitors. When the firm sets a standard to achieve narrow corporate goals only, such as improving its image, no benefits may be expected.

One area where the overlap of public and private standards has become the subject of controversy is food safety. This is because food safety is generally considered to be well addressed by regulation, at least in developed countries, and therefore additional requirements put by companies on food producers may not necessarily increase it. For instance, when a Greenpeace report on pesticide residues in fruit and vegetables triggered panic among consumers in Germany, domestic discount store chains reacted by claiming that they would demand that

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[7]   Some European small-scale farmers have claimed it is also costly for them.

their suppliers provide fresh produce with Maximum Residue Limits (MRL) lower than official values as defined by law. Yet, there was no evidence whatsoever that the official MRL were inadequate for public health. Apparently, the discounters' claim was mainly for advertising purposes. They were likely to increase the costs of production without any proven effects on consumers' health.

It should be noted that the position of developed country governments vis-à-vis business standards for food safety is not unambiguous. Governments may blame businesses for excessive requirements but, on the other hand, governmental regulations have encouraged companies to develop their own systems for safety control. Ultimately, the suitability of a standard to market players and society depends to a large extent on the process through which it was formulated.

6.3 The standard setting process

Critics of private standards have argued that their development process is neither participatory nor transparent. During recent meetings of the SPS Committee, developing countries repeatedly pointed that private standards are not set in a transparent and inclusive manner. Many of them feel that they are excluded from the process. They view private standards as competing and eroding the multilateral efforts to reach consensus on standards and facilitate their international harmonization. At a meeting of the SPS Committee in June 2005, the representative of Argentina stated that: "*If the private sector was going to have unnecessarily restrictive standards affecting trade, and countries had no forum in which to advocate some rationalization of these standards, twenty years of discussions in international fora would have been wasted.*" (WTO 2005- G/SPS/R/37/Rev.11)

Several countries have recommended following the example of the Codex Alimentarius Commission, which they view as participatory, transparent and science-based. They have underscored the need for agreed guidelines for developing private standards. Some have argued that private standards should be addressed by the multilateral standard-setting bodies (Codex Alimentarius, CPM and OIE), as this would reduce costs, increase transparency and promote harmonization.

Another frequent criticism of private standards is that they are defined in an arbitrary manner instead of being based on sound science. Setting international standards has proven to be very difficult due to the variety of circumstances that exist around the world. This is especially true for agricultural practices, which have to respond to differences in climate, soils and ecosystems, and are an integral part of cultural diversity. To address this diversity, international private standards should be normative standards, i.e. generic standards or guidelines to be used as a framework by local standard-setting or certification bodies to formulate more specific standards.

Arguably, the requirements of standards would be more relevant if companies involved their suppliers and independent experts when developing a standard. This would make it less likely that complying with the standard is too costly or complicated for producers. The reluctance of companies to involve stakeholders in standard setting may be partly explained by the trade-off between effectiveness and participation. The involvement of all stakeholders is bound to slow the development of the standards due to the often conflicting goals of stakeholders. Conversely, if a developer wants to produce the standard in a short time span and presses ahead with a certain standard, it is likely to lose the support of some groups. In a case study on Costa Rica, Bendell (2001), shows that many stakeholders dropped out of the standard setting group as the standard was being elaborated and adapted to operational constraints.

6.4 Accountability of standard setters and accreditors

In the case of governmental standards, it can be argued that there is a 'double accountability' guarantee. Governments are accountable to their citizens and to multilateral institutions (the SPS and TBT committees under the WTO system). There are multilateral rules governing standard setting, obligation of notification, provision of information and mechanisms for dispute settlement (see Chapter 1). Conversely, in the case of private standards, companies are only accountable to their shareholders (provided they comply with national laws). NGOs are only accountable to their members. The legitimacy of both groups in setting standards that may have impacts on the wider public interest (in particular human health) has been questioned[8].

6.5 The monitoring system

6.5.1 Effectiveness

Among the three approaches to conformity assessment described in section 2.7, first-party verification is probably the easiest to establish and the cheapest. However, under adverse circumstances, the company may face a dilemma between the cost of complying with the standard and its immediate financial performance target. Compliance may become irregular depending on the financial health of the company. In second-party verification the risk is lower, as compliance is monitored by another company (generally the customer). Yet, there is still scope for conflict of interests, for example when supply is scarce or in the case of preferred suppliers that the buyer cannot afford to lose.

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[8] This issue is discussed in FAO (2003b).

Conversely, with certification the potential for conflict of interests is limited, as the verifier is an independent third party with no interest in the economic relationship between the buyer and the supplier. Certification can be a useful instrument to access remote markets when the issue of trust arises. In countries where the effectiveness of regulation is perceived as low, or the developing country stereotype influences the perception of consumers in the importing markets, the use of external monitoring organizations may be a solution for establishing trust in the quality of exported products (FAO 2007a). In the agriculture export sector, the use of foreign control firms is common. Multinational certification companies, such as Bureau Veritas Quality International or Société Générale de Surveillance, perform thousands of quality controls of agricultural goods for export worldwide every year. Similarly, the use of foreign certification bodies is widespread for organic foods. One reason is that few developing countries have domestic organic certification bodies. Yet, the main cause is that consumers in importing countries are more likely to trust an organic product that bears the label of their own country's certification bodies. This is because they tend to trust the quality of the work of the latter in general. Also, they believe that these will be less vulnerable to possible pressures and conflicts of interest than the certification bodies of the producing country.

Nevertheless, it should be noted that certification does not automatically guarantee impartiality or absence of conflicts of interest. For example, the standard may have been set by any party, e.g. by the producer or by the buyer, in which case their interests are likely to be reflected in the standard. When a standard setting body certifies against its own standard, a conflict of interests may also arise. The standard-setting body may want to see high implementation rates of its standard, or have a bias against certain types of producers or processors for ideological reasons, which may influence certification decisions. If the certifier is a for-profit company, it may have an interest in not interpreting the standard in too strict a manner, lest some clients switch to competitors who have a more flexible interpretation. Also, withdrawing certification in case of non-compliance means losing a customer. Even when the certifier is a not-for-profit non-governmental organization (NGO), conflicts of interests are still possible. First, if the certifying NGO has set the standard itself, it may be tempted to interpret it flexibly so as to promote its adoption by a large number of producers. Therefore, ideally, the organization that owns the standard should not carry out the certification operations itself. Rather, it should authorize competent independent certification bodies to do this work after checking their capabilities. Second, a certifying NGO, in a similar fashion as for-profit certifiers, may have an incentive to be flexible to avoid losing "clients" if it faces fierce competition from other certifiers.

6.5.2   Implications for producers (resources and skills needed)

Obtaining and maintaining certification is costly, as suppliers have to pay registration and inspection fees. In addition to these direct costs, monitoring and record keeping

systems have to be developed to meet the demands of auditors. Such systems usually entail substantial investments in time and money for small producers. The latter need financial resources to upgrade their facilities to the level required by the standards. They also need skills to understand the standard's requirements, set the system and fill in the many forms that have to be submitted to the certification body.

In order to contain these costs, small-scale producers need to organize in groups, cooperatives and other forms of associations to set up collective quality assurance systems. Indeed, effective internal control systems will reduce the cost of certification for producers, ensure product quality and enhance the group's cohesion and management. Farmers and enterprises need to seek market information, technical advice and access to financial resources in order to select and adopt standards that are of interest to their business. Small-scale producers seldom have the capacity to do this on their own and therefore need support from national governments and development agencies.

6.6 Distribution of costs and benefits along the supply chain

Complying with new standards usually entails additional costs for suppliers. Investments are often necessary to upgrade the production facility. Obtaining and maintaining certification is costly. Although certification benefits the entire food chain, the costs of private food safety and GAP certification are almost always entirely borne by suppliers (farmers, processors and exporters). Small suppliers may not be able to afford such costs and run the risk of being excluded from value-added market segments.

As seen above, certification programmes that use an on-product label targeted to consumers may lead to a price premium. In some cases, the premium more than offsets the costs of compliance and certification. This is generally the case for organic and fair-trade certification. However, there is evidence that only a small share of the premium paid by consumers accrues to producers, as most of it is captured by downstream operators, in particular retailers. Case studies of certified banana exports from the Dominican Republic and Peru found that less than 20% of the premium accrued to the producing country (FAO 2009). The return to exporters was not higher for organic bananas than for conventional bananas. Retailers extracted the largest share of the retail price (40 to 50%), followed by importers. In a field study on the Dominican Republic, CIRAD (2008) found that grower organizations captured less than 12% of the retail value of certified bananas while retailers captured between 33 and 40%.

6.7 Differential effects of private standards on various stakeholders in develop-ing countries

6.7.1 Developing country governments

Most of the initiatives to adopt new private standards have occurred in developed countries. Yet, these standards apply to both domestic and imported products. From the perspective of developing countries whose economy relies on exports to major developed markets this is an alarming development. So far, the international debate on private standards has revolved around three issues: market access; impacts on economic development in developing countries; and relevance of WTO agreements to private standards. The following text focuses on the first two issues, while the latter is examined in the next chapter.

A large number of developing country governments feel that the rise of private standards threatens their market access and will reduce their export opportunities. In particular, food safety and good agricultural practice (GAP) standards have come under close scrutiny because they tend to be imposed by large corporate buyers on their suppliers as a prerequisite for doing business. Although in theory they are voluntary in nature, they are increasingly viewed as *de facto* mandatory. The GlobalGAP standard has generated particular concern due to the rising number of large supermarket chains that require it. Trade envoys from developing countries have complained that developed country governments have transferred the monitoring of food safety to their private sector, in particular the retailers. Those in turn shift this responsibility to their suppliers through certification requirements. In the case of imported foods, this means that the burden and costs of food safety monitoring have shifted from importing countries to exporting countries.

Developing countries often lack the infrastructure, equipment and trained personnel to meet the additional requirements of private standards. They have invested substantial resources and made efforts to meet the technical regulations of developed countries and are reluctant to have to comply with additional requirements from the private sector, especially if these are defined in an arbitrary manner and not based on scientific evidence. For those developing economies that rely on exports, losing market access will translate into a loss of vital export earnings, which jeopardizes economic and social development. Further, exclusion from international markets may shut them out from sources of expertise, inputs and technology.

6.7.2 Large commercial farms

Case studies (e.g. Maertens and Swinnen 2007) show that private standards are an extra cost for large scale farms and businesses, but in general it remains affordable. Obtaining certification will not generate a price premium, but it can give rise to other types of direct and indirect benefits such as the rationalization of production,

savings on inputs, more efficient management and enhanced corporate image as detailed in the previous section.

6.7.3 Small-scale farmers and agribusinesses

Much of the concern that has arisen over private standards and certification programmes relates to the burden they place on small-scale producers and exporters, especially in developing countries. Most of the complaints voiced have focused on standards for good agricultural practices and food safety. The first public concern on GlobalGAP at the SPS Committee was raised by Saint Vincent and the Grenadines, a country where the majority of farms have a very small size. Several developing countries have complained that the costs of ensuring food safety are borne by the sole producers instead of being distributed along the supply chain. Food producers have to invest time and money in order to obtain certification but do not receive higher prices. As a result, small-scale farmers may be forced out of the export market. A case study on Kenya (Graffham et al. 2007) showed that between 2003 and 2006, 60% of these small vegetable farmers were dropped by the export company they were linked with in 2005 or withdrawn from EurepGAP compliance schemes as they could not face the costs of EurepGAP. In some cases, technical assistance projects may reduce costs, but this is not a sustainable solution.

7. Prospects

Will private standards continue to gain ground and to what extent will they influence international food trade in 2050? In order to answer this question, it is important to assess what the world economy may be like in 2050. Global population is projected to exceed 9 billion by that date. This will put more pressure on limited natural resources, in particular land, water, forests and fossil fuels. Absent significant productivity gains, this means that the endemic surplus situation that characterized the agricultural sector globally from the 1980s to the early 2000s is likely to disappear. The growing economic weight of emerging markets such as China and India will lead to a multi-polar world with more diverse trade patterns. Despite recent difficulties exacerbated by the current economic crisis, trade liberalization is expected to continue both at multilateral and regional levels. Combined with progress in information technology, these developments will lead to a more globalized economy. Overall, a greater share of agricultural production will enter international trade.

However, this globalization trend might be somewhat mitigated by rising transportation costs due to the expected increase in fuel prices and government concerns about food security that may lead to export restrictions in some food insecure countries. Global warming will lead to an increase in climate instability and extreme weather phenomena, thereby raising the volatility of agricultural supply.

Given this scenario, the prospects for a greater role of private standards in international trade can be examined in the light of their main functions described in section 2.

7.1   Regulating supply and governing the value chain

An essential function of standards is to ensure the uniformity of products or processes. This paper has argued that standards are a useful tool for large companies to regulate supply and govern the marketing chain. Further globalization will increase the tendency of large retail and manufacturing companies to source raw materials and products worldwide, thereby making private standards even more necessary. Continued progress in information and communication technology will make it easier to trace products from one end of the chain to the other. The higher volatility of agricultural supply will render standards even more useful to those who control the value chain. It may reinforce the trend towards using standards for backward integration as opposed to direct ownership, as investing in agricultural production may become even riskier than in the past. On the other hand, it could be argued that the expected reduction in agricultural surplus may increase the need for securing supply through direct investment. This was illustrated by foreign direct investment into agricultural production picking up in 2008 following a long period of decline.

The end of large surpluses should shift some bargaining power back to producers away from retailers, who saw their power expand considerably from the 1980s to the 2000s. One implication is that retailers would no longer be able to demand that their suppliers comply with new standards without compensating them adequately for the extra costs incurred. This would lead to a fairer distribution of the costs and benefits of standards along the marketing chain. Higher product prices should give producers more resources to upgrade their facilities and meet food safety standards. Another implication is that efforts to harmonize supplier-oriented standards will increase. Standard-setting industry groups led by retailers such as GlobalGAP may give producers more actual power in decision making, thereby facilitating standard adoption. Eventually, standards for good agricultural practices, food safety and traceability may converge or enter mutual recognition arrangements. This would benefit all supply chain operators and consumers.

There will continue to be a growing interaction between public and private standards. Once the current economic crisis is over, governments in middle income developing countries will adopt standards to regulate food safety. Such initiatives will be facilitated by enhanced technical capacity in governmental agencies, rising purchasing power and higher awareness of consumers of food safety issues. As a result, it is forecast that the overlap of private and public standards will increase in the long term. The co-regulation approach will become widespread in the food safety area.

7.2 Product differentiation and value adding

Many producer groups and industry coalitions have used private standards to convey information to customers, differentiate their products in the market and add value. This trend was exacerbated by the endemic surplus situation in the food markets of developed countries. Should the surplus shrink, this driver of standard adoption would weaken. In particular, standards that do not have clear selling arguments or add little value would disappear from the market. However, other factors are likely to provide producers with continued incentives for adopting standards that are truly distinctive and add value. In particular, changes in consumer preferences will continue to be a key driver of private standards. Consumers will demand that the products they purchase address increasingly diverse concerns. Beside product standards, standards governing the production and trade processes will be increasingly demanded. This trend will be nurtured by progress in information technology which will reduce the costs of process monitoring and reporting. Overall, globalization is expected to provide producers with a strong incentive to use standards to differentiate their products from those of their competitors.

Consequently, little harmonization can be expected in the case of value-adding standards developed by producers. This stands in direct contrast with the expected trend for supplier-oriented standards developed by large companies procuring agricultural products.

7.3 Advancing societal goals

Many private standards, in particular process standards developed by not-for-profit organizations, address environmental, ethical or cultural concerns. Further globalization and the emergence of a multi-polar world are likely to raise the number of these standards. Demand for products certified to standards responding to cultural specificities will rise in a globalized economy. Human migrations and the blending of cultures in large metropolitan areas will nurture the demand for standards addressing cultural concerns (e.g. religious food standards, animal welfare, standards related to origin and traditional production processes such as geographical indications).

The lower per capita availability of natural resources will favour the rise of environmental standards. More private standards for the recycling of materials will emerge, complementing governmental regulations. The pressing challenge of climate change will lead to the emergence of certification schemes for low greenhouse gas emissions and fossil fuel use. Standards for carbon neutrality will become widespread. Life-cycle assessment will be increasingly used to analyze the environmental performance (including 'carbon footprint') of foods. The share of timber certified to private standards for sustainable forest management is expected to rise by 2050. Trade in organic certified foods will continue to expand, as their

competitiveness will be raised by high oil prices and a fall in the relative cost of labour vis-à-vis other production factors. Organic agriculture tends to use less fossil fuel and more labour per unit of output than conventional agriculture.

Ethical consumerism will continue to spread and its expansion will accelerate once the current economic crisis is over. As a result, it is expected that standards addressing labour rights and working conditions will influence a substantial share of trade in developed countries. More specifically, fair-trade standards will become increasingly important due to continued globalization and higher awareness of equity issues among consumers. Yet, the expected rise in agricultural prices will require the main fair-trade organizations to raise their guaranteed minimum prices and premiums in order to reflect the changing market conditions. Otherwise, farmers may judge the fair-trade system economically less attractive than presently and gradually stop seeking fair-trade certification.

It is expected that in the long term any major certification body will be able to certify against a range of standards and assess the compliance with several standards in the same inspection visit. This would lower the cost of multiple certification for producers and increase the volume of certified products in agricultural trade.

An increasing number of advocacy groups will discover the power of certification and labelling as a market-based tool to achieve their goals. This may increase the number of certification labels available in the market. However, there is a limit to the number of labels that consumers can recognize. It is doubtful that a product bearing 10 certification labels on its package is more attractive than a product bearing 4 labels. Therefore, the proliferation of certification schemes that has been observed since the 1990s is likely to come to an end in the future. Certification schemes will increasingly develop mutual recognition and equivalence arrangements among themselves. Some consolidation and mergers are to be expected, although this is unlikely to take place on a large scale due to the reluctance of many NGOs to merge into other organizations. As a result, whereas the volume of agricultural products certified to private standards is expected to grow substantially, the number of labels will not follow a similar growth.

8.   Conclusions

The influence of private standards on trade has risen since the early 1990s and this trend is expected to continue under the combined forces of globalization, trade policy liberalization, changing consumer preferences and progress in information technology. It is expected that private standards will affect a substantial share of international agricultural trade in 2050. However, government policy will be a key factor in determining the extent of their influence on trade. As noted in the previous sections, there has been a growing overlap of public and private standards. In some

sectors, such as the organic sector, governmental standards have marginalized private standards. In other areas, such as food safety, the trend has been the opposite: developed country governments increasingly rely on the private sector for enforcing food safety policies. The co-regulation approach is increasingly being used, especially in Europe. In some cases, standards that were initially private are adopted by the public sector and then become compulsory.

In addition to the increasing interaction between public and private standards, there have been growing calls in intergovernmental forums for bringing private standards under the disciplines of multilateral trade agreements and the mechanisms of the World Trade Organization. What situation can be expected in 2050? These issues are discussed in Chapter 10 of this volume.

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APPENDIX 1
Glossary - Definition of key terms

Standardization

One of the main objectives of standardization is that all companies in a given economic sector adhere to the same standards, i.e. the same procedures or product specifications. This may ease logistical procedures, facilitate trade, prevent consumer deception and improve quality. However, improvement in quality is not an automatic result of standardization. This will only be achieved when the advocated standard is a "high" standard, i.e. the requirements are an improvement in relation to common practice.

Standards

Standards are defined by ISO as

> "[…] documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines or definitions, to ensure that materials, products, processes and services are fit for their purpose."

From this definition it becomes clear that standards are not only used for standardization, but also as "guidelines", i.e. for capacity building.

Product standards are specifications and criteria for the characteristics of products. Process standards are criteria for the way the products are made. These process criteria might or might not influence the characteristics of the end products.

Certification

Certification is a procedure by which a third party gives written assurance that a product, process or service is in conformity with certain standards. Certification can be seen as a form of communication along the supply chain. The *certificate* demonstrates to the buyer that the supplier complies with certain standards, which might be more convincing than if the supplier itself provided the assurance.

The organization performing the certification is called a certification body or certifier. The certification body might do the actual inspection, or contract the inspection out to an inspector or inspection body. The certification decision, i.e. the granting of the written assurance or "certificate", is based on the inspection report, possibly complemented by other information sources.

Accreditation

The system of rules, procedures and management for carrying out certification, including the standards against which it is being certified, is called the certification programme. One certification body may execute several different certification programmes. To ensure that the certification bodies have the capacity to carry out certification programmes, they are evaluated and accredited by an authoritative body. Certification bodies may have to be accredited by a governmental or para-statal institute, which evaluates compliance with guidelines set by ISO, the European Union or some other entity for the operation of certification and inspection bodies. In addition, standard-setting bodies might accredit certification bodies for the scope of their particular standard. When the standard-setting body has developed normative standards, they will evaluate whether the specific standard used by the certification body is in line with the generic standard and whether they are satisfied with the method of verification.

