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Juthathip Jongwanich is an Economist and Nedelyn Magtibay-Ramos is an Economics Officer in the Economics and Research Department, Asian Development Bank. The authors thank William E. James and Archanun Kohpaiboon for useful discussion and valuable comments.

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Asian Development Bank
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Contents

Abstract

Over the past three decades, there has been a rapid expansion of processed food exports in developing countries, replacing traditional agriculture exports such as coffee and tea. However, this development and its policy implications have received little attention in the literature. This paper aims to redress this oversight by providing an overview of key characteristics and growth patterns of processed food exports in developing countries. The determinants of structural changes toward processed food exports in developing countries are examined using panel data econometric analysis. The results suggests that trade policy openness, large domestic market, good macroeconomic management especially in terms of price stability, as well as adequate financial support and infrastructure are the key factors that influence the structural changes toward processed food products.

I. Introduction

There has been a structural change in the composition of food exports from developing countries over the past three decades. Traditional (unprocessed) food exports have continuously declined and have been replaced by processed food exports. Expansion of processed food production and exports has become an important trend for developing countries since such exports have intrinsic characteristics of manufactured goods. The structural change in food exports is believed to generate superior growth performance. Reasons for this belief include employment generation, knowledge spillovers, and terms of trade gains. In particular, processed food production, especially in the final stage, appears to be labor-intensive. An expansion of processed food production could, therefore, generate positive effects on employment.

Processed food exports from developing countries are expected to continuously expand in the future since world demand for processed food continues to grow in response to diet upgrades resulting from rising incomes, growing health consciousness, and urbanization. Factors such as international migration, communication revolutions, and international tourism and trade liberalization initiatives under various rounds of world trade negotiations also contribute to an expansion of demand for processed food. Thus, ability to expand processed food production and exports into the world market of developing countries would provide an important impetus for their economic development.

However, not all developing countries so far have benefited from the growth of world demand in processed food. Why could only some developing countries move from traditional agriculture exports toward processed food exports? This study, therefore, aims to examine factors that explain intercountry differentials in structural changes of food exports in developing countries. To the best of our knowledge so far, this issue has received little attention in the literature on export-led industrialization in developing countries (Jaffee and Gordon 1993, Athukorala and Sen 1998, Athukorala and Jayasuriya 2003, Rae and Josling 2003, Regmi et al. 2005). It is only this study that quantitatively examines factors determining structural changes of food exports in developing countries. In addition, we apply the econometric results with the recent data to formulate a prudential policy in enhancing supply-side capability of developing countries, particularly in the Asia and Pacific countries, to reap benefit from potential world demand expansion in processed food products.

The rest of the paper is organized as follows. Section II presents key characteristics of processed food. Trends and patterns of processed food exports in developing countries over the past three decades are discussed in Section III. Section IV discusses determinants of intercountry differentials in structural changes of food export. Data, variable measurements, and econometric procedure are presented in Section V. The estimation results and implication for developing Asia are discussed in Sections VI and VII, respectively. The final section provides conclusions and policy inferences.

II. Key Characteristics of Processed Food: First Look

Processed food products retain the general characteristics of food products, particularly perishability, bulkiness, and uncertainties related to seasonality of production. Commodity perishability could lead to product loss and value decline during transport and storage. Transaction costs could increase dramatically since these commodities would be required to be repeatedly screened for quality at each level in the commodity system. Commodity perishability could also limit market flexibility of producers and increase their market risk. Because of their bulky and perishable characteristics, physical handling and transportation problems could become issues of concern. Investment in highly specialized and "lumpy" transport and storage facilities and equipment are necessary to lower costs of food production.

Another common set of food production characteristics concerns yield uncertainties and seasonality of production. The production of most food crops and animal products is dependent upon the life cycle of plants and animals. Raw materials of food production also face weather uncertainties and the possible incidence of plant diseases or pests. Adverse natural events could undermine total supply, resulting in farmer losses, underutilized marketing and processing facilities, and unmet consumer demand. These characteristics tend to create problems for cost-efficient utilization of transport and processing facilities. Thus, medium-term planning, including financing, seems to be crucial to ensure supply could meet consumer demand.

However, processed food products have four unique characteristics that differentiate them from traditional food products. First, food commodities exhibit considerable variability in their quality and multiple quality attributes, some of which are difficult to measure and most of which are valued and weighted differently by specific groups and consumers. Consumers, therefore, cannot be expected to have full knowledge about the choices and quality of products available to them. These characteristics tend to create asymmetric information related to product quality, leading to a reduction in an ability to use market prices as a signal for the quality of products. Suppliers of processed food face challenges in creating and preserving the unique characteristics of their products and conveying

information about those characteristics to consumers. Because of asymmetric information between producers and consumers, regulations need to be established to protect consumer from potentially harmful products and practices. These are related to certain tests, inspection of products, certain handling or processing procedures, requirements for nutritional information and labeling, and truth in advertising.

Second, processed food products tend to rely on numerous food supply chain. Broadly, the supply chain could be divided into five key processes, which are input supply, primary production, processing manufacturing, wholesalers/retailers/exporters, and consumers.[1] There are three main types of flows relating to the supply chain, namely physical product, financial, and information flows. With regard to the physical product flows, such flows generally are uni-direction, starting with input supply and ending with consumption. By contrast, financial resources tend to move in the opposite direction, with payments going to upstream suppliers as products move downstream toward consumers. In some cases, suppliers who retain ownership of their products as they move through the supply chain may pay fees to downstream firms for production, processing, or distribution services. Information flows move in both directions throughout the supply chain. Suppliers tend to convey information about product attributes and availability to downstream customers, while receiving information about product demand, product inventories in downstream segments, and consumer reactions to product attributes.

It is noteworthy that supply chains in processed food products must be operated in a broad environment characterized by infrastructure and institutions (Figure 1).[2] Infrastructure is a key element in facilitating food production and supply chains while institutions provide and exercise rules and regulations on both producers and consumers in the marketplace. A wide range of infrastructure is required in the food supply chain, including transportation, telecommunications, and multipurpose technologies for packaging and product preservation. With regard to institutions, they could be established through international organizations, national/local governments, or nongovernmental organizations such as trade associations (Jaffee and Gordon 1993). Such organizations establish laws and regulations that govern commercial practices, food safety and product quality, product packaging, trade, labor practices, and intellectual property.

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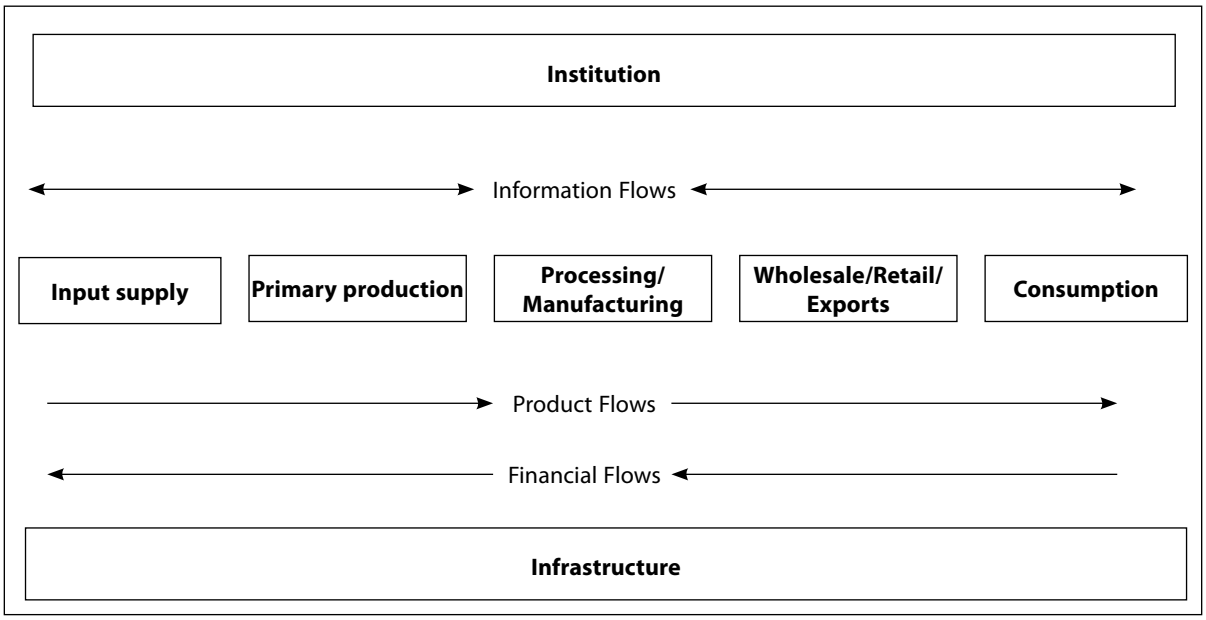
1 Note that all five segments are relevant for every supply chain and, in many cases, this process could be further divided into separable processes.

2 Infrastructure quality and institutions can have far-reaching impacts on supply-chain design for processed food products, and cross-country differences can significantly affect supply-chain configuration and the geographic scope of product distribution. Suppliers of branded food products may choose not to enter markets where infrastructure to support advertising is lacking and legal institutions that protect brand trademarks are weak.

Figure 1: Key Element of Processed Food Supply Chain



Source: Regmi et al. (2005).

Third, an established domestic market tends to be a precondition for processed food production and export success. As processed food products are classified as "luxury" consumer goods, i.e., with higher income and price elasticities of demand relative to other primary products, the production for the domestic market must be lucrative enough to enable firms to achieve economies of scale and thus reduce costs to break into foreign markets. Based on evidence provided by Jaffe and Gordon (1993), successful exporters often depend upon prior or parallel development of domestic markets. None of the local commodity systems has developed as an export-oriented enclave and relatively few have relied purely upon export markets for their sales.

Finally, processed food production and exports are likely to create spillover effects in developing countries. Processed food production, especially in the final stage of production, appears to be labor-intensive unlike in the case of further processing of resources such as timber or minerals that tend to rely more on capital equipment. Such characteristics, to some extent, imply that an expansion of processed food production could generate positive employment effects. In addition, processed food production tends to rely more on domestic resource content, unlike conventional manufacturing production that tends to rely more on import content. This naturally implies higher spread effects through input linkages in the domestic economy. While processed food industries tend to be closely related to activities in the rural sector, an expansion of processed food production could generate higher income for the poor and to some extent lead to poverty reduction. On top of that, knowledge spillovers, especially for export firms, could

be generated. Such spillovers would arise mainly from learning through interaction with foreign buyers, exposure to foreign technology, and improving quality standards in the face of stringent export competition. Meller (1995) points out that processed food exports might be able to generate knowledge spillovers on a scale to be comparable, or superior to, exports of labor-intensive manufacturing products.

Note that processed food products may be divided into two subcategories according to their specific characteristics, namely food processing (land-based foods) and manufactured food. Food processing refers to products that do not undergo major changes from their basic raw commodities, i.e., the characteristics of the original materials are retained. This type of food product includes not only all raw commodities, such as fruits and vegetables but also preserved products such as preserved (frozen/canned/dried) fruits, vegetables, meat, and dairy products. The production location of land-based processed food tends to be influenced by product perishability, transportation costs, and geography so that production is typically located near growing areas to minimize spoilage, transaction, and production costs.

Manufactured food refers to products that have significantly lost characteristics of agriculture raw materials from transformation, e.g., confectionery and bakery products. Such a transformation includes not only blending and fermentation but also cooking. Since technology and capital in producing manufactured food products are mobile in the world food market and raw materials of these products, e.g., refined sugar, starches, wheat and grains, are relatively nonperishable and inexpensive to transport, their production location does not need to be tied closely to the presence of natural resources. Production of manufactured food is, therefore, less location-specific than food processing products. To minimize distribution costs, manufactured food products tend to be located close to consumer markets, i.e., demand-oriented location decision so that manufacturing activities tend to be dispersed across the globe.

Table 1: Characteristics of Food Processing and Manufactured Processed Food

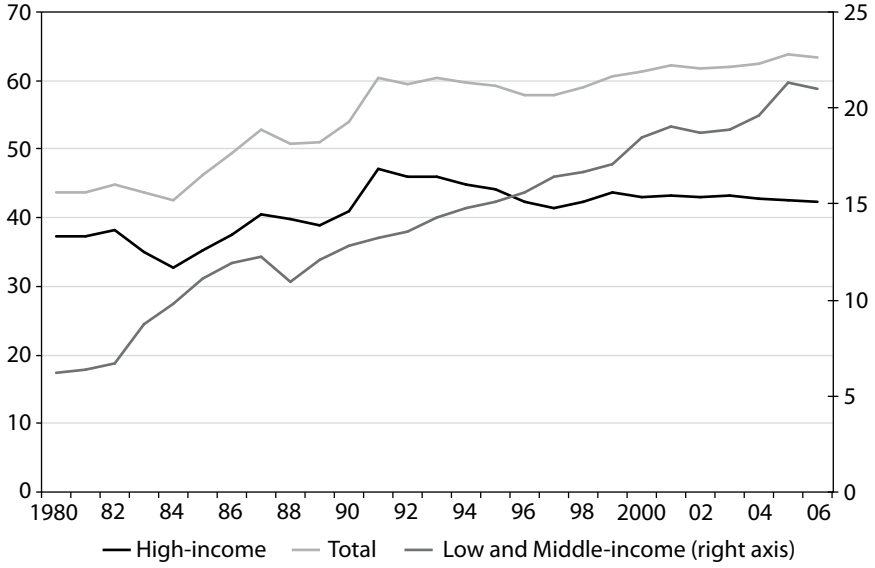
	Food Processing	Manufactured Food
Inputs	Sourced locally, perishable, and high transport cost	Sourced globally, relatively less perishable, low transport costs
Raw materials	Fruits, vegetables, live animals, and milk	Sugar, starches, wheat and grains
Processing function	Preserving basic commodities	Transforming commodities
Processing examples	Frozen, canned, and animal slaughter, drying	Blending, fermentation, and cooking
Production location	Close to raw material (agricultural products)	Close to consumer markets; location is demand-oriented to minimize distribution cost of final products
Products	Frozen fruits, vegetables, and meat and canned fruits	Confectionery and bakery products
Trade	Highly traded in global market	(Mostly) locally traded in regional market

Source: Regmi et al. (2005).