Labels

A certification label is a label or symbol indicating that compliance with standards has been verified. Use of the label is usually controlled by the standard-setting body. Where certification bodies certify against their own specific standards, the label can be owned by the certification body.

Part 3

WTO negotiations on agriculture and the stake of food-insecure developing countries[1]

Panos Konandreas [2]

1. Introduction

Food security depends to a large degree on measures at the national, sub-national and individual household levels but the international context in which national policy is being implemented is instrumental in the success or failure of national efforts. The multilateral negotiations under the GATT/WTO have been the dominant force shaping the international policy context during the past two decades. For better or worse, agriculture is now under the multilateral trading system (MTS) governing trade in goods and services, albeit the process of integration of agriculture into that system is not yet complete. In some ways, however, the implications of this integration are much more profound than in other sectors, as the whole array of policy instruments that governments use, both border and domestic measures, are subject to reform.

Initiating the process of disciplining agricultural trade policy under the Uruguay Round (UR) has been an important step forward, considering the lack of disciplines that characterised agricultural commodity markets in the 1970s and 1980s, as a result of heavy subsidization by some countries, to the detriment of others. The Agreement on Agriculture (AoA) has been an important step in reforming world agriculture. While recognising the political difficulties in bringing agriculture under multilateral disciplines, what has been put in place leaves much to be desired,

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especially from the point of view of food insecure developing countries. This chapter looks at this process of integration of agriculture into the MTS, its origins and motivations, what has been the record so far in terms of implementation and how best to address some of the concerns of food insecure developing countries.

2. The AoA was meant to address overproduction, not underproduction

The period leading to the launching of the Uruguay Round negotiations in 1986 was characterised by a serious disarray in world agricultural trade due to the prevalence of production and trade distorting policies in a number of developed countries. These policies, put in place in periods of shortage during the 1950s and 1960s, had led to structural surpluses and an excess supply in the world market, in a number of commodities, to the detriment of other countries, including many developing country exporters.

By and large, many developing countries had the opposite problem: underproduction, due to disincentive policies of their own as well as the distorted world market environment[3]. Most of them invested very little in their agriculture, they produced well below their needs and increased their dependence on cheap food imports.

The AoA, being essentially a trade agreement, aimed at stemming overproduction and associated trade distorting policies. The problem of underproduction and associated disincentive policies in many food insecure developing countries were not, and could not be addressed by a trade agreement. As the negotiated issues largely concerned developed county structural imbalances, developing countries, by and large, engaged sparingly in the UR negotiating processes and many of them signed on to the final agreement as if this had very little to do with their own agriculture. In doing so they made two potentially harmful commitments: (a) they agreed to production restraining provisions, possibly limiting their policy options to boost domestic production in the future, and (b) agreed to legitimization of past distortions in OECD countries, limiting their export opportunities in these markets in the future.

By subscribing essentially to the same production-limiting measures, food insecure developing countries may have given away the flexibility they had before the UR in

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[3] Farmers in low-income countries are disadvantaged partly because of a pro-urban bias in own-country policies and partly because richer countries (including some developing countries) favour their farmers with import barriers and subsidies. Both sets of policies reduce national and global economic growth and add to inequality and poverty in developing countries. See, for example, Kym Anderson, "Reducing Distortions to Agricultural Incentives: Progress, Pitfalls and Prospects", World Bank Policy Research Working Paper 4092, December 2006

pursuing agricultural and food policy to correct their own disincentive policies then and in the future. This is fundamentally the issue confronting many of them in the context of the continuation of the reform process in agriculture under the Doha Round of multilateral negotiations, which may call upon them to commit to yet more production limiting measures.

Therefore it is not surprising that, in retrospect, many developing countries view the AoA as an upside-down agreement and have invested much effort in seeing it reformed during the on-going Doha Round. Their defensive agenda, concerning their own policies, aims at maintaining and/or restoring domestic policy options, in order to be able to increase production in the future, while their offensive agenda, concerning OECD-country policies, aims at substantial reductions in domestic support in these countries and reduction in tariffs resulting in real export opportunities for developing countries.

3. With past biases against agriculture, AoA disciplines are hardly a constraint

Do the AoA disciplines pose a problem for developing countries? In general, the answer is no. Aside from some specific instances, the AoA disciplines are not presently constraining developing countries[4]. But why is that the case? There could be two reasons: either their commitments have been set too high or actual support to agriculture is too low. Unfortunately, it is the latter; actual support to agriculture in food insecure developing countries is desperately low[5].

The fact that many developing countries are making very little use of the flexibility they have under the AoA, often prompts suggestions for the case of limiting policy options in these countries to reflect their present levels of support to agriculture. The other position is to set limits and disciplines for developing countries that represent what they ought to be doing, but which they are not in a position to do presently because of resource constraints and other considerations.

It is not difficult to side with the latter position. It suffices to recall some of the well-known statistics concerning agriculture in many food insecure developing countries. When agriculture accounts for a large share of GDP, when it employs 70-80 percent of the population and is responsible for a large share of export

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[4] See, for example Sharma, R., "Developing Country Experience with the WTO Agreement on Agriculture and Negotiating and Policy Issues", Paper presented at the summer symposium on The Developing Countries, Agricultural Trade and the WTO, IATRC, Vancouver, Canada, 16-17 June 2002.

[5] In the aggregate, developing countries as a whole account for less than 10 percent of agricultural subsidies and these are basically accounted for the better-off among them. In many instances farmers in poor countries are taxed instead of subsidised.

earnings (albeit still in primary commodities), it is difficult to envisage any other sector that could provide the engine of growth for economic development and poverty reduction in these countries.

But how can developing countries move away from a situation of low agricultural productivity, growing import dependency and food insecurity? How can the agricultural potential in these countries be fully exploited? And what is the role of multilateral trade policy in this regard?

Many food insecure developing countries have gone through a long period of pursuing policies that actually penalised agriculture. The bias against agriculture, both through macroeconomic policies and sector-specific policies, has been well documented in the 1988 Krueger, Schiff and Valdes study based on 18 developing countries[6]. This study found that agricultural disincentives were stronger the lower a country's per capita income. The study accounted not only direct distortions to agricultural prices, such as export taxes, but also indirect ones, which attracted resources away from agriculture, such as manufacturing protection and overvalued exchange rates.

Although since then the macroeconomic bias has been reduced to some extent[7], agriculture continues to be disadvantaged in many developing countries because of lack of resources. Investment to agriculture and rural development has been on the decline, both from internal and external sources. World Bank lending for rural development decreased from US$ 4 billion annually in 1990 to US$ 1 billion in 2000 - the lowest level ever[8]. Official Development Assistance (ODA) to agriculture amounted to some 17 percent of total ODA in the early 1990s and this had dropped to around 3.5 percent in 2005.

The first imperative, therefore, is to reverse these adverse trends in investment to agriculture. There are some positive signs that investment in agriculture in food insecure countries could rise markedly in the coming years: declining ODA is being reversed (commitments under Monterrey Consensus and Millenium Development

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[6] Krueger, A.O., M. Schiff and A. Valdés. "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-wide Policies," World Bank Economic Review 2(1988): 255-72. See also Tyers, R. and K. Anderson. Disarray in World Food Markets: A Quantitative Assessment, Cambridge and New York: Cambridge University Press, 1992.

[7] In the last decade, several developing countries reduced their direct and indirect taxation of agriculture. Export taxes have been reduced or eliminated, import restrictions on agricultural inputs have declined, exchange rates have been devalued, multiple exchange rate systems penalizing agriculture have been abandoned (Quiroz, J. and L. Opazo, "The Krueger-Schiff-Valdés Study 10 Years Later: A Latin American Perspective," Economic Development and Cultural Change, 49(1), pp. 181-96, 2000; and Global Economic Prospects and the Developing Countries, World Bank 2003).

[8] The situation has improved considerably since then. In fiscal year 2007, World Bank investments in agriculture and rural development were $3.1 billion. It decreased in FY08 to some $2 billion but it is expected to recover in FY09 (World Bank, Agriculture & Rural Development website).

FIGURE **1.**

Public spending on agriculture over agricultural GDP
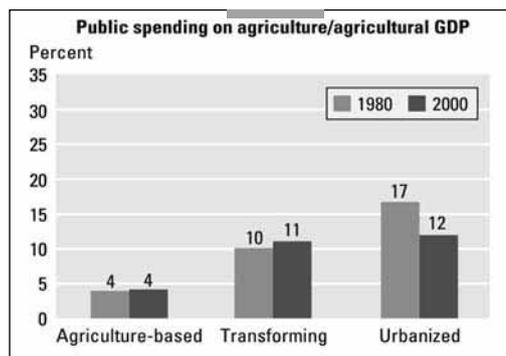
Source: WDR 2008

Goals); debt cancellation would allow a breathing space for the heavily indebted countries and more resources should flow to agriculture; World Bank's new rural development strategy has put a renewed emphasis on agricultural development; renewed commitments in successive G8 summits by donor countries to increase assistance to agriculture in food insecure countries (Sub-Saharan Africa in particular); the Alliance for a Green Revolution in Africa (AGRA), which are focusing on development of markets for small-scale farmers; and other new political commitments, such as NEPAD's commitment of 10 percent of budget for agriculture.

This being the case, it is inconceivable to think that such hopeful and concerted efforts could be impeded in any way by developments and obligations in another part of the multilateral system. Therefore, the second imperative concerns the nature of commitments food insecure developing countries would be making as regards their agricultural and food policy under the new agreement on agriculture being negotiated at the WTO.

4. Should developing countries be supportive of further reform in agriculture?

Yes, as regards reforms that would address the wrongs of the AoA. As already mentioned, subsidizing OECD countries legitimatised production and trade distorting measures in the AoA and, moreover, have the ability (through government funding) to continue making use of such measures. The architecture of the AoA, in terms of its specific instrumentation, allows plenty of room for these countries to meet their legal obligations technically, while in substance pursuing similar distorting policies as before[9].

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[9] Some OECD countries exploited the loopholes of the AoA and although they implemented the letter of their commitments, they did not always respect the spirit of these commitments. For example, export subsidy reduction commitments were met, but some countries circumvented their annual limits by carrying forward unutilized "entitlements". Domestic support reduction commitments were met, but support was shifted from the disciplined to the non-disciplined category, so that overall support in OECD has not been reduced by much. Finally, on market access, tariff peaks remain a problem, especially on key exports of developing countries (competing with temperate zone products).

FIGURE 2.

ODA Commitments to agriculture

Source: OECD International Development Statistics – Creditor Reporting System.
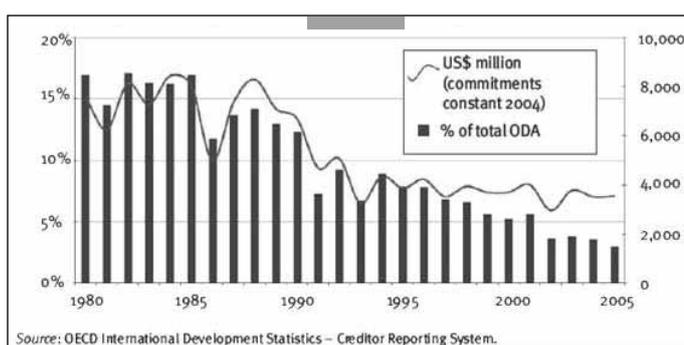
Moreover, there are still many trade barriers in developed country markets, including tariff peaks, tariff escalation and SPS measures, effectively limiting market access to developing country exports. If trade is to make a contribution to food security, these fundamental imbalances and loop-holes of the AoA have to be removed. In that sense, food insecure developing countries have a major stake in the continuation of the reform process in agriculture.

On the other hand, food-insecure developing countries may wish to retain ample flexibility in the negotiated rules so that these would not constrain their agricultural and food security policy options in the future. For many poor developing countries food production and food/livelihood security are often synonymous as agriculture is the main source of income for the majority of the population. The prospect of a continuation of past trends in growing food import dependency is unsustainable as it displaces domestic food production and denies rural households their means of earning a living. With barely any other viable means of employment, agriculture remains the underpinning of their food and livelihood security.

Another threat to food-insecure developing countries is world market volatility and import surges. Agricultural markets are subject to greater shocks than other sectors (weather, policy) and prolonged periods of depressed prices (2-3 years or more) are common, implying that farmers in these countries are exposed to considerable downside risk. Obviously, this is a problem for farmers everywhere, but the risk is much greater for poor developing countries as they do not have the means to defend against such external threats and/or to mitigate the impact on domestic farmers through compensatory transfers, a response often pursued by rich countries. Appropriate WTO rules should allow enough flexibility to countries to defend themselves against volatility beyond their control. At the same time and at the minimum, WTO rules should restrain countries from taking measures that make matters worse.

5. What policies would be most effective for food-insecure developing countries?

Historically, countries have tended to tax agriculture in their early stages of economic development and gradually changed from taxing to subsidizing it relative to other sectors. Several lessons from the history of agricultural development, in different parts of the world, are rather instructive in this context.

First, most countries that have been able to initiate and sustain modern economic growth were able to do so by first exploiting and developing their agricultural potential. Development of the sector helped them to raise rural incomes, reduce poverty and food insecurity and increase the national standard of living. Secondly, successful take-off to sustained agricultural growth was achieved through a judicious mix of subsidies, pricing polices and border measures, as well as other institutional and infra-structural support measures. This policy mix changed over time, depending on the stages of economic development of each country (see Graph), and provided the incentives and the means for farmers to produce and innovate. Thirdly, in terms of the specific measures pursued, after the early stage of infrastructural support to the sector, "coupled" rather than "decoupled" policies have been the most effective in rapidly raising agricultural productivity and production. One dollar spent on coupled policies (such as input subsidies) produces more output in the short term than the same dollar spent on decoupled measures (such as Green Box measures).

It has been amply substantiated by OECD analysis that input subsidies are the most production/trade distorting policies (even more so than product-specific output support policies)[10]. It is obvious, therefore, that if curtailing output can best be achieved by suppressing these most distorting production and trade policies, the same policies need to be encouraged when the imperative is to increase output, which is the case in food-insecure developing countries.

It follows, that predominantly agrarian food-insecure developing countries should not only be exempted from reduction commitments under the AoA but encouraged and assisted to increase support to agriculture. Moreover, unlike agriculturally developed countries, any support to agriculture in food-insecure developing countries should be in the form of the most production and trade distorting type possible (coupled support), in particular, input subsidies to achieve rapid increases in output of basic foodstuffs. There is also another important consideration that makes input subsidies a superior policy from the point of view of food policy in food-insecure developing countries. In such countries with a large part of the

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[10] Tangermann, S. "OECD Agricultural Policies and the Interests of Developing Countries." American Journal of Agricultural Economics 87(2005): 1128-44.

FIGURE 3.

Stages of development and type of support to agriculture

Stages of devt >>	Early stages: • Establish basics	Kick-start: • Production growth	Other concerns: • Farm income • Environment
Most effective support >>	Infrastructure: • land reform • roads • R&D • irrigation	Coupled measures: • input subsidies • price support	De-coupled measures: • income support • withdrawal payments
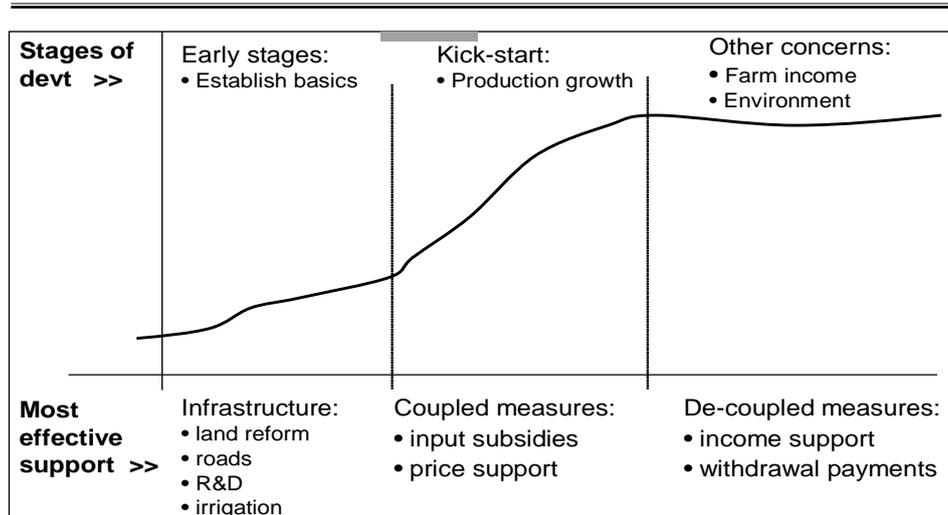
population spending most of their income on food, an input subsidy does not penalise poor consumer (which is the case by an output support policy) while providing an incentive to farmers (by reducing production costs).

There are certain concrete implications of the above for the negotiations. On the defensive side, although, currently, subsidies in food-insecure developing countries hardly get close to even the 10 percent *de minimis* levels allowed under the AoA (separately for product-specific and non-product specific support), this legal cover for trade-distorting support should be maintained and any attempts to reduce it should be strongly resisted. This is all the more important as these countries hardly have any other "entitlements" to production/trade distorting support under the Aggregate Measurement of Support (AMS), which is largely the prerogative of developed countries.

Another provision in the existing AoA that has proven very useful for food-insecure developing countries is Article 6.2, which exempts from reduction commitments investment subsidies generally available to agriculture and input subsidies to resource-poor farmers. These are well suited to food-insecure developing countries where a large part of the farming population is resource poor.

Beyond the domestic support pillar of the AoA, border protection should continue to remain an effective instrument for food-insecure developing countries. FAO analysis has shown that tariffs in developing countries play an important role for domestic market stability and for affording some protection

to domestic producers in years of low world prices[11]. This is mainly due to lack of budgetary resources to support farmers. Therefore, food-insecure developing countries should preserve some of the flexibility they presently have in the form of high bound tariffs to defend against external volatility, partly emanating from policies in OECD countries, the reform of which is likely to be slow. In addition (or alternatively), food insecure developing countries will need recourse to the special provisions envisaged under the Doha Round for Special Products (SPs) and the Special Safeguard Mechanism (SSM). Aside from selectively protecting certain products essential for their food security, these provisions, if well designed[12], could offer an easy-to-use alternative compared to the burdensome GATT/WTO general defence mechanisms.

The SSM has been a thorny issue in the negotiations all along and allegedly the cause of the collapse of the WTO negotiations in July 2008. Unfortunately, the debate on the modalities of the SSM has shifted to certain numerical and legalistic considerations and the essence of what this instrument was meant to address has been lost. Maintaining an across the board (countries and commodities) mechanistic eligibility to the SSM, as the proponents of this instrument insisted, was not conducive to agreement. Similarly, on the part of the opponents of this instrument, refusing to consider situations where the SSM raises tariffs above commitments countries made in the 1986-94 Uruguay Round (the "pre-Doha Round bound rates"), was equally not conducive to an agreement.

The SSM was supposed to be a means to provide temporary protection to those commodities threatened from short-term external shocks, but which are otherwise competitive under normal conditions. It would allow a temporary tariff increase in response to a pre-specified surge in import volumes or decline in import price levels. Implicit in the need for this instrument is the notion that other means of protection are not available or practicable, i.e. countries had little room in increasing tariffs up to bound levels and limited means to provide compensatory domestic support to farmers. Hence the two essential ingredients in designing a rational and effective SSM, i.e. where bound tariffs are already low and the country has meagre means to assist its farmers in situations of depressed world market prices.

This is demonstrated in Figure 4[13] for a particular commodity, contrasting two countries: country A with a high bound tariff and an ability to support farmers through various forms of domestic support measures, and country B which has a

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[11] Sharma R. op. cit.

[12] See some suggestions on how the SSM could be implemented can be found in Konandreas, P., "Implementing the Special Safeguard Mechanism (SSM) on the Basis of a Maximum Contingency Levy," FAO Geneva, November 2004.

[13] Konandreas, P. "Special Safeguard (SSG) of the Agreement on Agriculture – what has been the experience?" Flash Meeting on Agricultural Safeguards: "Make-or-Break" Issues in the Doha negotiations?, AITIC, Geneva, October 22, 2008.

FIGURE 4.