III. Trends and Patterns of Processed Food: First Look

Over the past three decades, there has been a notable composition shift in world food trade. The relative importance of "classical" food products such as coffee, tea, sugar, and cocoa has been replaced by the processed food trade (see Appendix 1 for a list of processed food products).[3, 4] The share of processed food exports in total world food exports increased from 44% in 1980 to around 63% in 2006. The compositional shift has been contributed to mainly by developing countries, particularly since the early 1990s. While the share of processed food exports in total world food exports tripled in developing countries during 1980–2006, the share was rather stable in developed countries (Figure 2).[5] The increasing importance of processed food exports has also resulted in a structural shift in world agricultural trade. The share of processed food exports in world agricultural exports increased to 51% in 2006 from only 32% in 1980 (Figure 3).

Figure 2: Share of Processed Food Exports in Total World Food Exports (percent)



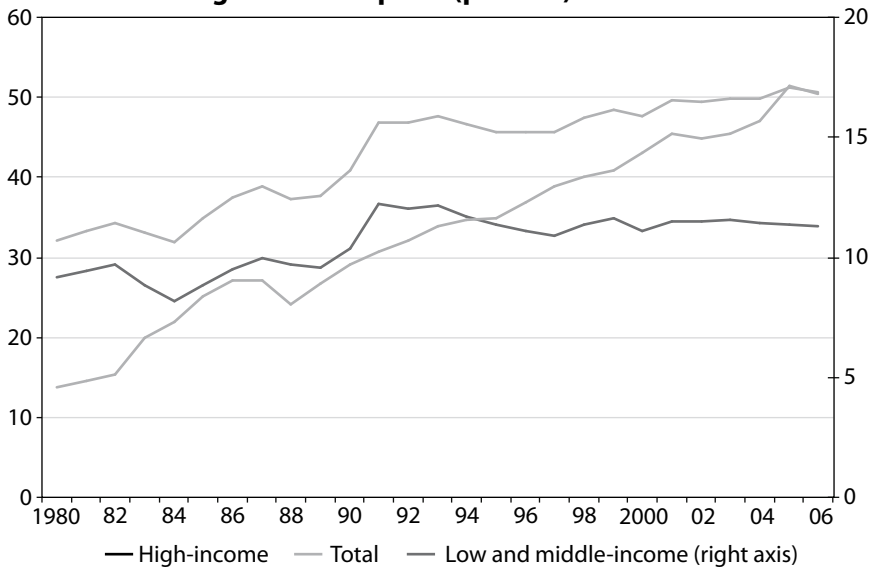
Note: Food exports include SITC 0+1+4+22-121 while agriculture exports include SITC 0+1+2+4-27-28. See Appendix 1 for descriptions of processed food.
Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

[3] While international trade in many of these is not entirely "new", their trade has experienced very rapid expansion in recent years, and they are often described as "new food exports" or "nontraditional food exports". To maintain the focus on these new dynamic export items, the traditional beverages (such as tea and coffee) and cereal grains (wheat, maze, rice, etc.) exported in bulk are excluded from our analysis.

[4] Generally, the definition of processed food products is based on the International Standard Industry Classification (ISIC). All commodities that belong to ISIC Section 3 are all classified as processed food. However, export data used in our analysis are reported under the Standard International Trade Classification (SITC). Thus, the SITC commodities listing at 5-digit level is used in cross reference to that of the ISIC listing at 4-digit level. See Athukorala and Jayasuriya (2005) for detailed discussion of processed food definition.

[5] Developed countries refer to high-income countries according to the World Bank classification. Note that the results are not significantly different when developed countries are defined to include only Australia, Canada, EU15, Japan, New Zealand, United States, and the East Asia tigers. Developing countries refer to low and middle income countries according to the World Bank classification.

Figure 3: Share of Processed Food Exports in Total World Agriculture Exports (percent)

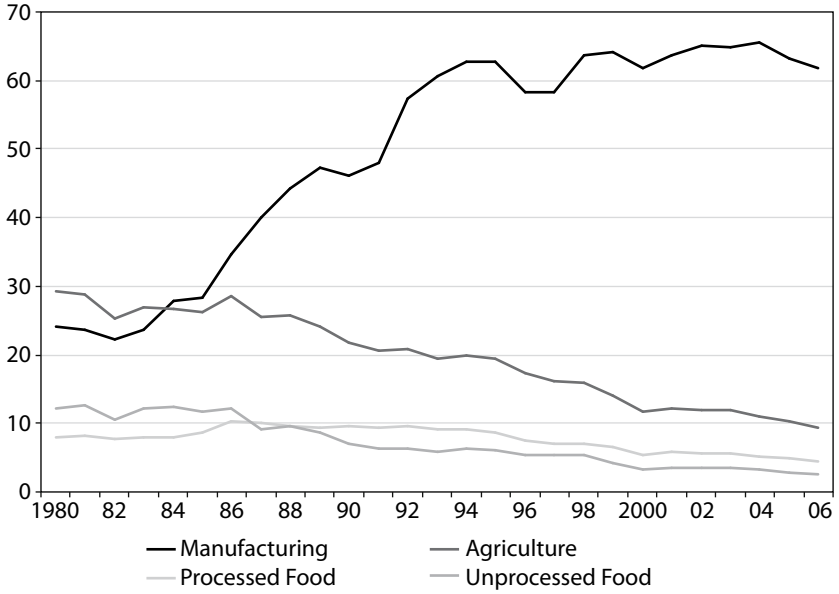


Note: Food exports include SITC 0+1+4+22-121 while agriculture exports include SITC 0+1+2+4-27-28. See Appendix 1 for descriptions of processed food.
Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

In the wider context of structural shifts, processed food exports have still been able to retain their importance in world merchandise trade. It is clear that world merchandise trade over the past three decades has been characterized by a dramatic expansion of manufacturing exports and a sharp decline in agricultural exports. The share of manufacturing exports in total world merchandise exports rose by 1.2 times from 59% in 1980 while the share of agricultural exports declined to less than 10% in 2006 from 16% in 1980. The proportionate decline of agricultural exports tended to be sharper for developing countries (from almost 30% in 1980 to 9% in 2006), compared to developed countries (from 15% to 7%). Interestingly, the share of processed food exports in total merchandise exports was relatively stable. In developing countries, the share was around 7–8% during 1980–1996 before slightly declining to around 4–5% after 2000 (Figure 4). This implies that processed food exports have grown faster than other exports of agricultural products, especially primary food; but growth has still been slower than manufacturing exports (Table 2). As pointed out in Athukorala and Jayasuriya (2005), the faster growth in manufacturing exports than in processed food is a result of the rapid expansion of parts and components trade underpinned by the broader process of product fragmentation. This led to the high import content of products involved and expansion of manufacturing trade. They argue that if net exports (gross exports – imported inputs) are estimated, the export growth of processed food would turn out to be much higher. Note that in 2006, the growth rate of processed food tended to be lower than other compositions of agriculture products, agricultural raw materials in particular, so that the