Need for the SSM: low bound tariffs and limited capacity for domestic support
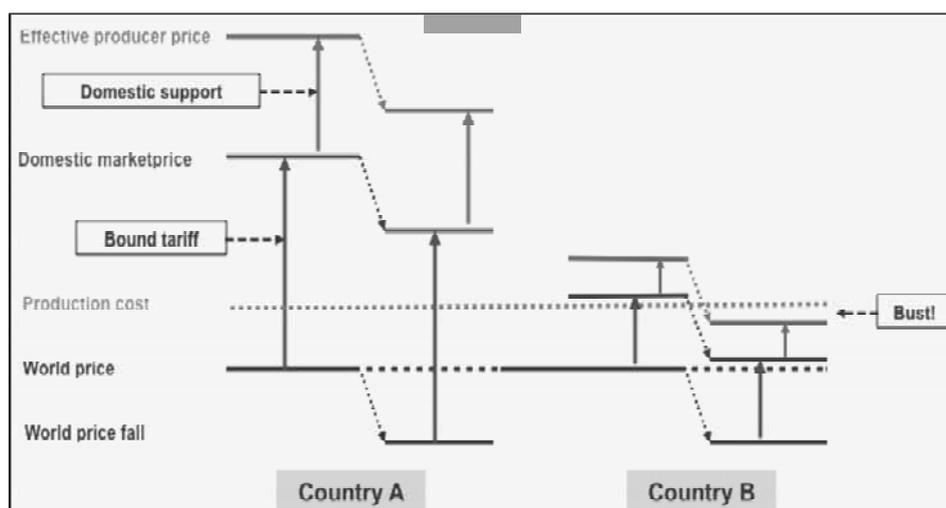
low bound tariff and limited means to provide domestic support. When the world market is at its average level, farmers earning are above cost of production in both countries, although in country B barely so. However, in a situation of a substantial drop in the world market price, farmers in country B would be unable to remain in business. It is clear that the basic parameters of a rational and effective SSM are the level of bound tariffs (or better yet the difference between bound and applied rates, reflecting the remaining flexibility in raising tariffs) and the ability to compensate farmers through resource transfers.

Aside from the downside risk due to depressed world market prices, there is also the other case of upside risk when prices soar, as has been the case recently during 2007-08. During such years importing countries can lower import tariffs to make foodstuffs more affordable by domestic consumers. In principle, however, applied import duties on basic foodstuffs in most developing countries are generally low[14]. They were already low in 2006, in the 5-10 percent range, in a majority of low-income food-deficit countries, and so could counterbalance only a small part of the large increases in food prices in the world markets experienced in 2007 and much less in early 2008 when prices soared. What has also aggravated the situation during this period of high food prices was the fact that many countries resorted to export prohibitions, restrictions and export taxation, without much regard to

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[14] See Sharma, R. and P. Konandreas, "WTO provisions in the context of responding to soaring food prices," FAO Commodity and Trade Policy Research Working Paper No. 25, Rome, August 2008.

the impacts on other countries. The effects on the world market were direct and immediate, with an already tight market situation getting worse to the detriment of net food importing countries.

Export prohibitions and restrictions are technically legal under the WTO rules. Such measures "temporarily applied to prevent or relieve critical shortages of foodstuffs or other products essential to the exporting contracting party" are exempted from the general prohibition of such measures under GATT Article XI: *General Elimination of Quantitative Restrictions.* The current rules of the AoA (under Article 12: *Disciplines on export prohibition and restrictions*) basically reiterate the validity of GATT Article XI and stipulate further that the "Member instituting the export prohibition or restriction shall give due consideration to the effects of such prohibition or restriction on importing Members' food security". Not much attention seems to have been paid to this weak clause during the recent period of soaring food prices when more than 20 countries resorted to export prohibitions, restrictions and taxation of different kinds.

The asymmetry in the WTO disciplines applying to imports and exports has been pointed out during the current negotiations on agriculture and several countries proposed stronger rules in this area. Japan's negotiating proposal was the most detailed[15], and focused on "rules and disciplines on exports" and on "redressing the imbalance between rules and disciplines applied to agricultural exporting countries and those applied to importing countries". The reference to "imbalance" is to contrast the weak rules on exports compared to well-defined and binding rules on imports. In addition, Switzerland had called for eliminating all export restrictions on agricultural products and the binding at zero of all export tariffs (with flexibility to the LDCs). The Republic of Korea also proposed prohibiting exporting countries from imposing export restrictions and also prohibiting the use of export taxes. Several other proposals had called for improved disciplines on export restrictions and taxes. Thus, in contrast to the current Article 12, export taxation was also very much on the negotiating table.

Unfortunately, however, there is resistance on these issues from other WTO Members and it is unlikely that stronger disciplines on export prohibitions, restrictions and export taxation would materialise under the Doha Round. Beyond the serious food security concerns of net-food importing countries due to weak WTO rules in this area, this also represents an important blow to the multilateral trading system itself. It raises doubts about the world market being a reliable source of food supplies and puts into question the credibility and impartiality of efforts to reform world agricultural trade.

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[15] Negotiating Proposal by Japan on WTO Agricultural Negotiations, WTO Document G/AG/NG/W/91, 21 December 2000.

Stockholding and domestic food distribution programmes have often been the policies of choice for many developing countries in the past, and a common response to domestic and international market instability, with the objective to both provide a minimum support to farmers and also to cushion the domestic market against world market instability. The existing AoA rules allow these instruments although there could be limitations in their application depending on bound AMS levels. Under the draft Modalities text, these restrictions are relaxed considerably, making the conditions for stockholding and related public food distribution programmes less stringent than before. This may be of value in the future if, in response to uncertainties about world market instability, more countries opt for putting in place such schemes. However, stockholding operations are generally expensive undertakings and the need for them is reduced with freer trade, both on the import side (reduced tariffs) as well as on the export side by negotiating tighter disciplines on export prohibitions and restrictions as suggested above.

Finally, another instrument that has a bearing on food security is food aid. Current provisions of the AoA are essentially more guidelines than rules binding the provision of food aid. They have had limited constraining power on how food aid is provided and used. However, the availability of food aid is generally on the decline and stronger disciplines are needed to make better use of this critical resource for people in need, and also to avoid its undesirable and unintended effects. By and large, the new rules on food aid contained in the draft Modalities text would discipline the provision of food aid in non-emergency situations (especially monetization of food aid), which has been a source of contention in the past. This is a desirable outcome, as there were many instances of food aid circumventing export competition provisions in the past to the detriment of other exporters and often the recipient country itself (disincentives to domestic production). To the extent that the related WTO disciplines are tightened as envisaged in the draft Modalities, most food aid would be provided to countries and people with limited resources to meet their needs, and thus constitute largely additional consumption with minimum undesirable effects to the world market and third countries.

Overall, the multilateral trading system and the rules that govern it can be helpful at the margin but not the answer to food-insecurity problems of developing countries. However, strengthening the AoA rules under the Doha Round along the lines suggested here could help, especially by giving more emphasis to designing instruments that provide more flexibility to food-insecure developing countries to increase food production and cushion against the risks of world market volatility. However, it is often the case that demands for policy flexibility on food security grounds and Special and Differential Treatment (SDT) provisions are made with the expectation that these would be granted to all developing countries across-the-board. Such an approach has been counterproductive and has prevented progress in this area.

6. SDT provisions should target problems not countries

Clearly, some differentiation between members of the WTO as regards their rights and obligations is necessary, in view of their differentiated capacity to implement various provisions and take advantage of export opportunities. As a general rule, however, such differentiation from the general rules is possible and politically acceptable when its potential market distorting effect is not large. Otherwise SDT provisions receive little support from important constituencies in developed countries, with the end result of being diluted and being of limited real value.

The implication of this is that, realistically speaking, it is very difficult to envisage substantive and binding SDT commitments that would be available across-the-board to all developing countries (including the better-off among them as well as large agricultural producers/exporters). The market effect of such all-encompassing SDT provisions would make them politically unacceptable for domestic producers in developed countries[16].

Conflicts of interests among developing countries themselves are even more intractable. The main problem is the great heterogeneity among developing countries, whereby the interests of some countries are adversely affected by an across-the-board SDT given to all developing countries. In particular, to the extent that certain SDT provisions hamper South-South trade, they are not supported by those developing countries adversely affected. Because of such conflicting interests within developing countries, the positions of some groups of countries are diametrically opposite to those of other groups of countries which renders a common stance in the negotiations virtually impossible[17]. That is not a bad thing however, as pursuing a common stance approach risks that even the most legitimate concerns of food-insecure developing countries may be sidetracked or addressed by shallow best endeavour clauses, as has often been the experience of past SDT provisions.

Another often advocated approach is to establish sub-categories of countries based on certain broad economic criteria and make SDT provisions available to them and not to other countries. The well-established LDC category is a case in point. However, beyond this well-defined group, there are major obstacles in classifying countries and, no-matter what criteria are used, certain countries inevitably are left

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[16] Developed countries are generally supportive of SDT provisions to the extent that the derogations from the general rules do not seriously impinge upon their own interests. In essence, however, that limits SDT to either "shallow" measures with limited value to all "beneficiary" countries (often such provisions are of little use in practice), or more valuable SDT to a limited number of countries (such as the well-defined group of Least Developed Countries).

[17] The varying interests among developing countries is amply manifested by the cacophony of the large groupings that have been formed, formally and informally, to pursue their individual interests, such as G-77, G-33, NFIDCs, ACPs, LDCs, Cotton Initiative countries, Small Island States, Landlocked Countries, etc.

out and others are included, something that creates considerable friction between countries and is politically undesirable.

In view of this, it is important to make a paradigm shift and focus on targeting problems and not countries. The key issue then becomes to focus on well-identified problems that WTO members face (whether developed or developing) which deserve special treatment. Such treatment of well-identified problems should be envisaged in the generally applicable rules and not be in the form of exemptions and exceptions from these rules, as in the case of traditional SDT provisions. To the extent that these well-identified problems are predominantly encountered in developing countries, these countries would benefit from special treatment without, however, being subjected to the indignity associated with traditional SDT, including also paying a price in the form of concessions in agriculture and/or other sectors[18].

A corollary to the above is that developing countries should move their strategy away from negotiating traditional SDT provisions of limited value to them and spend their limited negotiating power on fine tuning the generally applicable rules in a way that such rules relate also to the problems that they face. Shifting the emphasis into targeting problems is more rational, as not all agricultural producers in developing counties are necessarily in need of special treatment. It should also be easier to articulate and negotiate such problem-specific measures. It is rarely the case that a well-targeted intervention would have large market distorting effects globally, an issue which is of great concern to other countries, developed and developing alike.

In conclusion, a pragmatic approach is needed in the context of the WTO negotiations on agriculture to better reflect food security concerns. The idea is not to exonerate any country a priori from the general disciplines but to be realistic about how much well-targeted measures pursued by food-insecure developing countries actually contribute to distorting world markets and what they aim for, if they actually do so. Possible trade-offs between enhancing global food security versus any small distorting impact on world markets should always tilt in favour of the former.

FIGURE 5.

Heterogeneity within developing countries

AS EXPORTERS (OF FOOD AND NON FOOD PRODUCTS)

- Product type
- Mainly tropical (e.g. cocoa - Côte d'Ivoire)
- Competing temp zone products (e.g. wheat - Argentina)
- Market access conditions
- Preferential (e.g. sugar - Mauritius)
- MFN (e.g. sugar - Brazil)

AS IMPORTERS (OF FOOD PRODUCTS)

- High import dependence
- Adverse agro-ecological conditions (e.g. Haiti)
- Underdevelopment (e.g. many African countries)
- Low import dependence
- Efficient production; high productivity (e.g. Egypt)
- Traditional systems; low productivity (e.g. India)

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[18] Article 6.2 of the AoA, which exempts input subsidies to resource-poor farmers, is an example of such self-targeting provisions. Another example could be the envisaged SSM, designed as a self-targeting instrument if it is linked to the ability of a country to use other defence mechanisms, including its ability to compensate farmers through resource transfers as suggested above.

The compatibility of private standards with multilateral trade rules: Legal issues at stake

Michael T. Roberts [1]

1. Developments in the debate over private standards

1.1 History of the debate

The debate over the role of private standards in the food and non-food sectors is grounded in a doctrine called "legal pluralism" that suggests that "more than one body of laws or set of norms can exist within a legal jurisdiction[2]." This neo-liberalism notion has long subscribed to the view that "private groups should be entitled to exercise within the area of their competence an authority so effective as to justify labeling it as a sovereign authority[3]." The outcome of this notion in the global market context is an extralegal model that results in "voluntary corporate codes of conduct [that] are in vogue . . . .[4]"

Despite their popularity in some quarters, private standards in general are subject to three principal concerns: they lead to the devolution of the State, generate unintended consequences and function without accountability[5]. These

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[1] Michael T. Roberts, FAO Consultant.

[2] Orley Lobel, The Paradox of Extralegal Activism: Critical Legal Consequences and Transformative Politics, 120 Harv. L. Rev. 938, 966 (2007).

[3] Mark Dewolfe Howe, The Supreme Court, 1952 Term – Forward: Political theory and the Nature of Liberty, 67 Harv. L. Rev. 91, 91 (1953).

[4] Owen E. Hernstadt, Voluntary Corporate Codes of Conduct: What's Missing?, 16 Lab. Law 349, 349 (2001).

[5] See generally Lobel, supra note 2.

concerns are especially relevant in the global food and agricultural sector where the economies of developing countries are dependent on the viability of this sector. It has been argued that private standards threaten the viability of the international food trade system, established by nation states; generate unintended but significant barriers to trade for small producers in developing countries; and function without the accountability of a review body.

These concerns for the global food sector have of recent accelerated in parallel to the rapid increase of market penetration by very large supermarket chains and now occupy a regular spot on the agenda of the SPS Committee. The debate took hold at the SPS Committee meeting held on June 29-30, 2005, when Saint Vincent and the Grenadines, supported by Jamaica, Peru, Ecuador and Argentina, raised concern regarding operation of a EurepGAP scheme (now renamed GlobalGAP) in relation to trade in bananas with supermarkets in the U.K.[6] These complainants challenged the "Good Agricultural Practices" standard set by EureGap, which exceeds whatever public standards that applied to the EC. The EC argued in response that EureGap was a private entity and not subject to the SPS agreement.

Since then, the debate on private standards has flourished into a series of discussions, information sessions, reports and studies. A chronology of milestones in the debate at the WTO/SPS level is as follows:

• June 2005: St. Vincent and the Grenadines raised concern in the SPS Committee about EurepGAP certification for bananas.

• October 2006: WTO Information Session with participation of EureGAP and United Nations Conference on Trade and Development (UNCTAD) is held. St. Vincent and the Grenadines requested continued discussion by the SPS Committee.

• March 2007: The SPS Committee discussed private standards as trade concerns.

• June 2007: UNCTAD and WTO held a joint information session on private standards and discussions in the SPS Committee as a specific agenda item.

• October 2007: WTO Members are invited by the Secretariat to present specific examples of products, markets and private standards which have created difficulties or benefits for their exports.

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[6] G/SPS/R/43, paras. 40-42.

- June 2008: A WTO/STDF Information Session is held on facilitating compliance with private standards.

- October 2008: The SPS Committee adopted a work program that will result in a "Comparative Study" that invites interested Members to identify products whose trade is affected by private standards[7]. The SPS Committee also intends to organize ad hoc information sessions with private bodies and others.

The following notable reports have been issued in connection with the debate over private standards:

- Private Standards and the SPS Agreement, WTO, Committee on Sanitary and Phytosanitary Measures (January 24, 2007)[8]

- Private Voluntary Standards within the WTO Multilateral Framework (Submitted by the United Kingdom) (October 9, 2007)[9]

- Considerations Relevant to Private Standards in the Field of Animal Health, Food Safety and Animal Welfare (Submitted by OIE) (February 25, 2008)[10]

- Standards and Trade Development Facility (STDF) Information Session on private standards (June 26, 2008)[11]

- Private Standards – Identifying Practical Actions for the SPS Committee – Summary of Responses, SPS Committee (September 25, 2008)[12]

These discussions, information sessions, studies and reports demonstrate a strong interest in private standards, both for their role within the international construct governing food standards and trade and for their effect on producers in developing countries. The most recent activity by the SPS Committee in October 2008 shows that this interest is now being funnelled through a multi-track approach to address private standards issues. The SPS Committee notably suggested that a group of interested Members draft a descriptive report of data associated with private standards, including the cost of compliance, the overlap with private standards and the effect on trade for defined products. This report is expected in the beginning of the fourth quarter of 2009[13]. The request for this report reflects the complexity of the issues and a need for data and thoughtful planning.

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[7] G/SPS/W/230.

[8] G/SPS/GEN/746.

[9] G/SPS/GEN/802.

[10] G/SPS/GEN/822.

[11] G/SPS/R/50.

[12] G/SPS/W/230.

[13] Id.

An aspect of the debate over private standards that needs to be developed more is legal analysis to assess private standards in the WTO multilateral framework. The sole legal analysis to this point was generated by the United Kingdom in October 2007. The UK analysis takes a hard look at the application of the SPS and TBT agreements to private standards[14]. A more recent academic article concerning private standards in general proposes that a norm of leaving "transnational regulatory space" for standard setting should guide the WTO[15]. Further legal analysis from credible, diverse sources is needed to develop carefully and fully the legal framework upon which private standards in the global food market are measured against the SPS and TBT agreements.

1.2. Jurisprudence and related cases (e.g., US-tuna-dolphin, EC – Asbestos, EC - Sardines)

The problem of a lack of legal analysis over the role of private standards in the global food sector is compounded by the dearth of jurisprudence in relation to private standards. The only legal guide post from WTO jurisprudence is a small body of cases dealing with public standards, but from which can be derived certain principles that shed light or at least provide context for the treatment of private standards by the WTO.

1.2.1 U.S. – Tuna/Dolphin case[16]

This case was brought in 1995 by Mexico and others against the U.S. under GATT. The case raised animal welfare issues – the conflict between the U.S. and Mexico over the effects on dolphins of the tuna-catching methods used in the East Pacific. The U.S. enacted animal welfare legislation within its borders and demanded that Mexico place the same restrictions on its own fleet or be denied access to U.S. markets for tuna.

An issue raised in this case was whether trade rules permit action to be taken against the method used to produce goods rather than the quality of the goods themselves. This latter issue has become known as a "product" versus "process" issue.

The GATT Panel found that the U.S. breached its obligations by using unilateral trade restrictions to back up its domestic laws and could not embargo imports of tuna products from Mexico simply because Mexican regulations on the way tuna was produced did not satisfy U.S. regulations. The Panel was concerned

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[14] G/SPS/GEN/802, supra, note 8.

[15] Steven Bernstein & Erin Hannah, Non-State Global Standard Setting and the WTO: Legitimacy and the Need for Regulatory Space, 11 J. Int'l Econ. L. 575 (2008).

[16] Panel Report, United States-Restrictions on Imports of Tuna, DS21/R-39S/155 (Sept. 3, 1991); Panel Report, United States-Restrictions on Imports of Tuna, DS29/R (June 16, 1994).

about opening the gate to protectionist abuses that would enable any country to apply trade restrictions unilaterally – and to do so not just to enforce its own laws domestically, but to impose its own standards on other countries.

1.2.2   U.S. – Shrimp/Turtle[17]

In October 1996, India, Malaysia, Pakistan and Thailand lodged a WTO complaint against a U.S. embargo that was brought by the U.S. under its Endangered Species Act and required shrimp vessels to use turtle-excluder devices. The complaint alleged that such measures cannot be applied extra-territorially.

  The Appellate Body overturned an earlier Panel decision and found that the U.S. measure was an exemption permitted by Article XX(g), which allows discriminatory measures deemed to conserve exhaustible natural resources. However, the Appellate Body found that the U.S. protective measures were arbitrarily discriminatory and thus inconsistent with the chapeau to Article XX and therefore illegal under Article XI.

  This ruling modified somewhat the decision in the Tuna/Dolphin case, holding that the extraterritorial application of national regulations, such as non-product related production and processing methods, is justified under certain conditions to achieve environmental or other non-trade-related objectives.

1.2.3   EC – Asbestos case[18]

This case was brought in 2000 by Canada who made claims against a ban in France on asbestos and products containing asbestos. Canada argued that the asbestos it exports is a "like product" to substitute products used in construction and therefore deserved no less favourable treatment under the National Treatment standard in the GATT (Article III:4). Canada also claimed that France had violated the obligation under the TBT to ensure that its regulations are the least restrictive of trade necessary to attain the legitimate regulatory objective in question, here the protection of human life and health (Article 2:2, TBT Agreement).

  This case addressed the issue of what steps can a country take to protect national public-health interests? Does it make a difference if the public health objective being pursued is vital and important? Whose responsibility is it to make this decision?

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[17] Appellate Body Report, United States-Import Prohibition of Certain Shrimp and Shrimp Products, WT/DS58/AB/R (Oct. 12, 1998).

[18] Panel Report, European Communities -- Measures Affecting Asbestos & Asbestos-Containing Products , WT/DS135; Appellate Body Report, European Communities - Measures Affecting Asbestos and Asbestos-Containing Products, WT/DS135/AB/R (Mar. 12, 2001).

The Panel and the Appellate Body in this case both rejected Canada's challenge to France's import ban on asbestos and asbestos-containing products, reinforcing the view that the WTO Agreements support members' ability to protect human health and safety at the level of protection they deem appropriate. The Appellate Body noted that the more "vital and important" the policy pursued by a national government, the easier it would be to prove that a non-conforming WTO measure was "necessary" to meet the objectives of the policy concerned. This was the first case in which the WTO upheld national public-health protections.

1.2.4 EC Sardines case[19]

In this case brought in 2001 Peru challenged an EC regulation that maintained that only the species *Sardina pilchardus Walbaum* could be marketed in the EC under the name "sardines." The species swims in European waters and is largely fished by EC vessels, and in particular those of Spain. Because of the EC regulation, similar fish species, such as *Sardinops sagax* which inhabits the Pacific Ocean, could not be sold under the name "sardines" in the vast EC market, even though this species is sold as sardines in most other world markets.

The principal issue was whether the EU's regulation establishing common marketing standards for preserved sardines violated the TBT agreement's conditional requirement to use international standards?

The WTO Panel and the Appellate Body both found that the EC failed to comply with Article 2.4 of the TBT Agreement because the EC did not base its internal technical regulations on the Codex standard, and failed to demonstrate that this international standard would not be "effective" or "appropriate" in fulfilling the EC's "legitimate objectives" of ensuring "market transparency, consumer protection, and fair competition." Neither the Panel nor the Appellate Body provides insight, however, as to how the decision would turn if there were a competing private standard.

Conclusion: Jurisprudence Review

These cases show a limited, but pointed jurisprudence within the WTO SPS/TBT construct that creates boundaries for the imposition of standards on the trade of food products between countries and recognizes the primacy of international standards from a recognized-standard setting body. How this jurisprudence applies to private standards depends in large part on the issues raised by the application of standards in the global marketplace. If for example a Member adopts or references

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[19] Panel Report, European Communities - Trade Description of Sardines, WT/DS231/R (May 29, 2002); Appellate Body Report, European Communities - Trade Description of Sardines, WT/DS231/AB/R (Sept. 26, 2002).

a private standard, the issue would then emerges as to the efficacy of the private standards under WTO jurisprudence. Otherwise, the jurisprudence to date is not particularly helpful in predicting how the WTO would treat private standards under the SPS and TBT agreements.

1.3   Emerging issues

The lack of jurisprudence over private standards coupled with their rapid flourishing has given rise to numerous issues in the global food sector. These issues can be grouped into two categories: legal issues that relate to the multilateral agreement construct of GATT, SPS, and TBT agreements and practical issues over the consequences of private standards, especially to developing countries, and the proposed solutions to solve or abate these consequences. Another important category is issues related to the time table in dealing with these emerging issues.

1.3.1   Legal issues

The legal issues address how GATT or the SPS and TBT agreements deal with private standards. What is the relationship between the SPS agreement and private standards? What is the applicability of the TBT agreement to private standards, particularly the Code of Good Practice? The answer to these questions depends on resolving certain definitional problems in the SPS and TBT agreements.

The lack of jurisprudence makes answering these questions difficult. This in turn makes it difficult for national governments to determine whether private standards are a legitimate private-sector activity, with which governments should not interfere, or whether the SPS/TBT agreements obligate governments in importing countries to be responsible for private standards.

Especially problematic to the analysis is the blurring of the line between private and official standards. At what point does the interaction between a government body and a private-standard setting body render meaningless the distinction between "voluntary" private standards and official standards? What will be the result when a government standardizing body develops a national standard based on a privately-developed standard or when a Member permits entry of imported goods conditioned upon certification with a private standard that exceeds official requirements? These issues are not addressed in the WTO jurisprudence and are not readily answered by the SPS and TBT agreements. It should be noted that the preparation of national standards based on privately developed standards may be less problematic if the full process is transparent and the basic information used for the standard is assessed by experts at the official institutions.

Equally complicated is the issue of what legal consensus might be found. What would be the result if private standards were challenged under the WTO? What

would be the implications of an attempt to expand the jurisdiction of the SPS and TBT agreements over private standards? Would these results and implications threaten the viability of the international food-trade system? In working towards a consensus, are there co-regulatory approaches under the WTO that can be used? Should regulatory space be specifically carved out for private standards? What should be the role of intergovernmental standard-setting bodies? Is the multilateral monitoring of private standards desirable and feasible? These issues are complex and not easily answered.

1.3.2 Practical issues

The most pressing practical issue that emerges from the employment of private standards in the global food supply is how do small producers cope with the costs of compliance? Are there alternatives to certification that could make a more practical and affordable model for small-scale producers while ensuring equivalent assurance outcomes? Can there be practical interpretation of standards to minimize unreasonable demands and opportunities for adding value? Is there a model that both addresses the specific needs of the retail supply chain and is practical and affordable for small-scale producers?

   Related to issues of how to help small producers in developing countries cope with private standards is how to involve these same stakeholders in the private-standards-setting process. Is there a bridge that can be built between the multi-national supermarket chains and small producers in developing countries that helps generate private standards that are reasonable and that provide special treatment or accommodates to some degree these small producers? What is the most effective way to promote dialogue and exchange information between these two categories of stakeholders? What will be the long term practical effect of private standards in the food sector on trade policy? Would collaboration between the private sector and official standard-setting institutions facilitate the development of sound standards that consider the experience of the private sector?

   These issues are but a sampling of the manifold issues that private standards raise for stakeholders in the food sector.

1.3.3 Time table

The rapid proliferation of private standards in food industries presents challenging timing issues. Some consequences of private standards are immediate and many small producers in developing countries need help now. It is difficult, however, to devise a global consensus approach without having sufficient data and without having enough time to understand thoroughly the overall effects of private standards and the implications of possible approaches to dealing with these issues. Complex problems require time to understand the nuances of the issues and to build coalitions.

Thus, reaching a consensus on how to deal with private standards requires consideration of a time line. What issues can and should be resolved as soon as possible in order to abate unintended consequences? What issues require evaluation over the course of time? Is it possible for a strategy to be devised where issues are dealt with but is flexible enough to adapt where necessary to address problems as they emerge? This sort of pro-active, flexible approach requires short-term and long-term planning.

1.4. Positions of main stakeholders

The prospect of finding short-term and long-term real solutions to these legal and practical issues starts with building a fundamental understanding of the positions of primary stakeholders. In many respects, these positions have evolved in response to certain developments and trends amongst the stakeholders themselves: emerging consumer preferences and changes in legislation (e.g. 'due diligence' in new EU law) lead to retailer-imposed private standards that in turn generate unintended consequences for developing countries that then threaten the ability of governments to regulate food. These positions are set forth below.

1.4.1 Consumers

Consumers expect the world food system to provide them with a wide choice of products that are safe and nutritious. Widely-broadcasted food safety problems in various national food regulatory regimes have increased consumer concerns over safety. At the same time consumers have become interested in non-safety traits of food product, including the impact of food production on the environment, animal welfare and labour conditions[20]. These concerns are couched in terms of "ethical consumerism" and resonate especially in developed countries. Ethical consumerism combined with a heightened concern over the safety of food has escalated the demand for information, assurances and guarantees that are not necessarily science-based. Consumers expect this information and these guarantees to be provided by food companies who then have developed private standards as a means to gathering this information.

It is unlikely that consumers have a conscious position towards private standards. Consumers no doubt appreciate the information sufficient for them to make informed decisions about food product in supermarkets. It is doubtful that consumers, however, intend or even desire the negative consequences that private standards impose on developing countries. Because these consequences are not communicated to consumers at the point-of-purchase or any other time it is difficult to assess the attitude of consumers as stakeholders in the global

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[20] Tim Lang & Michael Heasman, Food Wars: The Global Battle For Mouths, Minds And Markets (2004).

food supply chain towards private standards, other than to note that it is the expectations of consumers that have in part fueled the proliferation of private standards. This includes the fact that private standards offer a response to the growing awareness and demand of consumers for extra precautions in matters of food safety and for certain practices in matters of food production. Also, some private standards are used by companies as a marketing tool resulting in consumers being inundated with information about the standards. This does not happen with public standards.

1.4.2 Food companies

Food companies have responded to the emerging consumer demand in two related ways. First, retailers especially have assumed a gate-keeper role and rely on private standards to guarantee safety and other desirable qualities. As "gatekeepers" of the food markets, retailers decide which products will be offered to clients and which products will access a defined market. This role reinforces a relationship of trust between consumers and retailers. Second, ethical consumerism has led retailers and food manufacturers to incorporate social responsibility standards that translate into private standards. Corporate responsibility covers a broad range of values, including many not related to food safety.

A principal aim of private standards is to help retailers derive information about unique attributes of food product. Certification is the means by which companies derive this information and use it to align private standards with demands from consumers[21]. Retailers do not believe that it is possible for public standards to meet this demand for information and to align public standards with consumer expectations[22].

Another factor that colors the position of food retailers is the recent retail concentration and power shift. As retailing becomes more oligopolistic, retailers prefer to minimize price competition and compete on the basis of other qualities that are not related to safety and are not necessarily science based. Such market concentration and increase of bargaining power allow retailers to impose the conditions they want on suppliers[23]. These elements favor the emergence of private food standards. These supermarkets then promote convergence of private food standards through benchmarking and manufacturing standards and improve cost efficiencies throughout the food supply chain. In developed countries where there

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[21] Maki Hatanaka, Carmen Bain, & Lawrence Busch, Third-Party Certification in the Global Agrifood System, Science Direct (2005).

[22] Relationship of Third-Party Certification (TPC) to Sanitary/Phytosanitary (SPS) Measures and the International Agri-Food Trade: Final Report, USAID (Dec. 2005); The Next Step in the Ethical Consumerism Revolution, Datamonitor (2008).

[23] Maki Hatanaka et al., Third-party certification in the global agrifood system (2005).

is a relationship of trust between consumers and retailers, standards can also shield retailers from liability in the event of a safety or sanitary crisis.

It is likely that all of these conditions render food retailers and manufacturers as strong supporters of private standards. Food companies are less concerned about the legal ideology associated with private standards or even their effect on trade as they are about meeting the expectations of consumers and selling product. Although food companies may not intend for the consequences of private standards to attach to producers in developing countries, it is doubtful that once informed of the consequences they would reverse their commitment towards private standards. A commitment to social responsibility values, however, may motivate food companies to be more cognizant of the consequences and to be amenable to efforts especially by coalitions to mitigate the unfavorable consequences.

1.4.3 Developing country governments

Unlike consumers and food companies, many developing country governments have strong concerns about private standards. Small farmers in developing countries have experienced first hand numerous problems due to private standards. These concerns translate into a position that for developing countries is both legalistic and practical.

Developing country governments view private standards as barriers to trade that should be controlled by governments in whose territory the organizations administering or applying the standards reside. The concern is that private standards are intended to meet consumer preferences and are formulated without consideration to scientific principles. Another concern is that private standards may not be transparent because they are not notified to the WTO. The complaint is that private standard-setters when they adopt or modify a standard that will apply at a large scale and have substantial market access and development implications do not have to notify those standards in advance, to publish them or observe a transitional period to allow time for all relevant parties to comply or switch to the new standard. These standard-setters do not use a transparent procedure with criteria for private standards and which is open to independent review as is the case with the SPS agreement. Finally, there is a concern that private standards impose additional burdens because they cover a wide range of issues, not just food safety, but quality, production processes and labour and environment requirements.

Developing countries are also concerned about the burden of compliance with private standards for small farmers. Producers who have the resources to comply with private standards and thus have access to the world's more valuable markets benefit from private standards. These producers are able to invest in upgrades and certification and can take advantage of opportunities to generate higher profits. However, many small producers with fewer resources find that they cannot meet

private standards or cannot afford costly certification procedures that involve several inspections by independent reviewers. They find the scope and content of standards difficult and compliance costs prohibitive. These costs implications therefore may exclude from export markets small and medium food producers, the very ones who have the greatest need to increase access to such markets.

These concerns are the impetus for developing countries to ask the basic question as to what can and should be done under the SPS and TBT agreements to deal with the consequences of private standards in the global food sector. Their view is that the standards "conflict with the letter and spirit of the SPS agreement and are veritable barriers to trade (which the very SPS Agreement discourages) and having the potential to cause confusion, inequality and lack of transparency[24]." Some also argue that private standards should offer special treatment for developing countries. Calls have been made for joint meetings of the SPS and TBT committees to address these issues.

1.4.4 Developed country governments

Developed country governments have the difficult task in responding to the growing demands of consumers for certain characteristics in food, to the growing role that food companies are taking in the regulation of food and to the consequences of private standards towards developing countries. This difficult task is made even more difficult by dwindling resources afforded to governments to regulate food production and trade.

A basic concern of governments is to preserve their role in the food regulatory system. The concern is that private standards erode the role of the government, both national governments and the multilateral food trade system. The irony of this concern is that the limits of national food law systems have helped create this problem in the first place. Cuts in public sector budgets have reduced funding for various food standards and regulations and enforcement institutions. There has also been a shift in focus by government agencies from inspection to auditing systems. As a result, an information and regulatory vacuum has emerged at least in terms of meeting consumer expectations for food safety and private standards have stepped in to fill the void. In some cases the increased role of private standards was the direct outcome of governmental policy. For example, in the wake of a series of food contamination crises in the 1990s, European governments shifted the liability for food safety and its enforcement to the private sector with the 'due diligence' requirements.

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[24] WTO, Private Industry Standards, Communication from Saint Vincent and the Grenadines, G/SPS/GEN/766.

The diminishing role of government in regulating the food supply leads to practical concerns that governments should have about private standards: that they are not always based on good science, are not always uniform in their application, are not always transparent and may exclude some players, including those unable to meet the standards. An even larger concern may be the long-term viability and even legitimacy of international institutions, such as the WTO/SPS/TBT trade system for food product, and Codex and OIE. In spite of the impressive efforts and accomplishments of Codex in recent years, the growing primacy of private standards may even lead some to question the role of Codex in the world food market.

These concerns have lead to a public-private partnership in some European countries as a new approach towards compliance. Examples include the Netherlands, where national authorities have worked closely with Dutch HACCP to promote public and private linkages on compliance, and from the UK where authorities have examined how to pool public and private resources for compliance[25]. This public-private partnership is part of the development over the past decade in the EU of a new regulatory policy that emphasizes the use of alternative instruments that include voluntary agreements labelled with the general terms of "soft law," "self-regulation," and "co-regulation[26]."

The position of governments therefore is defined by not only what to do about private standards but how and to what extent. How do governments devise a long-term policy position that deals with immediate problems of private standards and yet adapts to changing circumstances over time? To what extent can governments operate under the multilateral agreement construct? What are the constraints towards government action under the SPS and TBT agreements?

2. Trade Rules Issues

2.1 Treatment of private standards within multilateral agreement construct (e.g., GATT, SPS, TBT?)

The treatment of private standards within the multilateral agreement construct (GATT, SPS, and TBT) is negligible. There is no evidence that private standards were mentioned in formal negotiation meetings or discussions involving GATT. While negotiations were underway, the emphasis was on governmental safety standards that were considered to be a matter for action by governments in the form of sanitary measures (SPS Agreement) or technical regulations (TBT Agreement). The widespread dissemination of private standards driven by consumer concerns over

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[25] FAO, Overview of existing analytical work on the impacts of private standards of trade.

[26] See Linda Senden, Soft Law, Self-Regulation and Co-Regulation in European Law: Where Do They Meet?, vol 9.1 ELECTRONIC JOURNAL OF COMPARATIVE LAW (January 2005), http://www.ejcl.org/91/art91-3.html.

the impacts of agriculture on environment, labour conditions and animal welfare largely post-date the SPS and TBT agreements.

2.2 Legal relationship between the SPS agreement and private standards

No formal determination has been made to define the legal relationship between the SPS agreement and private standards. The analysis of a potential legal relationship is developed by working through the relevant language in Articles 1, 2 and 13, as delineated below.

2.2.1 Article 1

Article 1.1 sets forth the basic application of the SPS agreement:

1. This Agreement applies to <u>all</u> sanitary and phytosanitary measures which may, directly or indirectly, affect international trade. Such measures shall be developed and applied in accordance with the provisions of this Agreement.
2. For purposes of this Agreement, <u>the definitions provided in Annex A shall apply</u>.
3. The annexes are an integral part of this Agreement.
4. Nothing in this Agreement shall affect the rights of Members under the Agreement on Technical Barriers to Trade with respect to measures not within the scope of this Agreement. (Emphasis Added).

      Article 1.1 expressly applies to all SPS measures. The language in Article 1.1 does not limit the application of the SPS agreement to SPS measures taken by government authorities. Likewise, the definition of an SPS measure in Annex A (1) and the accompanying illustrative list of SPS measures does not limit these to governmental measures. A number of the existing private standards would appear to address the risks to human health identified in Annex A (1) (a), through means identified in the illustrative list. Thus, even though the SPS agreement was essentially designed to deal with public measures, Article 1.1 and Annex A of the agreement do not exclude private standards from the scope of the agreement.

2.2.2 Article 2

The scope of the application of SPS measures narrows in Article 2 of the SPS agreement. Article 2 sets forth the basic rights and obligations of the SPS Agreement:

1. <u>Members</u> have the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life or health, provided that such measures are not inconsistent with the provisions of this Agreement.

2. <u>Members</u> shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health, is based on scientific principles and is not maintained without sufficient scientific evidence, except as provided for in paragraph 7 of Article 5.

3. <u>Members</u> shall ensure that their sanitary and phytosanitary measures do not arbitrarily or unjustifiably discriminate between Members where identical or similar conditions prevail, including between their own territory and that of other Members. Sanitary and phytosanitary measures shall not be applied in a manner which would constitute a disguised restriction on international trade.

4. Sanitary or phytosanitary measures which conform to the relevant provisions of this Agreement shall be presumed to be in accordance with the obligations of the <u>Members</u> under the provisions of GATT 1994 which relate to the use of sanitary or phytosanitary measures, in particular the provisions of Article XX(b). (Emphasis Added)

Article 2 makes clear that the rights and obligations referred to in Article 1 that relate to SPS measures explicitly attach to "Members." In sum, these obligations require that Members shall ensure that SPS measures are 1) based on scientific principles, 2) do not arbitrarily or unjustifiably discriminate and 3) not applied to restrict international trade. It would seem then that these obligations of Members extend to all SPS measures including those developed by private standards-setting bodies.

2.2.3 Article 13

The scope of the obligations of Members that relate to SPS measures, however, is refined in Article 13, reproduced below:

Members are fully responsible under this Agreement for the observance of all obligations set forth herein. Members shall formulate and implement positive measures and mechanisms in support of the observance of the provisions of this Agreement by <u>other than central government bodies</u>. Members shall take such <u>reasonable measures</u> as may be available to them to ensure that <u>non-governmental entities</u> within their territories, as well as <u>regional bodies</u> in which relevant entities within their territories are members, comply with the relevant provisions of this Agreement. In addition, Members shall not take measures which have the effect of, directly or indirectly, requiring or encouraging such <u>regional or non-governmental entities, or local governmental bodies</u>, to act in a manner inconsistent with the provisions of this Agreement. Members shall ensure that they rely on the services of <u>non-governmental entities</u> for implementing sanitary or phytosanitary measures only if these entities comply with the provisions of this Agreement. (Emphasis Added)

This language limits the scope of Members's responsibility for the observance of SPS measures to the following four types of organizations:

- Bodies that are not central government bodies
- Regional bodies
- Local governmental bodies
- Non-governmental entities

The issue then becomes whether the sources of private standards – private food companies and private standard-setting bodies – qualify as any of these type of four organizations. It appears that "bodies that are not central government bodies" would include the other three types of bodies. It is also clear that private bodies, such as large supermarkets, are not local government bodies and regional bodies. Thus, the remaining issue is whether under Article 13 "non-governmental entities" includes private bodies? If the answer is yes, then the applicability of Article 13 presumably would extend to private standard-setting bodies.

As noted in the language of Article 13, the obligations of Members relative to non-government entities is 1) to take positive measures to ensure that all obligations are observed; 2) to take "reasonable measures" to ensure that non-government entities comply with agreement; 3) not to encourage non-government entities to breach agreement; and 4) to rely on services of non-governmental entities only if they comply with agreement. Article 13 in sum obligates Members to ensure that non-government entities do not act inconsistently with the SPS agreement, which includes the obligations in Article 2. These obligations apply to private-standard setting entities if they are included in the category of non-government entities. Unfortunately there is no language in Article 13 that defines a non-government entity. Article 13 also does not define what constitutes a "reasonable measure."

2.3 Applicability of the TBT agreement to private standards (Code of Good Practice)

As with the SPS agreement, no formal determination has been made to define the legal relationship between the TBT agreement and private standards. The analysis of a potential legal relationship is developed by working through the relevant language – Articles 1 through 5 and 8. Articles 1 through 4 specifically set up the point that private standards may be within the scope of responsibility for Members to ensure compliance with the Code of Good Practices.

2.3.1 Article 1

Article 1 defines and limits the coverage of the TBT agreement to food trade standards that do not apply to SPS measures – packaging, labeling or technical issues.

2.3.2 Article 2

Article 2 sets forth the obligations of the Members "with respect to central government bodies" (Emphasis Added).

Article 2.1 includes the Most-Favoured-Nation (MFN) and national treatment obligations and states that "in respect of their technical regulations, products imported from the territory of any Member be accorded treatment no less favourable than that accorded to like products of national origin and to like products originating in any other country".