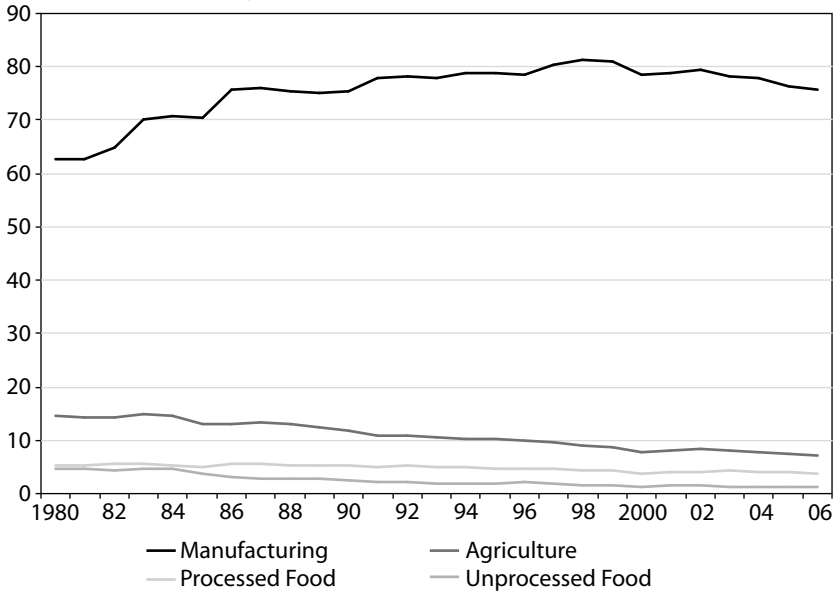
average growth rate of the latter during 2001–2006 was higher that that of the former. This could be a result of higher demand for producing biofuel products in response to the oil price hike.

Figure 4: Share of Agriculture, Processed Food, and Manufacturing in Developing Countries (percent)



Note: Manufacturing exports include SITC 5+6+7+8-68.
Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

Figure 5: Share of Agriculture, Processed Food, and Manufacturing in Developed Countries (percent)



Note: Manufacturing exports include SITC 5+6+7+8-68.
Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

Table 2: Growth Rate of Agricultural and Manufacturing Exports in Developed and Developing Countries (percent)

	Agriculture	Agriculture Raw Materials	Primary (unprocessed) food	Processed Food	Manufacturing
Developing Countries					
1981–90	8.2	6.8	4.8	12.9	18.9
1991–00	6.3	6.1	5.3	6.6	15.4
2001–06	10.8	12.1	10.4	10.6	15.3
Developed Countries					
1981–90	4.5	5.0	–0.4	6.3	8.4
1991–00	2.0	2.0	1.1	2.1	5.5
2001–06	7.8	7.0	6.6	8.4	9.1

Note: Agricultural raw material exports include SITC 21+23+24+25+26+29+121.
Source: United Nations Comtrade database (Rev.1), DESA/UNSD, downloaded April 2008.

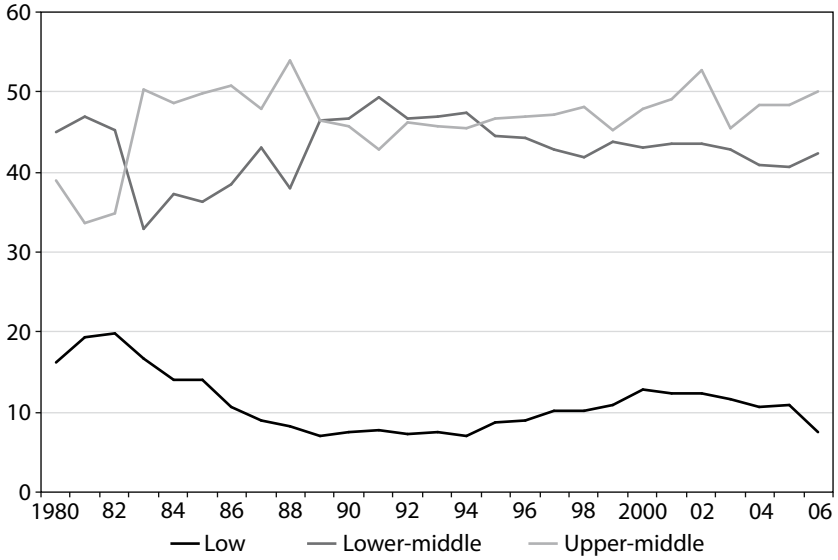
Although processed food exports in developing countries have continuously increased, not all countries have shared in the benefits. In general, countries belonging to upper-middle and middle-income countries according to the World Bank classification have performed better in expanding processed food exports than low-income countries. Figure 6 shows that more than 90% of total developing countries' processed food exports are contributed by upper-middle and lower-middle-income countries. Processed food is an important component in total food exports in upper-middle and lower-middle-income countries. Processed food exports in these countries accounted for more than half of total food exports. After the late 1980s, the gap between upper-middle and middle-income countries in contributing to processed food exports has narrowed. This resulted from the faster growth of processed food exports in lower-middle-income countries. On average, the annual growth rate of processed food exports in lower-middle-income countries was 10% during 1980–2006, compared to 11.2% in upper-middle-income countries and 7.1% in low-income countries.

Among upper-middle income countries, Chile, Malaysia, Mauritius, Oman, and Seychelles performed better than the other countries (Table 3). Particularly, processed food accounted for almost 100% of total food exports in Oman and Seychelles. The share of processed food exports in agricultural products in Seychelles doubled during 1986–2006 while the share of processed food exports to total exports also noticeably increased. Among middle-income countries, Algeria, Bolivia, People's Republic of China (PRC), Paraguay, Peru, and Syria tended to outperform the other countries. The annual growth rate of these countries was more than 10% and the share of processed food exports to total exports in these countries, except for the PRC and Peru, has increased over the past three decades. The higher share of processed food in total exports was also evident in other middle income countries such as Colombia, El Salvador, Fiji Islands, and Guatemala. The growth rate of processed food in these countries, thus, tended to be higher than other agriculture products (including unprocessed food), and in some

countries (e.g., Guyana and Paraguay), the growth rate was even higher than that in the manufacturing sector.

Even though the overall growth rate of processed food exports in low-income countries was lower than in upper-middle and middle income countries, Madagascar is a notable exception. The growth rate of processed food exports in Madagascar was around 10% during 1986–2006. Meanwhile, processed food exports are the key driver of food and agriculture exports in many low-income countries. In Bangladesh, processed food exports accounted for more than 95% of all food exports during 1986–2006 while the share of processed food exports in agriculture exports doubled during this period. These patterns tend to suggest that income *per se* is not able to explain intercountry differences in export performance of processed food products.

Figure 6: Contributions of Low-, Middle-, and Upper-Middle-Income Countries to Total Processed Food Exports, 1980–2006 (percent)

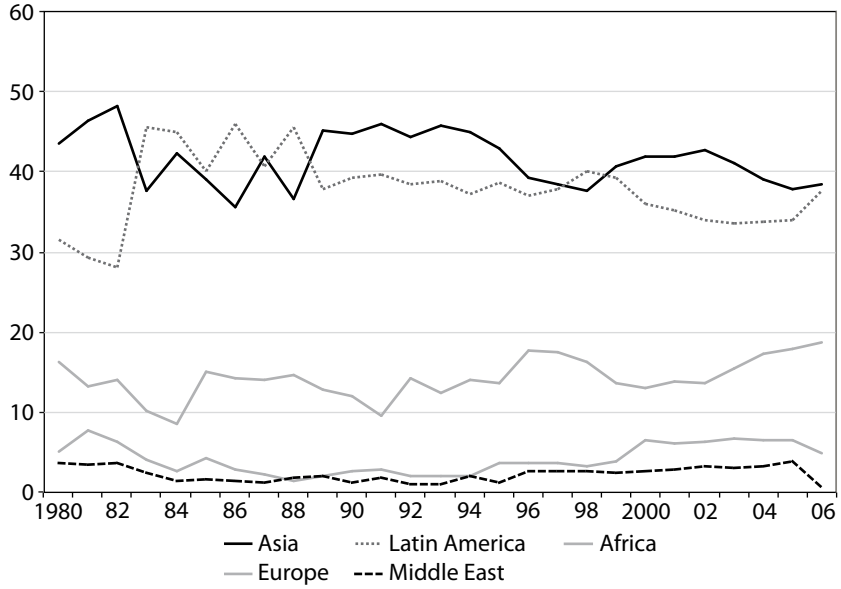


Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

In terms of the regions, developing Asia and Latin America tended to perform better than other regions in expanding processed food exports. The shares of processed food exports from Asia and Latin America in total developing countries' processed food exports, over the past three decades, were around 41% and 38%, respectively (Figure 7). The contribution of processed food exports from Middle East was the lowest, around 2% while Africa and Europe contributed 4% and 14%, respectively. While the contribution from Asia was rather stable over the past three decades, structural change tended to occur within the region (Figure 8). Processed food exports from Southeast Asia, the highest contribution over the past three decades, have shown a declining trend since the early 1990s, and in 2006, Southeast Asia has been replaced by countries in

East Asia. The share of processed food exports in Southeast Asia in total developing countries' processed food exports declined from 30% in 1985 to 25% in 2006 while the share of East Asia increased to 29%, from 14% during the same period. The share of processed food exports in South Asia has been relatively stable over the past decade but it noticeably declined in the early 1980s.

Figure 7: Share of Processed Food Exports in Developing Countries (percent)

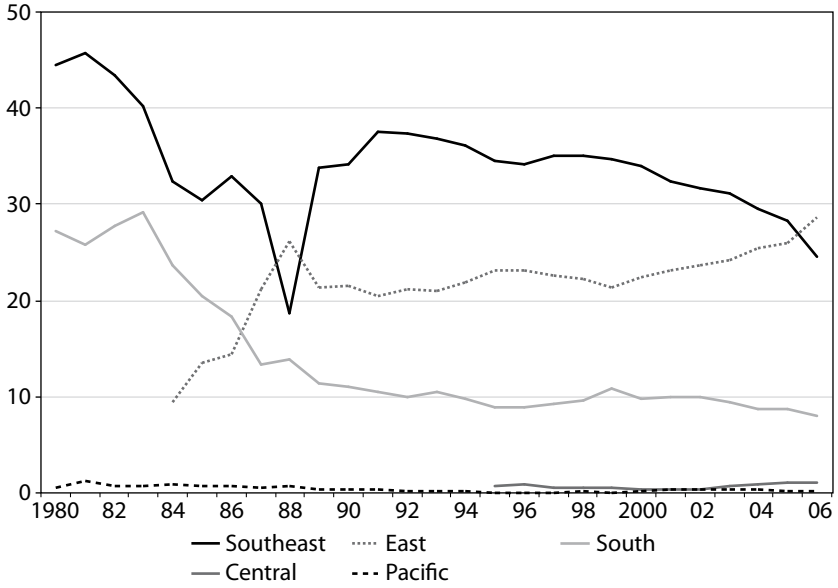


Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

The key products that contributed to most processed food exports were processed fish, followed by processed fruits and meat products (Table 4). Processed fish exports were relatively less important in the early 1980s (18% of developing countries' processed food exports), compared to meat products, but their importance has become noticeable since the late 1980s. In 2006, the share of processed fish was 23% of total developing countries' processed food exports, followed by 21% of processed fruits. PRC, Chile, and Thailand were the key exporters of this product. In 2006, the PRC accounted for more than 25% of total developing countries' processed fish exports while Thailand and Chile accounted for 15% and 9%, respectively. However, over the past 5 years, the contribution of processed fish has declined. This may be attributed to the global economic slowdown, resulting in a shift in consumer preference toward meat products exports, which are presumably cheaper than processed fish.[6] Brazil accounted for almost half of total developing countries' meat products exports, followed by the PRC (10%) and Poland (9%). Processed fruits exports have also increased over time, though not as spectacularly

[6] Note that prices of fish (Norway) and fishmeal (any origin, Hamburg) tended to increase in 2001–2007. Thus, the decline of processed fish was likely to be contributed by a reduction in volume instead of prices.

Figure 8: of Processed Food Exports in Developing Asia (percent)



Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

as in the case of processed fish. On the other hand, shares of "traditional" items such as coffee extract and animal and vegetable oil have fallen. In 1980, coffee extract accounted for 15% of total processed food exports from developing countries but in 2006, the share was only 4% of total processed food exports.

Table 3: Processed Food and Agriculture Exports for Selected Developing Countries, 1986–2006