Article 2.2 provides that Members "shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade. For this purpose, technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective, taking account of the risks non-fulfilment would create." Examples of legitimate objectives are listed in Article 2.2.

Article 2.4 encourages Members to use existing international standards for their national regulations, or for parts of them, unless "their use would be ineffective or inappropriate" to fulfil a legitimate objective.

Article 2.6 encourages Members "to participate, within the limits of their resources, in the work of international bodies for the preparation of standards."

Article 2.7 provides that "Members must give positive consideration to accepting as equivalent technical regulations of other Members, even if these regulations differ from their own, provided they are satisfied that these regulations adequately fulfil the objectives of their own regulations."

2.3.3 Article 3

Article 3 applies certain provisions of Article 2 that apply to central government bodies to the preparation, adoption and application of technical regulations by "Local Government Bodies and <u>Non-Governmental Bodies</u>." (Emphasis Added) Articles 3.1, 3.4 and 3.5 state respectively:

> 3.1 Members shall take such <u>reasonable measures</u> as may be available to them to ensure compliance by such bodies with the provisions of Article 2, with the exception of the obligation to notify as referred to in paragraphs 9.2 and 10.1 of Article 2.

3.4 Members shall not take measures which require or encourage local government bodies or <u>nongovernmental bodies</u> within their territories to act in a manner inconsistent with the provisions of Article 2.

3.5 Members are fully responsible under this Agreement for the observance of all provisions of Article 2. Members shall formulate and implement positive measures and mechanisms in support of the observance of the provisions of Article 2 by <u>other than central government bodies</u>. (Emphasis Added)

Thus, Article 3 provides that Members are obliged to take "reasonable measures" as may be available to them to ensure compliance with the provisions of Article 2 by "non-governmental organizations." As with the SPS agreement, in addition to what is a nongovernmental body, the issue arises as to what constitutes a "reasonable measure?"

2.3.4 Article 4

Where a private standard falls within the definition of a standard under the TBT Agreement, Article 4 would apply. Article 4.1 states:

Members shall ensure that their central government standardizing bodies accept and comply with the Code of Good Practice for the Preparation, Adoption and Application of Standards in Annex 3 to this Agreement (referred to in this Agreement as the "Code of Good Practice"). They shall take such <u>reasonable measures</u> as may be available to them to ensure that local government and <u>non governmental standardizing bodies</u> within their territories, as well as regional standardizing bodies of which they or one or more bodies within their territories are members, accept and comply with this Code of Good Practice. In addition, Members shall not take measures which have the effect of, directly or indirectly, requiring or encouraging such standardizing bodies to act in a manner inconsistent with the <u>Code of Good Practice</u>. The obligations of Members with respect to compliance of standardizing bodies with the provisions of the Code of Good Practice shall apply irrespective of whether or not a standardizing body has accepted the Code of Good Practice. (Emphasis Added)

Article 4.2 provides that "Standardizing bodies that have accepted and are complying with the Code of Good Practice (Annex 3) shall be acknowledged by the Members as complying with the principles of this Agreement." The Code of Good Practice characterizes a standardizing body as a "central government body, a local government body, or a non-governmental body." (Emphasis Added)

Thus, the substantive provisions of the Code of Good Practice then apply to "non-governmental standardizing bodies." This means that Article 4 requires "reasonable

measures" by Members to ensure compliance by non-governmental standardising bodies with the following provisions of the Code of Good Practice:

- Follow the principles of non-discrimination

- Avoid creating unnecessary obstacles to international trade

- Comport standards with existing international standards (except where such international standards would be ineffective or inappropriate)

- Engage with relevant international standardising bodies

- Avoid duplication or overlap of the work of other international standardising bodies

- Specify standards for product requirements in terms of performance rather than design or descriptive characteristics

- Ensure transparency and consultation with interested parties

These articles in the TBT agreement serve as the basis for the comments by the Secretariat of the SPS Committee that another avenue for disciplining private standards would be the TBT agreement, which covers food standards that related to issues other than human, animal and plant health and which enjoins Members to take reasonable measures so that non-government bodies would comply with its annexed Code of Good Practice. The Secretariat notes that private standards often contain elements, such as social and environmental requirements, which fall outside the SPS agreement, but well within the scope of the TBT agreement[27].

Articles 5 through 8 present another area under the TBT agreement that applies to non-government entities.

2.3.5 Article 5

Article 5 addresses procedures for assessment of conformity by central government bodies. Article 5.1 states:

> Members shall ensure that, in cases where a positive assurance of conformity with technical regulations or standards is required, their central government bodies apply the following provisions to products originating in the territories of other Members:

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[27] G/SPS/GEN/746.

Article 5.1 imposes obligations on central governments regarding conformity assessment.

2.3.6 Article 8

Where a central government body allocates to a non-government body the task of conformity assessment, such a delegation would likely trigger the application of Article 8. Article 8.1 states:

> Members shall take such reasonable measures as may be available to them to ensure that <u>nongovernmental bodies</u> within their territories which operate conformity assessment procedures comply with the provisions of Articles 5 and 6, with the exception of the obligation to notify proposed conformity assessment procedures. In addition, Members shall not take measures which have the effect of, directly or indirectly, requiring or encouraging such bodies to act in a manner inconsistent with the provisions of Articles 5 and 6. (Emphasis Added)

Article 8.2 states:

> Members shall ensure that their central government bodies rely on conformity assessment procedures operated by <u>non-governmental bodies</u> only if these latter bodies comply with the provisions of Articles 5 and 6, with the exception of the obligation to notify proposed conformity assessment procedures. (Emphasis Added)

In sum, Article 8 provides that Members are obliged to take "reasonable measures" to ensure that non-governmental bodies operating conformity assessment procedures comply with the provisions of Articles 5 and 6 (concerning conformity assessment by government bodies).

<u>Conclusion</u>

The application of the SPS and TBT agreements to the governance of private standards hinges upon two central issues: the definition of "non-government entities" in the SPS agreement and the interpretation of "reasonable measures" and "non-governmental standardizing bodies" in the TBT Code of Good Practice. These definitions dictate to a large extent the governance of private standards under the construct of the WTO and SPS and TBT agreements.

3.   Legal challenges to resolving issues

3.1   Problems of definitions

Despite the clear mandate in Article 13 that Members are to ensure that non-government entities do not act inconsistently with the SPS agreement, neither Article 13 or any of the other provisions of the agreement define the term "non-governmental entities." This vacuum presents a significant definition problem that renders hazardous any authoritative statement as to the treatment of private standards under the SPS agreement.

The only point the text is clear on is that a non-government entity is considered distinguishable from a government body, i.e., local government entity or central government entity. Although the text does not state, it appears that a government body is an entity granted the power by law to govern. In other words, the power of the body is derived from the law. Does this mean that a non-governmental entity by definition does not have power given to it by law? Or must a non-governmental entity under the SPS agreement have some positive enforcement role that is derived from government or law? Does the non-government entity need to be a legal entity? If so, does the legal status need to be determined or recognized by the national law of a Member? Does the non-government entity need to have a certain degree of government involvement to be recognized as a non-government entity? If so, what is the degree of government involvement that is required?   The only thing that can be stated clearly is that these questions are not answered by the text of Article 13 or the SPS agreement.

The next step then is to turn to textual sources outside the SPS agreement. The WTO agreement is a single agreement and the individual parts, including the agreements annexed to it, should be interpreted as an integrated whole and the provisions should be interpreted cumulatively and consistently[28]. In this vein, it is helpful to turn to the TBT agreement for a definition of "non-government entities." In Annex 1 of the TBT agreement, several definitions are set forth that apply to the TBT agreement[29]. These definitions define the four types of organizations listed in Article 13 of the SPS agreement. The definition of "Non-government body" states: "Body other than a central government body or a local government body, including a non-government body which has legal power to enforce a technical regulation." This definition is vague and open ended, but does perhaps shed some light on what constitutes a non-government entity for purposes of Article 13 of the

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[28] Appellate Body Report, Korea – Definitive Safeguard Measure on Imports of Certain Dairy Products, WT/DS98/AB/R, (January 12, 2000).

[29] These definitions are derived from the sixth edition of the ISO/IEC Guide 2: 1991, General Terms and Their Definitions Concerning Standardization and Related Activities. TBT Agreement, Annex 1.

SPS agreement. The non-government body under this definition has legal power (delegated or derived from a Member) to enforce a technical regulation. This suggests a relationship between the non-government entity and the government that enables the non-government entity to perform certain tasks, i.e., enforce SPS or TBT rules.

What is the significance of this definition of a "non-governmental body" in the TBT agreement? It is the only helpful textual definition outside of the SPS agreement; there is not another analogous or competing definition in the WTO texts. Also, the application of the TBT agreement to agricultural goods makes it conceptually relevant to the SPS text. Even if the definition can be applied analogically to the SPS agreement, however, it is limited in its scope. It is still not clear as to the nature of this legal power and to the relationship between the "non-government body" as defined and the government bodies (local or central). Does the definition in the TBT agreement automatically exclude not just from the SPS agreement but also from application of the TBT agreement non-government bodies that do not have legal power to enforce a technical regulation? In other words, does the definition create an exclusive class for purposes of applying the obligations of the SPS and TBT agreements? Are there other considerations as to what constitutes a non-government entity? Even if the view is taken that non-government entities not empowered by law to enforce an SPS rule are relevant to Article 13, the issue still remains as to whether such a non-government body is the same as a private body that sets private standards? In sum, no matter if the TBT definition is analogous or not to Article 13 of the SPS agreement, the problem of definition remains. The problem is one of precision, scope and application.

3.2 Legal interpretation of the TBT Code of Good Practice

The problem of definitions extends even beyond the initial question of what is a non-government entity. Assuming that a non-government entity fell under Article 13, Members would then be required under Article 13 to "take such reasonable measures as may be available to them to ensure that non-government entities within their territories [. . .] comply with the relevant provisions of this Agreement." The SPS agreement does not define what constitutes a "reasonable measure" and there is no SPS jurisprudence on this matter. It is necessary to turn to the TBT agreement for possible direction on this definition.

As previously noted, if a private standard falls within the TBT agreement, Article 4 applies, which requires Members to take "reasonable measures" to ensure that non-government bodies accept and comply with the provisions of the Code of Good Practice. Defining the scope of what constitutes "reasonable measures" is problematic. What is the difference between a reasonable measure and a measure that would not be regarded as reasonable? Like the SPS text, the TBT text is silent as to what constitutes "reasonable measures."

Consideration of what might be the interpretation of "reasonable measures" in general under the TBT and SPS agreements is difficult, as it involves issues related to the nature and quality of what is "reasonable." For example, does "reasonable" relate to the obligation of conduct or the results? Does the reasonableness of the measures have to be interpreted under national law but also international law? Does the "reasonable measure" requirement mean that the regulatory measure must be "suitable" to achieve a legitimate public policy objective pursued by the Members or must it be the "best alternative?"[30] If "suitable" is the answer, does this then set the bar at a minimum level of what is "reasonable"?

On a practical level, there are some initiatives that governments could take that likely would be reasonable under most circumstances. These initiatives would include the dissemination of information about the TBT agreement and its provisions applicable to private standard-setting, interacting with private bodies to encourage standards that are consistent with the TBT agreement, entering into memoranda of understanding with private bodies and encouraging compliance by private bodies. Is it reasonable, however, to move beyond these initiatives and regulate the setting of private standards by private bodies?

It is also important to remember that what might be viewed as reasonable in one country might not be viewed as reasonable in another. For example, if a central government finds that it has legal authority and that it is reasonable to regulate the setting of private standards, this same activity might not be viewed as reasonable in another country. This problems associated with the difference in approach are exasperated when the private organization is a multi-national entity, crossing national boundaries.

3.3 Lack of WTO jurisprudence

3.3.1 Article 13 "non-government entities"

There is little WTO case law on the interpretation of Article 13 of the SPS Agreement and there is no case law in relation to non-governmental entities and Article 13 of the SPS Agreement. Two WTO cases are helpful, however, to at least provide some context. First is a report of the Panel in Australia – Measures Affecting Importation Of Salmon – Recourse To Article 21.5 By Canada[31]. Canada claimed that Australia was legally responsible for the Tasmanian ban (import prohibition on Canadian salmon) under Article 13 of the SPS Agreement and Article 27 of the Vienna Convention on

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[30] See Federico Ortino, Basic Legal Instruments For The Liberalisation Of Trade at 445 (2004) (asserting that the requirement that the regulatory measure be "suitable" to achieve a legitimate public policy objective pursued by the Members is explicit in both the SPS and TBT agreements).

[31] Panel Report, Australia – Measures Affecting Importation Of Salmon - Recourse To Article 21.5 By Canada, WT/DS18/RW (February 18, 2000).

the Law of Treaties. The Panel found that the Tasmanian measure was inconsistent with Articles 5.1 and 2.2 of the SPS agreement. Australia's restrictions were spurred by its concern that the salmon may carry diseases that would spread among native fauna. Although not germane to its decision, the Panel made reference to Article 13 in support of the finding that the Tasmanian measure is subject to the SPS agreement and falls under the responsibility of Australia. The decision indicates that the Panel would look at Article 13 to determine whether there is "responsibility" of a WTO Member before determining whether the measure at stake is an SPS measure and whether there is a violation of the SPS Agreement[32].

Second is the Report of the Panel in Japan – Measures Affecting Consumer Photographic Film and Paper[33]. In this case, on account of the anti-competitive and exclusionary distribution system of Fuji, which blocked Kodak's access to the Japanese market for photographic film and paper, Kodak petitioned the US Trade Representative. The US then filed complaints against Japan with the WTO Dispute Settlement Body. The US alleged that Japan had implemented and maintained certain laws, regulations, requirements, and measures affecting the distribution and sale of imported consumer photographic film and paper. The Panel stated that

> past GATT cases demonstrate that the fact that an action is taken by private parties does not rule out the possibility that it may be deemed to be governmental if there is sufficient government involvement with it. It is difficult to establish bright-line rules in this regard, however. Thus, that possibility will need to be examined on a case-by-case basis[34].

From this decision it appears that governmental involvement is useful to demarcate "non-governmental bodies" from "private bodies[35]." It is not clear, however, as to whether this is the dividing line between government entities and non-government entities spoke of in Article 13 and even if it is what the nature and scope of this government involvement must be and how this involvement relates to private standards.

3.3.2 "Reasonable Measures"

What constitutes "reasonable measures" remains undefined under WTO jurisprudence. A GATT Panel Report in *United States – Measures Affecting Alcoholic*

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[32] G/SPS/GEN/802, supra note 8.

[33] Panel Report, Japan - Measures Affecting Consumer Photographic Film and Paper, WT/DS44/R (March 31, 1998).

[34] Id. at Paragraph 10.56.

[35] G/SPS/GEN/802, supra note 8.

and Malt Beverages (US – Malt Beverages has noted that GATT XXIV:12 contains a similar reference to "reasonable measures", which dispute panels have interpreted to mean "all constitutionally available measures[36]." An earlier panel decision in *Canada – Measures Affecting the Sale of Gold Coins,* interpreted "reasonable" to mean members are obliged to weigh "the consequences of non-observance … for trade relations with other parties . . . against the difficulties of securing observance[37]." These two decisions show the polar spectrums of precedence available to the Panel in interpreting "reasonable measures." The question as to what is a "reasonable measure" in relation to the SPS and TBT agreements remains one of speculation and conjecture.

3.4 Blurring of private standards and official standards

The problem of definitions under the SPS and TBT agreements that make the obligations of Members towards private standards confusing is exasperated by the fact that the distinction between private standards and public standards often is blurred. This fact is evident on several different levels. For instance, from the perspective of suppliers, procurement specifications set by major manufacturers are mandatory for doing business, as are government procurement standards. Although private voluntary standards are not mandatory by rule, some of them (such as the ISO 9000 standards on quality management) have become so in practice—meaning that they are required if economic agents want to compete globally. Numerous certification schemes for food safety management systems state that their requirements are based on Codex guidelines. Also, many private enterprises borrow parts of public standards. Insurance companies may request compliance with public standards to reduce product liability exposure. The culmination of this application of private standards is that such "private" regulation is if not *de jure* –at least *de facto* – substituting public regulation in determining what characteristics products and production/process methods need to match to be fit for trade.

The trend is certainly towards greater blurring. For example, Codex maintains contact with ISO through information exchange[38]. ISO is also an Observer Organization to Codex and to the SPS Committee. Codex is also seeking basic information on the development and use of private standards[39]. It is conceivable that a government standardizing body might develop a national standard based on ISO 22000. It is also conceivable that a member might decide to permit the entry

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[36] GATT Panel Report, United States – Measures Affecting Alcoholic and Malt Beverage, DS23R (June 19, 1992).

[37] GATT Panel Report, Canada – Measures Affecting the Sale of Gold Coins, L/5863 (Sept 17, 1985).

[38] Codex Document ALINORM 06/29/9D.

[39] Codex Document ALINORM 06/29/9B, Part II, Add.1.

of imports that are certified to comply with a private standard that incorporates and exceeds the official requirements. Could the Member be construed as relying on the services of a non-governmental entity to implement sanitary and phytosanitary measures [40]? Will this blurring then trigger the application of Article 13's obligations of Members towards non-government entities?

3.5 Difference of scope between Agreements and private standards

Even more serious than definitional problems is the difference in scope between the SPS agreement and private standards. This problem of scope is two-fold. First, private standards are often more stringent than public standards vetted by the intergovernmental institutions. This event challenges the suitability of the SPS model for delivering standards. It also potentially devalues the public standard-setting process. Second, private standards often go beyond food safety. For example, GLOBALGAP, a partnership of major food retailers has developed standards for a wide range of agricultural practices, some related to food safety and others to environmental protection and labour. These scope problems portend even greater strain on the definitional problems of "nongovernmental entities" unless a consensus is reached to what is an appropriate role for private standards in the global food system. The discussion could include the applicability of emerging regulatory instruments that refer to new governance, self-regulation and co-regulation[41].

4. Prospects

4.1 Where could consensus be found?

It is difficult to find a consensus on how to resolve all of the issues associated with private standards. There is a wide range of views held by Members regarding the extent to which private standards establish TBT and SPS measures, their effects on trade and development and their legal relationship with the TBT and SPS agreements.

4.1.1 Points of agreement

Notwithstanding the challenges of finding a consensus, there are three foundational points upon which a general agreement can be found. First, private standards in the global food market are here to stay. Consumer demand coupled with the

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[40] G/SPS/GEN 746 at 5.

[41] See European Economic and Social Committee Self and Co-Regulation online, http://eesc.europa.eu/smo/prism/regulation/synopsis/index_en.asp

emergence of market concentration of retailer groups position a permanent and likely growing role for private standards. It is unlikely that private standards are a passing fad. It is reasonable to assume that private standards will be a permanent fixture in the global food supply.

Second, private standards have unintended consequences in the global food sector. These consequences are positive or negative depending on the viewpoint of the stakeholder. Although private standards benefit some producers – mostly larger operations – it is generally conceded that although not intended they render costs to small farmers particularly in developing countries and may pose barriers to trade.

Third, the entrenchment of private standards in the global market and the complexity of the issues make it prudent to engage in thoughtful, long-term planning. Such planning will be served better with data that probe the effects of private standards on all stakeholders. Having the data and a better understanding of the effects of private standards will make it easier to expedite a consensus for an optimal plan.

4.1.2 Approaches

For now, however, finding a consensus on how to treat or manage private standards is a difficult task. Given the limited information on hand, there appear to be three fundamental approaches to the treatment of private standards that can be followed to varying degrees: carve out regulatory space to accommodate private standards, challenge the legitimacy of private standards and work to abate the consequences of private standards. Each of these approaches if adopted has implications for the major stakeholders and for the global food supply chain that need to be carefully weighed.

• *Carve out regulatory space*

The first approach is to adopt the norm that regulatory space should be carved out so that private standards can be adopted, promoted and applied outside the direct purview of the WTO disciplines – the SPS and TBT agreements[42]. Support for this approach is based on a positive view towards private standards – a belief that standards make food safer, provide unique market-access opportunities for producers, respond to consumer preferences and help resolve environmental and labor issues. This positive view is bolstered by the recent proliferation of such standards in the global food sector and the proliferation of uncontrolled private certification services that do not always perform ethically or efficiently.

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[42] See Steve Bernstein and Erin Hannah, Non-State Global Standard Setting and the WTO: Legitimacy and the Need for Regulatory Space, 11 J. Econ. Int'l L. 575 (2008).

In addition to this positive view, support for private standards rests on the fundamental belief that the SPS and TBT agreements as currently formulated do not prevent private standards. Furthermore, there is a view that these agreements and the WTO legitimacy is at risk if legal challenges are lodged against private standards. The notion is that the attempt to gain recognition for private standards as legitimate and relevant international standards is likely to succeed and will pose even more serious challenges to the international trade regime, unless regulatory space is created[43].