	Growth (Processed food)	Growth (Manufacturing)	Processed Food to Food Products		Processed Food to Agriculture Products		Agriculture Products to Total Exports		Processed Food to Total Exports	
	1986–2006	1986–2006	1986	2006	1986	2006	1986	2006	1986	2006
Upper-Middle-Income	9.2	14.4	46.9	56.9	37.7	45.8	27.5	10.5	10.3	4.8
Argentina	7.4	10.6	36.5	36.3	34.6	35.1	69.6	45.6	24.1	16.0
Brazil	8.3	9.2	41.3	49.4	36.3	40.8	37.1	28.7	13.5	11.7
Chile	11.5	14.6	66.1	80.6	48.5	60.0	36.0	20.6	17.4	12.3
Dominica	(3.4)	2.6	94.7	93.3	94.2	93.2	67.7	34.6	63.8	32.3
Hungary	6.5	11.5	36.7	58.5	32.3	53.9	22.5	6.2	7.3	3.3
Malaysia	11.3	16.1	20.5	38.2	8.8	27.5	36.8	9.7	3.3	2.7
Mauritius	11.5	6.8	8.3	39.2	8.3	38.5	44.0	29.0	3.6	11.2
Mexico	8.9	15.8	51.6	66.4	47.3	61.8	16.6	5.8	7.9	3.6
Oman	10.7	5.5	77.2	93.1	74.9	92.9	19.8	2.0	14.8	1.8
Poland	11.3	13.4	84.8	78.0	65.2	69.7	12.3	10.4	8.0	7.2
Saint Lucia	(5.0)	2.9	91.7	55.5	90.4	54.7	75.6	37.4	68.3	20.4
Seychelles	27.9	9.4	44.2	97.0	43.4	97.0	14.1	53.1	6.1	51.5
Turkey	5.6	10.5	83.3	97.2	63.3	85.6	34.6	7.0	21.9	6.0
Uruguay	7.7	4.6	78.2	78.7	62.6	69.9	53.1	62.0	33.2	43.4
Venezuela	(3.5)	8.0	60.4	55.8	58.9	50.9	1.6	0.2	0.9	0.1
Lower-Middle-Income	10.3	21.8	42.6	68.5	34.1	54.3	28.3	7.4	9.6	4.0
Algeria	11.0	9.0	31.3	75.3	30.3	72.2	0.3	0.2	0.1	0.1
Bolivia	12.9	17.0	24.7	27.0	16.2	24.3	14.0	15.8	2.3	3.8
Cameroon	5.0	(0.9)	11.6	29.0	9.3	12.3	65.2	28.3	6.0	3.5
PRC	14.3	25.9	44.4	89.5	31.9	76.4	17.1	3.3	5.5	2.5
Colombia	8.2	13.1	10.8	46.1	10.1	36.0	71.1	20.2	7.2	7.3
Ecuador	5.7	19.7	87.3	89.1	85.4	76.9	53.6	31.0	45.7	23.8
Egypt	8.1	9.7	69.4	56.1	20.7	45.5	22.9	8.0	4.7	3.6
El Salvador	9.9	10.8	5.4	39.0	5.3	38.1	83.1	36.7	4.4	14.0
Fiji	9.0	7.4	15.0	41.7	14.5	38.5	59.3	50.1	8.6	19.3
Guatemala	6.9	9.4	19.1	36.1	17.7	32.3	79.7	55.2	14.1	17.8
Honduras	1.7	16.0	51.2	46.4	48.4	43.6	94.7	60.3	45.8	26.3
Indonesia	9.8	15.2	30.1	32.7	18.6	20.9	21.3	18.0	4.0	3.8
Jamaica	4.3	0.8	29.8	33.3	29.0	33.1	27.6	16.7	8.0	5.5
Jordan	9.7	13.3	59.9	74.0	58.1	72.5	18.7	13.6	10.9	9.9
Morocco	6.1	10.8	97.6	96.2	89.6	88.3	32.6	20.9	29.2	18.5
Nicaragua	9.6	8.2	22.5	40.7	17.7	39.7	94.0	81.0	16.6	32.1

continued.

Table 3: *continued.*

	Growth (Processed food)	Growth (Manufacturing)	Processed food to food products		Processed food to agriculture products		Agriculture products to total exports		Processed food to total exports	
	1986–2006	1986–2006	1986	2006	1986	2006	1986	2006	1986	2006
Peru	14.5	11.8	21.7	46.6	18.2	42.7	32.7	16.0	6.0	6.8
Philippines	5.5	18.0	46.9	66.8	39.1	60.3	30.9	6.0	12.1	3.6
Sri Lanka	5.9	11.9	84.7	86.9	66.8	77.5	48.5	24.3	32.4	18.8
Syria	16.7	10.2	58.9	62.4	24.2	55.4	16.9	19.5	4.1	10.8
Thailand	8.5	17.6	58.4	78.6	48.6	53.3	52.4	16.5	25.4	8.8
Low-Income	7.8	12.4	48.3	50.2	35.3	39.3	35.5	15.2	12.5	6.0
Bangladesh	5.5	15.3	99.0	95.6	59.3	77.6	33.6	7.4	19.9	5.8
India	7.5	13.9	62.4	57.3	51.9	45.4	27.9	10.5	14.5	4.8
Kenya	6.4	11.6	38.6	77.4	35.8	59.6	74.5	54.5	26.7	32.5
Madagascar	10.2	15.2	12.1	65.9	11.6	58.6	84.6	36.7	9.8	21.5
Malawi	2.2	8.7	49.1	51.6	20.5	12.6	92.9	85.8	19.1	10.8
Pakistan	8.3	9.4	28.3	36.3	13.8	32.8	31.4	13.0	4.3	4.3
Senegal	3.8	5.6	69.1	76.6	65.2	70.1	43.5	35.7	28.4	25.0

Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

Table 4: Composition of Processed Food Exports in Developing Countries, 1980–2006 (percent)

	1980	1990	2000	2006
Coffee extracts	15.4	7.9	4.3	3.7
Diary products	1.6	1.4	2.8	4.1
Edible products	1.4	2.2	5.4	6.0
Egg and egg products	0.2	0.3	0.4	0.3
Fish	18.2	25.8	30.6	23.4
Flour and cereals	1.0	1.4	2.9	3.5
Fruit+ fresh or dried	18.5	24.2	22.6	21.1
Meat products	20.5	12.6	10.4	14.4
Sugar preparations	3.6	4.0	4.5	5.8
Vegetables	14.4	15.5	12.2	12.8
Processed vegetable oil	5.1	4.9	4.0	4.8

Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

Developed countries are the key export destinations of processed food exports from developing countries. Among developed countries, the G3 countries (European Union [EU], Japan, United States [US]) accounted for more than 50% of total developing countries' processed food exports. The EU is the most important export destination, followed by the US and Japan, respectively (Table 5). Since the early 1990s, the importance of the G3 markets has declined and developing countries have become more important for developing countries' processed food exports. The share of processed food exports in developing countries doubled during 1990–2006 while the share of G3 markets declined by almost 10 percentage points. Latin America, Asia, and Europe have become the key importers of developing countries' processed food products. These three markets accounted for 25% of total developing countries' processed food exports in 2006. For Africa and the Middle East, the shares slightly increased but were still less than 5% of total developing countries' processed food exports.

Table 5: Key Export Partners, 1980–2006 (percent of total developing countries' processed food exports)

	G3 Countries	US	European Union	Japan		
1980	59.9	13.3	38.4	8.3		
1990	63.0	21.0	29.6	12.4		
2000	59.5	20.1	23.9	15.5		
2006	53.4	16.8	26.4	10.2		
	Developing Countries	**Asia**	**Latin America**	**Europe**	**Africa**	**Middle East**
1980	18.1	3.2	6.3	1.4	3.1	4.0
1990	15.4	3.3	5.8	1.0	2.2	3.0
2000	25.2	7.1	7.2	5.6	3.1	2.2
2006	32.8	8.8	5.8	10.5	4.0	3.7

Source: United Nations Comtrade database (Rev.2), DESA/UNSD, downloaded April 2008.

IV. Determinants of Structural Changes in Food Exports

This section reviews potential factors that explain intercountry differentials in the structure of food exports in developing countries *(PROEX).* Specifically, we review potential factors that could alter the share of processed food exports in total agricultural exports. We use total agricultural exports as the denominator instead of total food exports because exports of unprocessed food and other agricultural products tend to behave similarly to each other. The first factor that can affect a structural change is the domestic market *(CS).* As mentioned in Part II, processed food products are relatively luxurious, compared to traditional agricultural products. Thus, to enable firms to achieve economies of scale and to reduce costs to break into foreign markets, the domestic market must be large enough to support economies of scale. Thus, an expansion in the size of the domestic market leads to an increase in processed food exports.

Trade policy regime (*OPEN*) in a country is another variable that can have an impact on structural change in food exports. Trade liberalization provides incentives for producers to export instead of selling in the domestic market. Although tariff and nontariff barriers in the agricultural sector, including processed food, declined after the Uruguay Round of 1986–1994, there are no clear theoretical and empirical studies to show that trade liberalization would affect processed food exports more than other agriculture products. Thus, the direction of the effect of the trade policy regime on structural change of food exports is a priori inconclusive. (See Box 1 for tariffs on processed food products.)

A number of trade facilitation measures could also help to support an expansion of processed food more than other agricultural products thereby increasing the share of processed food in total agricultural exports. These include a well-functioning financial market (*DC*) to provide financial support to all relevant supply chains of processed food industries. Sufficient financial support allows firms to better manage risks and uncertainties, mainly related to transport and storage of raw materials and commodities, and improve production and distribution technologies. Infrastructure (*INFRA*) is another key variable that can determine export performance of processed food industries. This includes well-developed roads, railways, ports, telephone lines, power systems, terminal markets, storage, and processing facilities. While processed food production involves more processes than other agricultural production, an improvement in infrastructure could provide greater benefits to the former more than the latter.

In addition to trade facilitation, favorable macroeconomic conditions also play a pivotal role in shaping and influencing incentives for investment in production and marketing activities in processed food industries (Jaffee and Gordon 1993). In particular, price instability (*PIS*) and an overvalued real exchange rate (*RER*) could induce higher costs of production and lower returns on farm inputs and food products, thereby reducing investment incentives and possible expansion of food exports. However, while these factors could also affect other agricultural products, their effect on the share of processed food exports to total agricultural exports is inconclusive.

Finally, while the behavior of processed food exports resembles labor-intensive manufacturing, foreign direct investment (FDI) could play an important role in this industry. This would be in contrast to traditional agricultural production in which there is no significant involvement of FDI. However, the impact of FDI on processed food industry is ambiguous. On the one hand, an involvement of multinational enterprises (MNEs) could generate positive effects to processed food industries, particularly exporting firms. MNEs have an international production network so that flows of information on home country and other markets are completed. In addition, they tend to undertake a large proportion of the world's total research and development and are principal bearers of technology across international borders (Borensztein et al. 1998, Lipsey 2000, Vernon 2000). With these advantages, one would expect that MNE affiliates are likely to face lower production and entry costs in export market. However, technology and capital in producing manufactured food products are mobile in the world food market and raw materials of these products are relatively inexpensive to transport. MNEs may, therefore, intend to locate closely to consumer markets to minimize distribution costs so that an increase in FDI could lead to an overall reduction of processed food exports.

All in all, the empirical model of processed food exports could be written as follows:

$$\underset{\substack{(+)\ (?)\ (?)\ (?)\ (?)\ (?)\ (+)}}{PROEX = f(CS,\ OPEN,\ DC,\ PIS,\ RER,\ FDI, INFRA)} \qquad (1)$$

where *PROEX* = share of processed food exports in total agriculture exports

CS = country size/domestic market

OPEN = trade policy regime

DC = financial availability

PIS = price instability

RER = real exchange rate

FDI = foreign direct investment inflows

INFRA = infrastructure

V. Variable Measurements and Econometric Procedure

The empirical model is estimated based on 79 developing countries[7] during the period 1990–2006. The country coverage is based on data availability. The whole sample is divided into six nonoverlapping 3-year periods (except for the last subgroup for which the data are averaged only from 2-year periods). Three-year periods are applied, instead of annual data, to reduce business cycle fluctuations associated with these data series. The dependent variable is measured by the share of processed food exports in total agriculture exports to reflect a structural change in agricultural exports (*PROEX*).

The expansion of the domestic market (*CS*) is measured by gross domestic product (GDP) per capita in which GDP is measured in real terms at 2000 US$ prices. While there is no unique measure of trade policy regime, this study applies two well-known proxies, namely trade to GDP (*OPEN1*) and implied tariff rate (*OPEN2*) (total tariff revenues as a percentage of total trade) in measuring trade policy openness. Tariff revenues are composed of customs and other import duties, taxes on exports, profits of exports or import monopolies, exchange profits, exchange taxes and other taxes on international trade, and transactions collected on a cash basis. In fact there are other proxies for trade policy regime such as binary index, which takes the value 1 for open economies and zero otherwise, originated by Sachs and Warner (1995)[8] and the ratio of merchandise trade to good (agriculture and industry) GDP, excluding nontraded activities. However, because of incomplete and not updated data,[9] this study applies only the former two measures to reflect trade openness.

The ratio of private domestic credit over GDP (*DC*) is used to proxy the availability of financial support to all relevant supply chains in processed food industries. Price instability is measured by the deviation of agricultural prices (deflator) to their trends (*PIS*). The trend of agricultural prices is derived from the Hodrick-Prescott filter method. The *RER* in this study is measured as a nominal exchange rate (in terms of the US dollar) adjusted by price differentials. Both consumer prices and GDP deflators are

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7 The 79 developing countries include Albania, Algeria, Argentina, Azerbaijan, Bangladesh, Belize, Bolivia, Brazil, Bulgaria, Burundi, Cameroon, Cape Verde, Central Africa, Chile, PRC, Colombia, Costa Rica, Croatia, Dominica, Ecuador, Egypt, El Salvador, Ethiopia, Fiji Islands, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guyana, Honduras, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Latvia, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Nicaragua, Niger, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Russia, Saint Kitts, Saint Lucia, Saint Vincent, Senegal, Seychelles, Sri Lanka, Thailand, Togo, Tunisia, Turkey, Uganda, Uruguay, Ukraine, Venezuela, Zambia, Zimbabwe.

8 Sachs and Warner (1995) employ the following policy criteria to distinguish countries with closed (inward-oriented) from those with open (outward-oriented) policy regimes: (i) nontariff barrier coverage of intermediate and capital goods import of 40% or more; (ii) an average tariff on intermediate and capital goods imports of 40% or more; (iii) a black market exchange rate that is depreciated by 20% or more relative to the official exchange rate; (iv) a socialist economic system; and (v) state monopoly on major exports.