In a similar vein, this approach also reinforces the view that WTO members should ensure that the trade regime leaves transnational regulatory space for private standard setting rather than try to create additional rules on what standards to accept. The idea is that the WTO is not the appropriate body to develop social and environmental standards because these standards are outside the competency of the WTO. When the WTO tries to address these issues, it engenders conflict and challenge to its legitimacy[44].

• *Challenge the legitimacy of private standards*

A second approach is to challenge the legitimacy of private standards themselves under the SPS and TBT agreements. This approach is based on a negative view of private standards – a belief that standards exact burdens and costs on developing countries, impose trade barriers and violate the spirit and intent of the SPS and TBT agreements. This view is espoused in the responses to the questionnaire that the Secretariat of the SPS Committee circulated among its Members showing that "some respondents were categorical that private standards could not facilitate compliance with international standards," and that "[a] number of Members [were of the opinion] that there was no evidence that private standards contributed to the compliance of official SPS requirements, and it was noted that most private standards did not correctly address SPS issues[45]." This position advocates a strictly public approach to food standards on the basis of the international standards identified in the SPS and TBT agreements. It also implies that any conflict or overlap between applicable public and private standards should result in the former trumping the latter.

A challenge to the legitimacy of private standards advances two possibilities. First is to attempt to compel Members to discharge their affirmative obligations under the SPS and TBT agreements. As already noted, under the terms of the agreements this would be difficult. The definitional ambiguity of "non-government entities"

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[43] See id.
[44] See id.
[45] G/SPS/W/230, supra note 11.

and "reasonable measures" make it difficult to create clear affirmative obligations under the SPS and TBT agreements towards private standards.

The second possibility is to enlarge the scope of the jurisdiction of the SPS and TBT agreements. This requires amending the SPS and TBT agreements to clarify obligations of Members to non-government entities. The procedure for amending the agreements is found in Annex 1A to the Agreement Establishing the WTO. The provisions in the Annex provide that to amend the SPS or TBT agreements would need to be submitted to the WTO Ministerial Conference, which would then submit the proposed amendment to the WTO Membership for discussion and possible acceptance. Article X of the WTO Charter describes which majorities are needed for a formal amendment. In practice, the procedure to follow and the majorities to be reached clearly indicate that amendments to the WTO Agreements are difficult to achieve. This approach would require a majority agreement as to the obligations of Members towards private standards. The diverging views of private standards by different groups of countries would make it difficult to reach a consensus on how and to what extent to amend the SPS and TBT agreements.

- ***Steps to abate the consequences***

A third approach is to take steps to abate the consequences of private standards. This approach can be followed independently or in connection with either of the other two approaches. In other words, it may be that this approach is adopted regardless of whether regulatory space is carved out for private standards or whether a strategy of challenging private standards is employed.

This approach could be based upon a pragmatic view that while private standards generate unintended consequences that are quite serious especially in developing countries, they are here to stay and some of them have some redeeming value, particularly for consumers in developed countries. The approach would be intended to determine a reasonable role of private standards while at the same time creating accountability and taking steps to abate the undesirable consequences. In this way, private sector standards have a complementary role to public, official standards.

Alternatively, this approach can be based upon a view that private standards should be challenged – directly under current SPS and TBT rules or by enlarging the scope of jurisdiction of these agreements by amendment – but that such a challenge will take time and exact costs such that efforts will still be needed to abate the consequences of private standards.

Whatever the rationale, a practical approach of implementing steps to abate consequences and create accountability can be both a short-term and long-term solution to issues raised by private standards. If implemented soon enough, these steps will address some of the most pressing concerns and allow for more time to

gather data and the gradual building towards a long-term consensus. The steps can also incorporate the beginnings of a long-term strategy itself in the dealing with consequences in the event that private standards continue to proliferate in the future. This approach is also consistent with the multi-track path recently advocated by the Secretariat of the SPS Committee.

   Although not exhaustive, the following ideas and concepts are illustrative of the steps that could be taken to abate the unintended consequences to developing countries and to build accountability:

• Develop and hold workshops to coordinate private and government bodies involved in the standard-setting for the global food system. This will help the work of international public- and private-setting bodies – Codex, OIE, IPPC and ISO – to be coordinated so producers can discern more easily emerging standards. The Codex trust fund is an excellent example of steps that can be taken.

• Form a joint committee or consultative group across public standards agencies and private standards-setting bodies to examine ways to enhance coherence, harmonization and transparency.

• Develop and hold regional conferences and training to private standards and to encourage interaction with public agencies, transparency and harmonization. These conferences and training could be developed and sponsored in concert by public and private bodies. The training could include i) assist countries in the development of national legislation and standards and conformity assessment bodies that comport with the procedures approved by target markets; and ii) strengthen the implementation of the Code of Good Practice and the notification of standards.

• Develop social responsibility values that could be incorporated by food companies in connection with private standards. Voluntary social responsibility statements could show a public acknowledgement by food companies of the importance of connecting private standards to consequences and educate consumers on the need to balance concerns of food safety and social ethics with ensuring the viability of small farmers in developing countries. It may also be an opportunity to showcase the importance of small farmers in developing countries to the global economy as well as the quality and safety of the global food supply.

• Solicit a commitment by the private sector to provide information, financial aid and technical support to small farms. So far companies and industry bodies that set standards have been reluctant to provide financial support to help small farmers meet the standards they have created. However, they could become

more amenable to such support if the expected reduction in food surpluses shifts the bargaining power back to producers in the future.

• Encourage private standard-setting bodies to establish mechanisms to address the concerns of farmers, in particular smallholders. This approach is already being applied by some private standardization schemes. GlobalGAP has for example developed a "Smallholder Involvement" program, which allows for small producers to obtain "group certification" of their product in order to spread the costs of the procedure[46] and to convey their concerns to its technical committees.

• Build through forums, conference, workshops and other interactive platforms scientific knowledge about standards. Science could help determine the impact of the standards and the actual effects of standards on animal welfare and sustainable agriculture. This will provide some measure of accountability and rationale for certain private standards that fall outside the SPS agreement.
• Explore how to enhance the supervision of certification bodies. The supervision of the performance of certification bodies as well as the work of accreditation bodies should be strengthened. Standards could be developed to monitor the training and activities of certifiers.

• Find alternatives to certification that could make it more practical and affordable for small-scale producers while ensuring equivalent assurance outcomes.

• Establish an independent adjudicatory body to allow concerned stake-holders to challenge the relevance of a standard before an independent body. This body could be the WTO Dispute Settlement Body or another independent body.

• Develop a clearinghouse or database for information concerning private standards, emerging issues, harmonization efforts and other relevant information germane to the role of private standards in the global food sector. The source could be objective and complement the efforts by the SPS Committee and other interested bodies.

4.2 Likely implications of an agreement on the development of private standards?

Reaching a consensus on an approach and the overall development of private standards would allow the global food sector to galvanize around key concepts, preserve trade and deal with the issues of private standards. To this end, it is helpful to assess the positive and negative implications for each approach. Some of the

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[46] See GLOBALG.A.P. Smallholder Involvement at http://www.globalgap.org/cms/font_content

implications are far-reaching and should be considered carefully before an approach is adopted.

4.2.1 Carving out regulatory space

Carving out regulatory space for private standards would legitimize private standards as having a defined role in the global marketplace. Although this could encourage additional private-standard making, it is doubtful this would happen. Retailers do not make private standards because they believe they have permission; rather, the decision by retailers to develop and use private standards is driven by market factors.

There are a series of potentially negative implications to this approach. Legitimizing private standards could institutionalize the costs and burdens that private standards impose on developing countries. It may also devalue to some extent the integrity of the SPS/TBT construct, as for now it is recognized as the sole occupier of the regulation of food product for WTO Members. Legitimizing the adoption of standards that do not have a science basis is troubling and may undermine the one objective basis upon which food standards rest. It would also be difficult to determine the boundaries of this regulatory space.

4.2.2 Challenging private standards

Challenging private standards would allow those who strongly oppose them to test the parameters of the SPS and TBT agreements application to private standards. Even if successful, however, a legal challenge is expensive and time-consuming and likely would not lead to a definitive result. On the other hand, if the scope of jurisdiction of the SPS and TBT agreements is enlarged the legal questions of enforcement would be satisfied.

The consequences of an unsuccessful challenge, however, could undermine the WTO's legitimacy. Private standards are already gaining legitimacy and support and are not likely to disappear quietly. Some standards tap into increasing social and environmental concerns in both developed and developing countries where sustainable development and human rights are the focus. Concerted efforts by private-standards governance systems are likely to succeed, which could pose a serious challenge to the reputation and presence of the international food trade regime.

4.2.3 Steps to abate consequences

Taking steps to abate the consequences of private standards is likely to have the support of most stakeholders, albeit to various degrees. An agreement on the development of private standards that is based on a coordinated approach that

allows for direct involvement of developing countries will allow for Members and constituencies to focus on solving unintended consequences through practical devices. Many of these steps are already being considered by the SPS Committee through its current multi-track approach.

Another implication is that this role moves intergovernmental standard setting bodies from a role of making prescription legislation to a "facilitator" of regulations set by public or private actors. This permits capitalizing on the positive effects of private standards while taking measures to correct their shortcomings. It also abates some of the consequences of private standards while a long-term consensus for addressing private standards is developed.

A possible negative implication of the "facilitator" role for public bodies is there may be a point where the collaboration turns into the endorsement of private standards. This further "blurring" of public and private standards could compound the definitional problems confronting interpretation of the SPS and TBT agreements and their application to private standard-setting. It could also trigger the application of these agreements' obligations of Members towards non-government entities. Such additional blurring could further undermine and damage the reputation of the entire public standard-setting construct and the role of intergovernmental standard setting bodies. Ironically, these last two implications are some of the very consequences that this approach is designed to prevent.

4.3   What role for intergovernmental standard setting bodies?

Putting aside concerns over implications, it is clear that intergovernmental standard setting bodies should focus on involving the developing countries. Developing countries need to have their voice heard in the private standard area. This includes being involved in the application and development of private standards, as in the case of the Africa Observer Project, supported by GLOBALGAP, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and UK Department for International Development (DFID) through participation in National Technical Working Groups and funding for innovative activities[47].

It would also be prudent for intergovernmental bodies to work with private standard-setting entities in two different, but important ways. The first is to open a dialogue with private standard-setters. There is information that can be gained from them and intergovernmental bodies should find platforms for sharing of information and talking and incorporate the steps suggested in this paper to build bridges. It should be recognized that the closeness of private standard-setting bodies to the global food market has allowed them to establish dynamic procedures

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[47] See Johannes Kern Presentation, WTO June 26, 2008 Report.

for establishment, modification and implementation of standards, making the standards adaptable to new circumstances in the market.

The second way is while appreciating the market responsiveness of private standards, intergovernmental standard setting bodies should be cognizant of how private standards affect trade. It may be that retailers are not really aware of specific problems that private standards are causing developing countries; the consequences are unintended. These intergovernmental bodies could sensitize the supermarkets to specific concerns and help build initiatives and social responsibility standards to be followed by food companies in the implementation of private standards, as advocated in this paper as a possible positive step.

Another important role that should not be lost in the focus on private standards is for intergovernmental standard-setting bodies to improve continually their efficiency and legitimacy. Codex has been recognized as "one of the finer achievements of the twentieth century[48]." It along with OIE is the axis upon which the SPS agreement relies upon as the traditional government standard-bearer for food. The proliferation of private standards may, however, create an impression that Codex and OIE are out of touch with the new world market realities and question the suitability of the SPS model with these public bodies as the standard-setters. It is incumbent therefore for intergovernmental standard-setting bodies to articulate their role and to continue to improve their performance. Notwithstanding the emergence of private standards, it is and always will be critical for the long-term viability of safe and quality food in the global market for public institutions such as Codex and OIE to take the leadership in transparent, non-discriminatory and science-based standards setting and in the involvement of developing countries.

4.4 Is multilateral monitoring of private standards desirable and feasible?

The concept of monitoring private entities through the WTO is problematic. As pointed out in the UK sponsored report, WTO agreements do not produce direct effect[49]. In other words, the WTO is neutral as to the direct effect of its rules, leaving to its members to decide on the effects of the WTO agreements in their national legal orders. For example, as a result of the Uruguay Round, the EC and the U.S. prevented the invocation of WTO rules by denying the direct effect in their respective ratification acts.

Some level of monitoring via the rendering of interpretative guidance, such as in the form of ad hoc decisions by the SPS Committee, could provide some monitoring guidance for Members, at least to the extent of their obligations under Article 13 of the SPS agreement. For that matter, it could define "non-government entity"

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[48] Codex, Understanding the Codex Alimentarius.
[49] G/SPS/GEN/802, supra note 8.

and give guidance as to what degree of government involvement is necessary to measure their application. While this approach would provide helpful clarification, it may be difficult to accomplish, given the divisiveness of country attitudes towards private standards.

It is likely that an informal multilateral monitoring role is more feasible, along the lines of what has been suggested in this paper as possible steps to abate the consequences of private standards. As the steps imply, this informal multilateral monitoring role would require partnershipping between public bodies and private standard-setters. It would need to be a pragmatic approach with communication and education as a focus.

4.5 What role for trade policy?

In the course of building a consensus for dealing with private standards in the global marketplace, it is important not to lose sight of the role of trade policy. It is important to keep in mind that the SPS agreement is in essence a trade agreement, not a food safety agreement. It seeks to apply the WTO trade rules to the trade in food products, and to harmonize food safety regulations in order to lower trade barriers on food products resulting from those regulations.

Regardless of the long-term role of private standards, the elimination of trade barriers should continue to be the guide for the multilateral response to private standards. The purpose of the rules of international trade is to facilitate trade among countries and to reduce as much as possible the barriers that inhibit the circulation of goods and services between national markets[50]. Food products are the mostly widely traded goods worldwide and their export accounts for a very large share of many countries' gross domestic product. It is therefore vitally important that food products can be traded widely and easily throughout the world. As the number of dominant actors in the food sector has lately been reduced to a small group of powerful producing wholesaling or retailing multinational corporations, efforts should be made continuously to account for whatever extent these privately developed standards impact on the ability of a product to reach markets. If private standards for food safety represent barriers to the trading of food products, they run counter to international trade policy and this view should not be lost in the effort to manage the emerging private/public food trade regulatory construct.

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Looking ahead to 2050:

Evolution of agricultural trade policies

Tim Josling [1]

1. Introduction

The past four decades have seen remarkable developments in agricultural trade and in the policies and institutions that provide the environment for that trade. Agricultural trade has moved from being dominated by the purchase of raw materials from land-rich countries and those blessed with tropical climates to a complex network of marketing chains supplying food and other farm products to all corners of the world. The multilateral trade rules have evolved from informal codes of conduct for manufactured goods that had little impact on agricultural trade to a treaty-based agreement that determines in what form and by how much governments can intervene in agricultural markets at home and at the border. The regional trade rules that have been adopted in an explosion of preferential agreements also increasingly apply to agricultural and food trade, leading to a partial polarization of trade around several major markets.

The task of this chapter is to discuss future trends in agricultural and food trade policies. How are the institutions, domestic, regional or multilateral, likely to evolve over the next forty years? Will the emphasis be on consolidation of progress already made? Will globalization reach its ultimate endpoint of a borderless market for agricultural and food products with consumer choice determining trade flows

along with the cool logic of sourcing from low-cost suppliers? Or are we likely to see trade evolve in different directions? Will we see a resurgence of national concerns for food security and a corresponding emphasis on producing food in places close to consumers? Will the pace of policy reform be slowed or halted by a reconsideration of the implications of a global marketplace for small farmers that are unable to participate fully? Or will climate change and environmental concerns lead to priorities for the food system that conflict with the low-cost consumer driven model? Or will the present mixed system of trade rules and trade patterns continue, as a way of gaining at least some benefit from trade while at the same time controlling the social and political ramifications of such trade flows?

The approach taken in this chapter is to consider the future in the context of the changes over the past forty years. Consequently, the first section looks at the period from the mid-sixties to the mid-nineties, by which time the Uruguay Round rules were in place and discussions of a "next step" were being initiated. The second section details the issues that have arisen in the current Doha Round of trade negotiations which give a rich picture of the present tensions and trends in this area. The section also looks at the recent developments in the area of regional and bilateral trade pacts A third section steps back to look at some emerging developments in agriculture and in the economy that will influence the discussion of trade policy in the coming decades. A short concluding section summarizes the possible future for the agricultural and food trade system.

2. The Evolution of Agricultural Trade Rules: 1963-1994

The current trade system, for both goods and services, is a mix between two regimes: one based on multilateral and the other on regional or bilateral trade arrangements[2]. Agricultural trade is an integral part of this complex trade system, though with rules that differ in certain respects from those for manufactured trade. This section discusses the evolution of this mixed system for regulating trade and the role of agriculture within it. This will entail a brief discussion of the treatment of agriculture in the GATT, and the incorporation of agriculture within the GATT rules in the Uruguay Round. It will also include an overview of the place of agricultural trade in the regional and bilateral trade agreements that make up the other part of the trade system. Both are reflections of the agricultural policies and programs of the major trading countries: these policies have evolved in tandem with the trade rules.

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[2] The same holds true for intellectual property protection and for regulatory cooperation. Dispute settlement procedures related to trade also operate at the multilateral and the regional level.

2.1   The Multilateral Trade System

A convenient starting point for a retrospective assessment of the development of the current trade system is the Kennedy Round, which was initiated in 1963 and completed in 1967. Trade policy in the decades after the Second World War had been dominated by the transatlantic relationship, and in many ways reflected the state of political conflict or comity in that relationship. The US and the UK had built up, in the GATT, a pragmatic political instrument that allowed an impressive expansion of trade while at the same time respecting domestic political constraints (Barton, *et al.* 2006). New nations emerged as a result of gaining independence from the European colonial powers. The GATT recognized that these historic ties had to be accommodated both by allowing easy entry to the "trading club" and by recognizing the new trading agreements that replaced the commercial links that had formed the basis for the colonial trade system. Moreover, the war-torn countries of western Europe were encouraged to develop their own political integration based on a strong internal trade system as a buffer against the spread of political or economic influence from the Soviet Union. By the early 1960s this project was well in hand and the European Economic Community was ready to develop its external policies.

The Kennedy Round was a major political attempt to develop a strong multilateral framework for containing the potentially divergent commercial interests of the transatlantic partners. It proved to be a largely successful attempt to reduce tariffs across the board for manufactures, to counter the external impact of the establishment of the European Economic Community, and to incorporate the countries emerging from colonial rule into a global trade system. Earlier rounds had been focused on such issues as the conversion of quantitative restrictions on manufactured trade into tariffs. The negotiating technique used was for the principal supplier of a product to request the removal of a trade barrier and in turn offer some "concession" in the form of improved market access to its own market. The Dillon Round, which immediately preceded the Kennedy Round, showed up the difficulties of expanding this modality to a wide range of products: that Round ended with virtually no progress in liberalizing manufactured trade. By contrast, the Kennedy Round reduced tariffs for manufactured goods by almost one-half.

Agricultural trade lagged far behind in the process of multilateral integration. The GATT, as it emerged in 1947, applied to agricultural trade but also included two articles that specifically modified the impact of the general provisions relating to trade in goods. Article XI, which established the principle that non-tariff trade barriers could be only be used under specific circumstances, made way for some types of agricultural programmes. The article recognized the case where an agricultural product is subject to quantitative restrictions on domestic production (Article XI:2 (c)): under such circumstances quantitative import restrictions were allowed (Josling, Tangermann and Warley, 1996). Many countries relied on this clause to restrict

imports by quantitative trade barriers when domestic markets were being managed. The other agricultural "exception" was to specify different rules for export subsidies of manufactures and primary products. Though the original GATT subjected both primary and manufactured product export subsides to the same notification and consultation procedures, in 1955 it was agreed to add an explicit prohibition on export subsidies on manufactured goods (Article XVI). Agricultural export subsidies were constrained only by the obligation not to use such subsidies to capture "more than an equitable share" of world markets. Successive GATT panels failed to come up with a satisfactory definition of this concept, and agricultural export subsidies in effect escaped any disciplines (Josling and Tangermann, 2002)[3].

The Kennedy Round had failed to introduce rules for agricultural trade that would constrain the domestic subsidies of the EU and the US. Instead, the discussion on agriculture focused on the setting up of commodity agreements that would coordinate the reaction of governments to high and low prices. The EU wished at one stage to go further, projecting its new market management regime onto the international stage, a convenient mixture of pragmatism and ideology. One such commodity agreement did emerge from the Kennedy Round, but it failed to stop the slide in the international prices of agricultural commodities caused in large part by the generous domestic price support policies of the US and the EU.

The Tokyo Round, initiated in 1974 and concluded in 1979, did not do much better for agricultural trade. Coming at a time when world prices were high the emphasis was on coordinating stockpiles of basic foodstuffs rather than in reducing support levels and trade barriers[4]. A further international commodity agreement was negotiated, but barely survived the end of the Round. A plurilateral subsidies code (applicable only to the signatories) was agreed, as was one on standards. A dairy agreement and a bovine meat accord attempted to address some of the problems in these sectors but had little impact on the behavior of the developed country governments and the direction of their domestic policies.

The fundamental weakness in these approaches was recognized and discussed in two Committees: the Trade and Agriculture Committee of the GATT (1982) and the combined Agricultural and Trade Committees of the OECD (1984), acting under a mandate from the ministers. The GATT Committee discussed ways in

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[3] Even these two exceptions did not constrain farm policy in developed countries. A prominent example of this was the imposition of quotas by the US under Section 22 of the Agricultural Adjustment Act (as amended) that mandated quantitative restrictions on imports of a number of goods whenever domestic programs were "materially interfered with" by imports. This required a waiver of the US obligations under Article XI, a waiver that was renewed annually until made irrelevant by the Uruguay Round outcome. The EU also avoided restraints on its Common Agricultural Policy (CAP), which used "variable levies" to stabilize the duty-paid price of imports. Such an instrument was not easily classified as either a customs duty or a quantitative restriction. The Uruguay Round Agreement on Agriculture specifically bans such variable levies.

[4] An exception to this was the successful removal of many of Japan's quantitative restrictions on imports.

which the agricultural rules could be brought more into line with those for trade in manufactured goods. This included the notion that non-tariff barriers be converted into tariffs. Though no agreement was reached at that time, many of the ideas of the Committee found their way into the Uruguay Round discussions. The OECD Committee took a different approach, requesting from the Secretariat credible information on the extent to which domestic policies gave incentives to production (and reduced consumption) and hence had an effect on trade. The Secretariat calculated two indicators, the Producer Subsidy Equivalent and the Consumer Subsidy Equivalent, and provided the basis for a more intensive and focused debate in the Uruguay Round on the disciplines that could be applied to domestic support.

In 1986 the GATT launched the Uruguay Round of trade negotiations. The Round marked a transition of the multilateral trade system from a limited intergovernmental agreement on rules of conduct for trade in goods to a more comprehensive treaty covering trade in services and trade-related aspects of intellectual property protection as well as goods trade. It set up a secretariat to assist members in their application of the rules and established a dispute settlement system that could ensure that the broader rules were respected and interpreted in an agreed manner. All members undertook the full set of obligations (the "single undertaking") though the rules themselves allow for limited differentiation by development status ("special and differential treatment" for developing countries). Membership expanded during the Round and 108 countries signed the Marrakesh Treaty in 1994 that set up the WTO.

In addition to the broadening of the multilateral trade rules, further deepening also took place. Two issues were addressed: the consolidation of the Tokyo Round Codes (that had been set up as plurilateral agreements that countries could sign if they chose) and the absorption of agricultural and textiles into the mainstream of the trade system. The issues of agriculture and textiles were considered to be an important part of the agenda for developing countries, balancing negotiations over services and intellectual property that favored developed countries.

The Agreement on Agriculture (URAA) marked a turning point in the treatment of agricultural goods in the multilateral trade system. The URAA introduced effective disciplines on agricultural trade by establishing special rules. A tariffs-only regime was installed but a special safeguard for agriculture and the establishment of tariff rate quotas (TRQs) were allowed in those cases where tariffs replaced quantitative restrictions. The URAA banned new export subsidies and limited existing export subsidies but did not eliminate them. Thus special agricultural rules still apply in this area, though the number of countries that use such subsidies is small. The URAA disciplined domestic subsidies but classified them differently from the SCM and therefore set up an apparently parallel set of criteria for judging the trade impact of such measures. Institutional innovations, such as the establishment of the Agriculture Committee, have had success in providing greater transparency.

2.2 The Preferential Trade Systems

Over the period from the Kennedy Round to the Uruguay Round, parallel trade discussions were proceeding at a regional and bilateral level. The European Union led the way, with the agreement on the shape of the Common Agricultural Policy (CAP) in 1962 representing an attempt to develop at a regional level the market regulations for farm products that had existed in all members. By 1967 the six countries of the EEC had moved to common prices for the major products under a common regime of import levies and export subsidies at the border and intervention to take surpluses off the domestic market. In 1973 the UK, the largest import market for foodstuffs in Europe, joined the EEC along with Denmark and Ireland. Enlargement to include the Southern European countries took place in the 1980s, so that by the time of the Uruguay Round the EU had twelve members and the CAP was the most significant (and controversial) agricultural trade system in the global economy[5].

In 1960 the countries of South America attempted to borrow from the European experience and set up a Latin America Free Trade Area (LAFTA) that encompassed most of the countries of the region[6]. The model of open trade was however constrained by the economic paradigm of import substitution industrialization that involved high protection for domestic sectors that could reduce dependence on imports from the industrial countries. Agriculture was seen as low on the list of priorities for such treatment and was generally omitted from trade agreements in the region. The Caribbean countries that had gained their independence over this period formed a free trade area (CARIFTA) that has developed over time to become the Caribbean Community. The nature of the trade agreements in the Latin American and Caribbean region shifted sharply in the mid-1980s, as country after country abandoned the import substitution model in favor of an opening of the economy to competition through low tariff barriers and less government intervention in markets. By the time of the Uruguay Round the prevailing economic paradigm was moving decisively in the direction of lower trade barriers, whether negotiated in multilateral or regional agreements or decided unilaterally. Moreover, the incorporation of agricultural trade in these agreements had begun, though with exceptions for particularly sensitive products.

In Africa a number of post-colonial free trade areas were formed, though they did not address issues with respect to the main trade flows between these countries and the European market. These trade relations developed under the auspices of

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[5] Countries that had stayed outside the EEC formed a less comprehensive free trade area (the European Free Trade Association) that excluded agriculture and fisheries from its operations.

[6] The countries of Central America had established a Central American Common Market in 1958, though political tensions among the members limited its effectiveness.

the EU, as a series of non-reciprocal preferential trade pacts, culminating in the Lomé agreements. The goal of an African Economic Union has been espoused over the years. The reality, at least for agriculture, is that trade has not expanded along with the growth of RTAs. Internal African food trade has been hampered by all manner of problems from political conflicts to inadequate roads.

Asia was left far behind in the development of regional trade agreements: the one major regional initiative, the Association of South East Asian Nations (ASEAN), was set up mainly for political and security reasons and economic integration (through the ASEAN Free Trade Agreement) emerged as an afterthought.

The parallel development of regional and multilateral trade systems was exemplified by the discussions among the US, Canada and Mexico leading up to the North American Free Trade Agreement (NAFTA) in 1992. The US had negotiated a free trade agreement with Canada (CUSFTA) in 1986 (at the start of the Uruguay Round) and much of the content and language of the CUSFTA found its way into the GATT drafts. In 1990, Mexico decided that access to the US was essential to its own development, and sought a free trade area with the US. The US discarded its reluctance to enter into regional and bilateral agreements in the mid 1980s, and had entered into agreements of a non-reciprocal kind with the countries of the Caribbean Basin and of the Andean Pact. Discussions with the countries of the Pacific Rim in the context of the Asia-Pacific Economic Cooperation process (APEC) seemed to confirm the change of trade policy in the US, and is said to have contributed to the conclusion of the Uruguay Round.

2.3 Treatment of agriculture in RTAs

Agricultural trade is regarded as a sub-category of trade in goods for the purposes of bilateral, regional and multilateral trade agreements (Josling, 2009). But in virtually all such agreements it is subject to special treatment. This treatment in bilateral and regional trade agreements can range from exclusion from the schedule of tariff reductions to import restrictions by quota over a transition period, and often includes specific safeguards and new institutions such as committees to which problems can be referred.

How have sensitive sectors of agriculture been protected from competition from regional and bilateral partners? A review of the various ways that agriculture has been treated shows that this is most often done by quantitative restrictions on imports. On some occasions the sensitive sector is excluded altogether. More frequently, the tariff on imports from partners is reduced more slowly than that for other goods. But even in with this special treatment regional and bilateral trade agreements are slowly constraining the ability of governments to maintain a high level of protection for agricultural producers.

One of the issues in evaluating trade agreements for their consistency with WTO rules (specifically with Article XXIV of GATT 1994) is their product coverage. Article XXIV require "substantially all trade" to be covered, and the level of preference to be 100 percent. Though there has as yet been no agreement on the interpretation of "substantially all trade," agriculture is the sector most often excluded or treated differently. Manufactures are far more likely to benefit from tariff reductions in RTAs than are agricultural goods. On the other hand, the prospect of competing exporters challenging the exclusion of agriculture in an RTA is remote: they benefit from the exclusion. And exporters within the RTA have implicitly agreed to the exclusion, and would be reluctant to make a challenge against a partner in respect to mutually agreed decisions.

3. The Doha Round and the Current Agricultural Trade Policy Environment

In the period since the Uruguay Round the multilateral trade system has consolidated its rule-based approach enshrined in the Marrakesh Treaty. But significant discontent among both trade officials and the general public began to surface in 1996, after the first of the biennial Ministerial Meetings of the WTO. Though the Singapore Ministerial remains a high-point of the WTO, the twin issues of the "reach" of the WTO into new areas related to trade and the relative lack of "voice" by most developing countries in the decision making structure began to surface. In Seattle, in 1999, the attempt to launch a new Round of talks failed in a humiliating fashion. The momentum of the Uruguay Round was replaced with the need to build consensus and confidence among the members. Meanwhile, the negotiation of regional and bilateral trade agreement continued apace.

3.1 The Doha Round

The current discussions in the WTO about further reform of the trade system can be thought of as both a follow-up from the Uruguay Round and as an attempt to shift the agenda. The agenda-shift was in response to the demands by developing countries that the Doha Development Agenda (Doha Round) would encourage and facilitate development and if possible remove some of the impacts of asymmetry in the operation of the trade system. The Doha Round includes talks on agriculture, services and non-agricultural market access (NAMA) as well as on trade facilitation. Progress in all areas is needed for a successful conclusion, and the slow pace of the agricultural component has prevented agreement in the other areas.

Trade negotiations of this complexity and importance are commonly a long-drawn-out process of exploring possible approaches. Member governments agree to deadlines to give structure and urgency to the process, but often find agreement difficult when the deadline arrives. The early phase of the talks was marked by a large number of submissions on the way in which the agricultural

talks might be focused, as well as specific comments on particular items of interest. The incorporation of the agricultural talks in the Doha Round increased the scope for trade-off and for an ambitious outcome. The Doha Ministerial was followed by a period of more intense negotiation, but not an agreed framework. Such a framework eventually emerged in August 2004, and led to an attempt to agree on modalities by the time of the Sixth Ministerial in Hong Kong. It proved impossible to agree on the framework before the Ministerial, but at Hong Kong a timetable was agreed that would allow the Round to be concluded with expedition. Modalities were to be agreed by 30 April 2006 to allow for compilation of draft schedules of tariff and subsidy reductions. Members would aim to reach final agreement on the modalities and schedules by 31 July 2006, so as to complete the Round before the US Trade Promotion Authority expired in June 2007.

These deadlines proved to be optimistic, and the Round was suspended in July 2006 to give negotiators time to reassess the situation. Negotiations started up again in January 2007, and by July a Framework was agreed. In early 2008 talks began coalescing about draft documents circulated by the Chairman of the Agricultural negotiating committee and a mini-ministerial in July 2008 pushed resolutely toward an agreed modalities document. This agreement proved elusive, though a compromise had emerged on most of the issues. The process is currently in limbo, waiting for a decision by the major countries to resolve the differences that remain.

The importance of the Doha Round to agricultural trade policy is hard to overstate. The final elimination of export subsidies would be a major step, and the pegging of trade distorting support at a relatively low level would prevent a shift backwards in policy reform. Cutting bound tariffs by over one-half would begin to bring border protection levels in agriculture more into line with non-agricultural tariffs. However, the main sticking point is now the degree of flexibility that countries will have to protect particular sectors against import surges[7]. It is proving a striking demonstration of the diverging interests of the major negotiating parties in the Doha Round. It is tempting to interpret the meaning of these positions as indicating the future evolution of agricultural trade policies. If the reluctance of major developing countries to further liberalize the imports of special and sensitive products proves to be the cause for the collapse of the Doha Round then that bodes ill for future trade liberalization.

3.2 Regionalism in the Doha and post-Doha world

The decade after the Uruguay Round saw a resurgence in the number of regional and bilateral free trade areas. There appears to be no slowing down of the interest

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[7] The Mini-Ministerial held in Geneva at the end of July 2008 broke up when the negotiation over the Special Safeguard Mechanism (SSM) reached stalemate. Most other agricultural issues were within reach of an agreement. However, the negotiations did not address the difficult issue of deeper cuts in cotton subsidies.

in these preferential trade agreements. Indeed, that has, along with continued unilateral trade liberalization, been the major activity in the area of trade policy. Some 200 regional and bilateral trade agreements have been notified to the WTO, many of them since 1995. Almost every country is a member of a regional or preferential trade pact, and most countries are members of two or more such agreements.

The EU has been active in forging a foreign commercial policy around the twin notions of negotiating at the multilateral level and at the same time pursuing regional pacts. Access to the large domestic market is a tempting target for foreign governments and the EU has found no lack of takers. But the driving force behind the EU's trade policy is overseas development. Traditionally, the EU has used the policy of unilateral trade preferences as a strategy of co-operation for development. Europe-Mediterranean agreements take further steps for trade liberalization on a bilateral and reciprocal basis. Since the first Euro-Mediterranean Conference in November 1995, the EU and twelve Mediterranean countries have been engaged in negotiating Association Agreements (the Barcelona Process). The overall objective is to form, by 2010, one Euro-Mediterranean free trade area from the separate agreements in place[8].

In the network of agreements involving the EU and non-members, agriculture is still treated as being largely outside the realm of unrestricted free trade. The Euro-Med agreements have so far avoided including unrestricted access for sensitive agricultural products, as does the customs union that was negotiated with Turkey. The negotiation of a free trade agreement between the EU and South Africa was held up by the reluctance of the EU to grant improved access to goods that would have directly competed with those covered by the CAP. The agreement between the EU and Mexico was also difficult to negotiate, until Mexico abandoned its attempt to get easy access for a full range of agricultural products into the EU market.

Similarly, talks between MERCOSUR and the EU are finding it difficult to overcome the problems that improved access to the EU market would seem to pose for European agriculture. The Cotonou agreement between the EU and the African, Caribbean and Pacific countries (ACP), that mandated the negotiation of a change in the existing non-reciprocal agreements into full free trade areas, has attempted to address agricultural trade issues, but these negotiations have also been hampered by inconsistency with the CAP. The trade agreement between the EU and the Least Developed Countries (called the Everything But Arms agreement) broke significant new ground in this respect, by providing duty- and quota-free access for agricultural goods, with only temporary derogations for the most sensitive commodities - rice, sugar and bananas.

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[8] To date, bilateral Association Agreements have been concluded with seven trade partners: Tunisia (1995), Israel (1995), Morocco (1996), Jordan (1997), the Palestinian Authority (1997), Algeria (2001) and Lebanon (2002).

US policy towards regional and bilateral trade agreements changed dramatically in the mid-1980s. Long a champion of the multilateral system, and of non-discrimination, the US has now become an active supporter of bilateral trade agreements as a complement to its commitment to the WTO and its membership of NAFTA. The US has completed, or is currently in the midst of, trade negotiations with 31 other countries aimed at creating about 22 separate Free Trade Areas (FTAs)[9]. The US strategy is to expand its commercial ties with countries for both economic and geopolitical reasons: the attraction to other countries is to secure preferred access to the large US market[10].

The US policy to negotiate bilaterals is an expression of a policy of "competitive liberalization". This policy consisted of offering swift negotiations to any country that was willing to conform to the terms consistent with the mandate of the US Administration as specified in the Trade Promotion Authority. The list of willing trade partners included Singapore, Morocco and Bahrain. Among the other bilateral agreements with a more significant agricultural component were those with Chile and Australia. Talks with Malaysia, Thailand, Panama, Colombia, Ecuador, Bolivia, the South African Customs Union (SACU), Korea, Oman, the United Arab Emirates (UAE) and Peru are in various stages of completion[11]. Recent agreements have often been designed as "templates" for future FTAs within a region. Thus the FTAs with Bahrain, the UAE and Oman are seen as building blocs toward a Middle-East Free Trade Area, and the negotiations with Malaysia and Thailand (along with that already in place with Singapore) are supposed to pave the way for other bilaterals with ASEAN countries.

What agricultural provisions do these US FTAs contain? All of the FTAs have provisions for tariff reductions that affect many food and agricultural goods. However, with few exceptions, the agreements control trade in a range of products considered politically sensitive in one or both partners. For the US these sensitivities include sugar, citrus fruits, peanuts and dairy products, and for the partners the list includes corn and beans along with rice. Three agreements have the most actual or potential impact on US agricultural markets and hence on the environment in which policy is formed: the recent FTAs with Chile and Australia, along with the CAFTA-DR agreement. Currently awaiting ratification is an agreement with Korea (KORUS) which would certainly be of agricultural significance.

In Africa, several new trade agreements have however emerged, not least as a result of the need to negotiate more effectively with outside institutions. Activity

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[9] It is worth recalling that the US trade policy in the late 1930s took a similar direction. The Reciprocal Trade Agreements (RTA) Act was an open-ended mandate to sign bilateral trade agreements with other countries. Some 30 such agreements were signed.

[10] In many cases the access is already covered by existing agreements, but the negotiation of a formal FTA reduces the uncertainty that these preferences will continue.

[11] SACU includes the Republic of South Africa as well as Botswana, Namibia, Lesotho, and Swaziland.

in Latin America revolves around the trade relations with MERCOSUR, now the dominant market in the region – though itself an imperfect customs union. Integration is proceeding slowly in the Mid-East region. The locus for much of the discussion of free trade agreements has for now shifted back to Asia.

A plan for an ASEAN Free Trade Area (AFTA) was agreed by the six governments in 1992, with the objective of eventual free internal trade. However, expansion to include the four less developed economies has delayed realization of the AFTA. Currently the target date for the completion of the free trade area is 2010 for the six more advanced members and 2015 for the remaining four. Though there has been an expansion in agricultural trade, many agricultural goods, foodstuffs and other primary products are still excluded from the planned liberalization. But the ASEAN countries have been important players in agricultural trade discussions. ASEAN countries have been active members of the Cairns Group, the Group of 20 and the Group of 33. They can be expected to continue to push for further trade liberalization at an international level, with an emphasis on maintaining policy flexibility at home. There is no doubt that increased trade among these countries would also be possible if agricultural liberalization were to be fully included in the ASEAN free trade area.

This activity has no doubt acted as a distraction within Commerce Ministries, but it has not been to the obvious disadvantage of the multilateral system. Indeed, the two forms of trade agreement are in many ways synergistic. The challenge is to make use of the synergies and avoid the fragmentation that would raise trade costs and divert trade. One element of this synergy is the extent to which one can include disciplines on domestic farm subsidies in regional and bilateral agreements. It is often assumed that the conduct of domestic policy is outside the realm of the FTAs, but this is not always the case. The movement towards "decoupled" policies, encouraged by the URAA, has the advantage of making it easier to have free trade in a commodity and still maintain domestic support policies. Nevertheless, the existence of an active domestic support policy, involving subsidies and market management, complicates the negotiation of free trade in those products. The issue of domestic policy is clearly connected to that of the inclusion of agriculture in free trade agreements. If one can omit agricultural trade from the FTA provisions then the question of domestic support does not arise. Conversely, if one cannot exclude agriculture without violating WTO provisions, then the potentially problematic issue of domestic support is unavoidable.

Allied to the issue of the application through RTAs of disciplines on domestic support is that of the treatment of export subsidies. Various trade agreements have tried to include provisions that countries may not use export subsidies in mutual trade. This sounds like a logical provision. However, in practice it is not easy to ban subsidies paid on internal trade without creating an incentive to import from outside and a disincentive to export within the free trade area. So in effect export subsidies have also to be controlled at the WTO level.

With WTO talks on agriculture grinding slowly, regional negotiations may, however, take the brunt of attempts to further liberalize agricultural trade and to gain access to new markets for agricultural exports. Thus in agriculture there is a strong degree of complementarity in trade negotiations. Plurilateral talks can erode market access barriers but set up trade flows encouraged by discrimination among suppliers. Multilateral talks can reduce the scope for such trade diversion. The multilateral process can handle subsidy reduction, which in turn makes it easier for countries to agree to opening up regional or bilateral trade. This complementarity, however, depends on progress at the multilateral level. Currently that is the stumbling block.

4. Emerging Developments in Food and Agricultural Sectors that will Shape Future Trade Policies

Trade policy is largely reactive to events and trends. Developments in the markets for agricultural and food products prompt a response from policy makers. The responses may be to change trade rules and that in turn provides the environment for future domestic and policy. More generally, the trade policy space is itself circumscribed by events and attitudes that may have little direct connection with agriculture. The list of such non-agricultural economic and political emerging developments would be long, and so this discussion will be selective. It will focus on ten of the most significant developments that are likely to determine the contours of future agricultural trade policy arrangements. The questions posed in each case are whether one might expect a continuation of these developments, how such a continuation would impact the environment for agricultural trade policy and what might happen if the trends were to prove reversible?

4.1 Continued growth in the global economy

Perhaps the most important determinant of trade policy in general and of agricultural trade policy in particular is the health of the global economy. Continued strong growth in the emerging countries would seem to be a prerequisite for further liberalization of trade. When off-farm jobs are available the improvement in market access for farm products is politically more acceptable and economically more advantageous. Consequently, it is reasonable to assume that steady growth in the world economy, particularly in the developing world, would be a fertile environment for the further liberalization of trade in agricultural products and an eventual convergence between the treatment of agriculture and of non-agricultural goods in multilateral trade rules.

However, the key question is whether such growth brings with it pressures that constrain the opening up of markets. One such impact of growth is on the price of commodities and in particular on the price of oil. Though some agricultural producers will gain from the higher commodity prices, many will find that higher input costs

outweigh any benefit from higher selling prices. Another by-product of growth is its uneven impact on rural-urban income distribution. If the growth is concentrated in urban-based export industries then the political demands for assistance for rural areas will tend to increase. As exchange rates will tend to appreciate in rapid-growth countries, farmers will face growing competition from imported products. So growth brings further pressures on domestic producers to become more efficient or move to non-farm jobs. And the reaction of the government may well be to try to protect rural industries so as to alleviate the pressure for migration.

Perhaps more worrying for the trade system as a whole is the prospect of a serious slowdown in global economic growth, in particular if this accompanied by political tensions or trade disruptions. The scenarios are not too difficult to imagine. Oil supplies are dependent on a small group of countries, many with potentially unstable regimes. Periods of inflation and slow growth in the past have been associated with sharp increases in the price of crude oil. Though the widening base of the world economy has reduced to some extent the vulnerability to economic fluctuations in particular countries there are counter trends stemming from the integration of world financial markets. Indeed, if one looks at a period of four decades ahead, it would be unrealistic to expect the world economy to grow without periodic interruptions. The question is whether the trade system as it has emerged over the period since the Kennedy Round can survive a serious downturn in the global economy that could lead to self-preservation policies that in effect destroy the mechanisms that have been laboriously established. Can the trade system survive another 1930s type depression? Or will one see beggar-thy-neighbor trade policies once again lead to competitive protectionism?

4.2   Continued growth in agricultural output and investment

The recent period of high food prices has brought to the attention of countries the extent to which investments are needed to maintain and increase the capacity of the agricultural sector to meet the demands of a growing population. Expenditure on research has been lagging in recent years, as a result of shifting priorities for public investment and lack of financial incentives for private investment. So one might expect there to be a resurgence of public investment in the production of basic foodstuffs if the price levels stay reasonably high. Complementing this could be an increased interest in infrastructural improvements that are often the constraint on the marketing of local foods in developing countries. In this respect, investments may be driven in part by the phenomenal expansion of supermarkets in most regions of the developing world. The ability for small and medium sized farms to be incorporated into the supply chains of modern food retailing will remain a key to the impact of these trends. This demand-driven growth in agricultural output and productivity will have a beneficial impact on trade and be consistent with a continued opening up of markets, particularly in the developing world. South-south

trade will grow under such conditions to the advantage of the balance in the global economy.

Whether or not public investment in agriculture is increased, the role of the private sector will be crucial in keeping supply in line with demand. It is less clear that private investment be forthcoming in the amounts necessary. The experience of investment in biotechnology, where consumer acceptance has been slow in many parts of the world has undoubtedly had a salutary effect on the attitude of private companies. A critical question for the future is whether the public authorities are likely to become more engaged as a partner in private sector investment in new technologies that are based on genetic advances. The ability to steer the genetic makeup of plants and animals to improve their productivity will certainly exist: the extent to which this ability is translated into products acceptable to consumers is still uncertain. Trade rules play a vital role in such matters. Investment is unlikely to be forthcoming if global markets are fragmented by regulations on biotech and on other scientific approaches to increasing food supplies. Intellectual property rights need to be protected in a way that does not exacerbate income disparities.

The enthusiasm with which new investments in biofuels were made over the past few years stands in sharp contrast to the cautious approach to biotechnology. If oil prices remain high there will be many opportunities that open up for the use of agricultural crops in energy production. But again there is the potential for a backlash from civil society: already the uncertain contribution of biofuels to environmental goals and the undoubted exacerbation by ethanol production of the recent spike in food prices has taken some of the bloom off the biofuels expansion. In this respect, private investment will follow directly from changes in government policy. If the various subsidies and tax breaks for ethanol and biodiesel were to be reduced, along with the mandates for the incorporation of biofuels in transportation requirements, the private sector would find many of its investments unrewarding. Trade rules could help in these circumstances. If these products were more freely traded (and be produced in ways that minimized environmental impacts) the investment in renewable fuels from agricultural biomass could be considerable.

The period since 1985 has seen some major changes in the domestic agricultural policies of the developed countries. Reform started in such countries as New Zealand and Chile with the notion that the government could not artificially provide the demand for farm products in exporting countries in the light of macroeconomic distortions and locational disadvantages. It spread to those countries that were stifling their farm sectors with marketing arrangements that provided little incentive for quality and kept down the price to producers. Together with the paradigm change in the management of the economy, toward deregulation and the provision of incentives, the change in agricultural policies in the 1980s away from market intervention towards direct payments has now transformed the policies and provided a new environment. In the EU this process accelerated over

the 1990s as farm policy shifted to include environmental and quality aspects of food production, culminating in the reforms of 2003 that virtually eliminated for arable agriculture any link between farmer support payments and commodity market conditions. Progress in the US has been less linear, with a move in 1996 to delink payments and production but some recidivism in 2002 and 2008 as commodity-based price support programs proved to have strong support in the farm lobby and in Congress.

So the issue for the next few decades is whether the reform process will continue, so that all developed countries will in essence have rural policies that emphasize land stewardship and rural development, nutrition policies that focus on quality and food safety, and agricultural policies that are aimed specifically at issues of productivity enhancement and risk management. Such a world would be consistent with a more open trade system and the removal of the many impediments that developing countries face in supplying food to the industrial country markets. But reform could become unhinged if attitudes changed perhaps as a result of food shortages and a collapse of world trade. It would not be difficult for those who would prefer the old policies of protection of producers by governmental management of markets to make the case that the "free market" had not worked. And the benefit of keeping the major developed countries moving along the same path, albeit at different speeds, is clear. It would be difficult to imagine an EU following a reform agenda that removed government from involvement in commodity markets if the US were moving in the other direction by increasing that involvement. So this is one area where the backstopping of the multilateral trade system is particularly useful. If the Doha Round continues to languish, or is abandoned altogether, the possibility of the market-oriented reforms of the past twenty years in developed country farm policies being reversed is much increased.

4.3 Continued policy reform in developing countries

The more fundamental question is whether developing countries will follow the same pattern with respect to the protection of domestic markets and producers. Much of the impetus for public intervention in developed country markets came as a reaction to different rates of growth in the agricultural and the non-agricultural sectors. Strong growth in manufactures and services, as indicated above, can put pressure on the government to intervene to help agriculture. But how that help is given, and under what conditions is important.

There are two "models" from which to draw lessons. The first is that of Latin America, that entered the 1980s with considerable protection for its agriculture and highly regulated domestic markets. These countries, often with the support of the World Bank, the InterAmerican Development Bank and the International Monetary Fund began a process of "structural adjustment" that emphasized opening up the agricultural sector along with other parts of the economy. As

a result, applied tariffs even on agricultural products are now relatively low, though the bound rates are often higher. This type of agricultural policy has been conducive to growth of trade and to stronger regional markets. However, the process could always go in reverse: serious income problems in rural areas of Latin America could spur a resurgence of protectionism. A disruption of exports to the US and Europe may be enough to bring two decades of relatively open trade policies to a close.

The second model that may be followed is more typical of Asia, where agricultural trade policy owes more to debates about self-sufficiency and poverty alleviation than about access into the lucrative US market. This has led to an increase in agricultural protection as countries experience rapid economic growth. The pattern has been repeated in several countries since the 1960s, first in Japan then in Korea and now in China and India (Anderson and Hayami, 1986; Anderson Martin, 2008). How the emerging countries manage the stresses of relative agricultural decline will determine the extent to which they will agree to further liberalization in agricultural trade. The stalling of the Doha Round in July 2008 illustrates the problem. The apparent cause of the failure to agree on modalities was the difficulty to fashion a special safeguard mechanism for developing countries that would have allowed them to raise tariffs when world prices fell.

4.4 Variability of prices as a trade issue

Trade policy in agriculture may be as much affected by price variability than the absolute level of prices. If so, then the question to ask is whether we are in for more unstable conditions in trade and global agricultural markets? And, if so, in what way will this impact on trade policy in agriculture? Price volatility is a function in the main of production fluctuations and the level of stocks. Production fluctuations may well increase in the future, as global warming changes weather patterns and makes agriculture marginal in certain regions. More extreme weather events may also be one product of global warming. Stocks would acts to smooth out these fluctuations, but the levels of carryover stocks tend to have been lower in recent years. During a period of low prices the cost of holding stocks increases and the benefit of having those stocks decreases. Neither the private sector nor the public sector has the incentive to hold stocks through these low-price periods. However, as prices rise, the lack of stocks leads to panic buying. The political reaction in exporting countries can also exacerbate price spikes, as export controls and taxes operate to keep supplies at home.

Price instability can undermine the legitimacy of the global market as a place in which countries can buy food supplies on a regular basis and make use of trade to supplement domestic production. Even exporters benefit little from price fluctuations, and will drive prices down when surpluses begin to appear. The WTO rules are currently unbalanced: they spring into action when prices are low but

do little to constrain government action when prices rise. So export subsidies are constrained and tariffs are bound, but export taxes are not limited and export embargoes barely mentioned. The ability of the world trade system to respond in times of price volatility is likely to be tested severely in the future, and some creative institutional arrangements may be needed. This is one area where the regional and bilateral trade arrangements have not attempted to solve these problems. Apart from the CAP (and an ASEAN grain reserve policy) the issue of price stability and stock levels have not been addressed at the regional level[12]. However, free regional trade does help to even out production fluctuations within such areas.

4.5   Continued concern for environmental impacts of agriculture

One issue that was almost entirely absent from the discussion of agricultural policy in the 1960s was the impact of agriculture on the environment. Now it is rapidly becoming an important part of the equation when domestic and international farm policies are being decided. The EU has to a large extent taken the lead on this issue by making farm support payments conditional on good environmental practices. But other countries are following down the path of recasting income support as compensation for environmental stewardship and the provision of public recreational goods. Other environmental issues (beside the biofuel subsidy and biotech questions mentioned above) include the contribution of agriculture and forestry to carbon sequestration and the problems caused by methane emission by livestock.

The impact of this increased concern over environmental issues on the trade system is likely to become more significant in the future. Once the concept of life-cycle analysis of products takes hold in national legislation the differentiation of goods by their method of production becomes inevitable. The trade system is set up to recognize goods by their product attributes not by the process attributes that one needs to evaluate a carbon footprint. So until this disconnect can be resolved, one would expect increasing conflicts over the issue of the environmental impact of the production and processing methods of traded goods.

On the assumption that the trade system can eventually classify goods in a way that allows environmental regulations to coexist with trade rules then the issue becomes whether this will increase or decrease trade in foodstuffs? Increasing product differentiation is generally positive for trade: one could imagine land-rich areas benefiting from the switch in demand for food from more extensive

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[12] Vulnerability to shortages of agricultural products on world markets has always been a concern of ASEAN countries. This aspect of agricultural trade was tackled in 1979, with the establishment of an emergency food stockpile, to which all would in principle contribute and from which each could withdraw in times of need. The initial stockpile consisted of 50,000 tons of rice, a small but useful reserve in times of shortage.

agricultural systems. But this may depend on the environmental impact of transportation services. The effect of, say, carbon taxes on food trade patterns may be to encourage local production at the expense of overseas supplies.

The role of regional and bilateral trade arrangements in reacting to environmental challenges is likely to be limited. Many of the issues are global in scope, and partial trade rules would be inadequate and lead to issues of competitiveness. But at the global level the debate has centered on whether to work purely through environmental institutions or to build environmental considerations into trade rules. The negotiations on the trade in "environmental goods and services" in the current Doha Round suggests that the WTO may become more involved. On the other hand the talks have for now floundered on the definition of environmental goods.

4.6   Continued concentration in the food system

One issue that could complicate the trade picture in the coming decades is the increased dominance of significant parts of world trade in agricultural and food products by a relatively small number of large firms. The main result of this has undoubtedly been to increase efficiency and choice, as consumers in developed countries enjoy the convenience of large grocery stores and a wider array of foodstuffs. Farmers can buy improved seeds and purchase fertilizers and other farm chemicals from distributors with world-wide networks. But a side effect is that corporate decisions can affect millions of farmers and consumers. Concern has grown that concentration of economic power could at some stage constrain rather than empower farmers and consumers.

Much trade in manufactures moves within the same firm, as supply chains lengthen. The same trend is noticeable in food trade, though to a much lesser extent (Grant, *et al*, 2006). In the area of biotech seeds the effect of concentration is most noticeable, and the conflict with the traditional practices of farmers most evident. But the problem is a part of a broader question: should the use (and abuse) of market power in international trade be regulated? Competition policy has been considered as a topic for regulation in the WTO. The Singapore Ministerial identified four new areas that could be ripe for inclusion in the WTO rule structure: investment, government procurement, trade facilitation and competition policy. But at the Cancún Ministerial in 2003 three of these topics were dropped from the agenda, leaving only trade facilitation (customs procedures) to be a part of the Doha Round. Whether and when competition policy will re-emerge remains to be seen.

4.7   Continued provision of consumer-driven food attributes

The main manifestation of globalization of the food sector may have been the establishment of global supply chains: the driving force behind such chains has

been supermarkets and food processors. The consumer has played a willing role in this development. In developed countries the successful attempt to package attributes of health and environmental responsibility with foodstuffs, along with animal welfare and in some cases labor conditions, has transformed the economics of food trade. In developing countries consumers have embraced the availability of non-local foods and the better reliability and quality control that can come with firm size and management expertise.

This has set up some potential conflicts in many respects similar to those related to environmental regulations. Governments negotiated at length to establish the rules for health and safety regulations, contained in the Sanitary and Phytosanitary (SPS) Agreement. This circumscribed the ability of governments to set import standards that were not justified by risk assessment and based on scientific evidence. But consumers in many cases decided that the government and their scientific advisors were underplaying certain subjective risks to health and to the environment. Headline issues such as biotech crops became grist for the competition for market shares among retailers. But this was merely the tip of the iceberg, as private standards tied to particular marketable attributes began to proliferate. The SPS Agreement itself has been useful, particularly in the area of animal and plant diseases, but has not been effective in the area of private standards.

The question that countries will have to face is whether to try to amend the SPS Agreement to allow government regulations to respond to consumer concerns that have not been found to have scientific merit. Exporting countries clearly see this as a possible end to the SPS Agreement as a constraint on governments: who is going to arbitrate on whether subjective fears pass some test of credibility and legitimacy? But in the absence of some sort of solution to this problem the SPS Agreement will increasingly become irrelevant for most food trade. This could be compounded by the adoption of standards related to such longer-term health topics such as obesity. The SPS Agreement relates to regulations governing the safety of foods, but eating too much of a "safe" food can cause health problems. So it is not inconceivable that agencies such as the World Health Organization could find itself advocating policies that are in contradiction to the SPS Agreement.

4.8   Continued integration by regional and bilateral agreements

So how cohesive might the global market be in the future? Will it begin to fragment as more regional and bilateral trade agreements are concluded? Or will these regionals and bilaterals effectively merge to create global free trade?

One emerging trend is a move toward bilaterals with significant trading countries such as Malaysia and Thailand, and large trading powers such as Japan. Any move in this direction by the US would certainly be accompanied by trade agreements between the EU and these countries. It is inconceivable that these mega-agreements

could omit agriculture. A trade agreement between ASEAN and China would certainly have to include agricultural trade. If India and China were to sign a trade agreement, it would be difficult to imaging that it would not also include provisions for expanded agricultural trade.

It is also possible, particularly if the WTO Doha Round is further postponed, that there could be a networking of existing trade agreements (Tovias, 2008, calls these cross-regional agreements). One attempt at this type of regionalism emerged in the mid-1990s as attempts were made to transform existing free trade networks in the Americas into actual supra-regional trade agreements that spanned the continent - the Free Trade Area of the Americas (FTAA). This supra-regional network represents an essentially new way of negotiating reductions in trade barriers. But progress on the FTAA halted when the WTO Round began. But in a post-Doha environment several countries in the region could start the process again.

The FTAA is scheduled to include agricultural products and thus lead toward a single market in the hemisphere. For countries such as Argentina and Brazil, inclusion of agriculture is imperative. Canada, as a proponent of the FTAA, will be confronted with the need to include agriculture despite the domestic sensitivity in some sectors. If such an agreement were to be concluded, improved market access for agricultural products, both US exports to Latin America and their exports to the US, would have to be included. This could have a very significant impact on markets even if domestic policy were not regulated in the FTAA[13]. The pressure for an FTAA may come from a fear of being excluded from emerging markets while competitors get free access. It is likely that the EU will soon conclude an agreement with MERCOSUR that would include preferential access for farm products (though quota controlled for some years). This would put US exporters at a disadvantage in both the EU and the Latin American markets if an FTAA did not materialize. So an FTAA (and possibly even a strengthened Transatlantic trade agreement) may be necessary for the export prospects of several sectors of US agriculture.

4.9   Continued support for the WTO

This all leads to a consideration of the future of the multilateral policy framework for trade and for the WTO in particular. The Commission set up by the University of Warwick to consider the future of the WTO identified several potential weaknesses that will need to be addressed (Warwick Commission, 2007). One is that political support for freer trade, and by implication the WTO, is eroding in the major developed countries. Though none of these countries has hinted of any desire to withdraw from the WTO one could imagine a scenario where some major disagreements erupted

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[13] Mexico and Chile have already signed a number of bilateral (and trilateral) trade agreements with other countries in the region.

over adverse panel reports on (say) ethanol or the extent to which an emerging country (such as China) was living up to its obligations. So one cannot assume that the WTO will necessarily remain in its present form for the next four decades. But if trade grows and economic policy does not turn away from the post-war consensus of "embedded liberalism" then some multilateral institution will still be needed.

Another important task before the WTO is that of effecting a reconciliation with regionalism. This issue has become at the least a serious distraction and at the worst a wholesale repudiation of the principle of multilateralism and non-discrimination on which the WTO is based. But as the same governments that profess support for the WTO negotiate the regional and bilateral agreements, it would be futile to take a confrontational stance. The WTO will have eventually to accept the successes of the regional and bilateral trade agreements and incorporate them into its own activities. Though this may be seen as a weakness in the multilateral structure it would dramatically increase the scope of the negotiating process and the share of world trade that is directly affected by WTO commitments.

5. Summary

What are the main trade policy challenges in the coming decades? As indicated in the previous section, there is a serious problem emerging of governance of a multi-polar trade system. The cosy bigemony of the 1960s, when the US and Europe could define the terms under which trade took place, subject to accepted constraints of domestic political realities, is now long gone. The WTO is suffering from its own success as being a club that everyone wants to join. But having joined the members want to have a say in the direction that the institution will take. This includes defining the boundaries of the WTO competencies, deciding on the relationship between trade and development, and instituting measures that correct for past imbalances. Each of these issues will pose difficult problems for the developed countries and their political representatives. So the problem might come down to the fact that the developed countries cannot muster the political support for a trade system that is essentially focused on issues of the full integration of developing countries into the trade system as equal partners.

Further incorporation of developing countries in trade system is essential for their development and for attracting investment. The Doha Round does not by any means fully exploit the gains from such integration, but it offers modest progress in that direction. Hence the significance of the outcome of the Round is greatest for developing countries. The Round would produce many clear winners and a few losers, but for most countries it represents a way to tackle some obvious and long-standing trade problems (particularly the abnormal levels of protection in agriculture) while building on the institutional foundations of the Uruguay Round. As a consequence, if the Doha Round is abandoned then some other device will be needed to achieve its objectives. This could involve developing different

negotiating methods such as weakening the "single undertaking" nature of the WTO to encourage plurilateral agreements among members. It could imply a period of continuous negotiation where "early harvest" results could be agreed. It could include a "time out" for reflection and the agreement on some basic objectives that go beyond the exchange of concessions at the bargaining table.

In the best of worlds, one could expect the trade system in 2050 to be representative of the multipolar economic landscape, be fully integrated with both developmental and environmental policies and institutions, and have successfully merged the regional and the multilateral rules and negotiation processes. In a less than perfect world it is more realistic to expect continued problems of governance as economic power continues to shift, some remaining tensions between development goals and the narrower aims of reducing transactions cost, and only partial success in simplifying the architecture of the mixed trade system. But even if it works no better than the present system at least it will provide a framework for firms and farms to trade and consumers to have an ever-expanding choice of products.

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