9 The binary index was calculated only during the period 1982–1994.

Box 1: Tariffs on Processed Food Products

In the Uruguay Round of 1986–1994, the Agreement on Agriculture, which subjects agricultural trade to stronger international disciplines, was adopted. The member countries agreed to convert their agricultural nontariff barriers to tariffs (tariffication) and agreed to reduce agricultural tariff rates. In particular, developed countries agreed to reduce agriculture tariffs, including those resulting from tariffication, by a total of 36%, on simple average, from their base-period rates, with a minimum cut of 15% for each tariff (Regmi et al. 2005). In response to the tariffication process, tariffs in many categories were still so high that it is difficult to see any profitable trade opportunities in such markets (Rae and Josling 2003). The new rounds of agricultural trade negotiations began in March 2001. The use of a tariff-cutting formula, a second round of the 36% average tariff reductions of the Uruguay Round, and the elimination of tariffs on specific commodities were the key topics of discussion. These discussions have continued but progress has been limited, particularly in terms of the formula used to reduce agricultural tariffs. In addition, compared to industrial tariffs, agricultural tariffs remain a major distorting component and global average tariff rates are still higher than manufacturing tariff rates by around 10 times.

The Uruguay Round tariff cuts were by and large confined to bulk agricultural commodities while there was no substantial tariff cut on processed food products. As shown in Table B1, recent tariffs on processed food of the EU, Japan, and US were on average more than 10% while those of bulk agricultural commodities were less than 8%. Higher duties imposed on processed food than bulk commodities result in tariff escalation, i.e., duties imposed by an importing country increase with the level of processing. Such a tariff structure in developed countries would encourage raw materials imports from developing countries, at the expense of processed food exports. Importers in developed countries protect their domestic processing industries in order to capture value added locally. Developing countries seeking to export processed foods have been vocal in supporting efforts to decrease tariff escalation (Rae and Josling 2003, and Regmi et al. 2005).

Box Table 1: Tariff on Food Imports in, EU, Japan, US, and Selected Developing Countries

	HS code	US	EU	Japan	PRC	Indonesia	Malaysia
Preserved vegetables	2001–05	6.9	15.5	11.1	30.0	5.0	4.0
Preserved fruits	2006–09	9.2	16.6	17	26.3	5.0	6.6
Fresh/frozen vegetables	07	4.6	13.2	7	38.3	4.9	0.8
Fresh/frozen fruits	08	2.5	10.4	9	33.8	5.0	4.8
Fresh/chilled meat	0201–0208	--	--	8.7	34.4	5.0	0.0
Processed meats	1601–1603	6.4	10.9	9.1	30.0	5.0	5.2
Canned fish/seafood	1604–06	3.8	18	8.5	22.9	5.0	7.0
Fresh/chilled seafood	0302–06	1.3	11.1	4	6.9	4.9	1.0
Processed food		10.2	13.2	16	27.8	5.0	3.7
Unprocessed (primary) food		7.2	7	4.6	21.3	3.8	3.4

continued.

Box Table 1: *continued.*

	Philippines	Thailand	India	Argentina	Brazil	Mexico
Preserved vegetables	9.9	30.0	30.3	14.0	14.0	23.0
Preserved fruits	8.5	26.3	30.5	14.0	14.0	23.0
Fresh/frozen vegetables	13.8	36.3	31.5	8.0	8.0	21.7
Fresh/frozen fruits	8.0	32.5	33.7	9.9	10.6	22.3
Fresh/chilled meat	19.0	34.4	32.8	10.1	10.1	81.0
Processed meats	3.0	27.9	41.7	16.0	16.0	22.4
Canned fish/seafood	13.6	22.9	30.0	16.0	16.0	23.0
Fresh/chilled seafood	7.8	6.8	30.0	9.6	9.6	29.4
Processed food	10.4	27.1	32.6	12.2	12.3	30.7
Unprocessed (primary) food	10.0	18.7	45.5	7.0	7.1	26.4

Sources: Tariffs of the EU, Japan, and US are from Athukorala and Jayasuriya (2005) (tariffs are based on 2004 level). Tariffs of Asia are from the APEC tariff database available at www.apectariff.org/ (PRC=2005; India=2005; Indonesia=2006; Malaysia=2006; Philippines=2005; Thailand=2006). Tariffs of Latin America are from the Hemispheric Database (Free Trade Area of the Americas) available at ftaa-hdb.iadb.org/chooser.asp?Idioma=Ing (Argentina=2003; Brazil=2004 and Mexico 2003).

Tariff escalation is also evident in developing countries. The gap between tariffs on imports of unprocessed commodities and on processed commodities in Thailand tends to be higher than other developing countries. In Thailand, while tariffs on processed food were around 27%, they were 19% for the unprocessed commodities. For other countries, the gaps between these two tariffs were around 3.3 percentage points. The tariff escalation structure in developing countries could provide the perception that developing countries are still protecting their processing industries, compared to the unprocessed (primary) commodities. Interestingly, tariff escalation is not evident in India. The unprocessed (primary) food tended to have a higher tariff rate than processed food. This tariff structure may hurt processed food production as the effective rate of protection in the processed food industry may become negative.[1]

The existing tariff structure has implications for further tariff cuts in the Doha Round and beyond. In 2003, a World Trade Organization (WTO) proposal recommended that "the rate of tariff reduction for the processed product shall be equivalent to that for the product in its primary form multiplied, at minimum, by a factor of 1.3 percent" (WTO 2003). However, no specific formula has been adopted yet. In 2004, the eventual framework adopted by the WTO General Council pointed out that tariff escalation will be addressed through a formula to be agreed (WTO 2004). Even though there is no adopted specific formula, the relatively low levels of tariffs on raw materials and traditional (unprocessed) food indicate that any substantial cut in tariffs have to come from those on processed food products. This may provide opportunities for developing countries to obtain wider access into developed countries' markets. However, as pointed out in Athukorala and Jayasuriya (2005) that the net market access gains from such tariff cuts would depend crucially on what happens in the sphere international food safety regulation. Importing countries, particularly developed countries, have ample room to restrict market access by relying on stricter food safety standards while honoring promised tariff cuts. Even if there is genuine market opening, many developing-country exporters may not be in a position to reap benefits because of supply-side constraints on meeting food safety standards.

[1] The effective rate of protection would be useful to reveal the structure of protection of the processed food industry in India.

used as a proxy of price differentials. FDI is measured as net inflows of foreign direct investment as a percentage of GDP.[10] Road density *(ROAD),* which is measured as total road networks divided by total population, is used as a proxy of infrastructure.[11]

Data on processed food exports and agricultural exports are from the United Nations Comtrade database (UNCOMTRADE), Revision 2 (Rev. 2) while real GDP per capita, agricultural products, agricultural price deflator, consumer and producer prices, trade to GDP, tariffs, total import value, total network of roads, private domestic credit, FDI, and total population are compiled from the *World Development Indicators* (CD-ROM) of the World Bank.

To examine the determinants of structural changes in food exports, an unbalanced panel econometric procedure is applied for six nonoverlapping 3-year periods, 79 developing countries with 262 panel (unbalanced) observations, during 1990–2006. The unit root test for panel data is first performed to ensure that there is no unit root for all dependent and independent variables. Because of stationarity of the data ($I(0)$), the level of both dependent and independent variables can be used without concerns on spurious regression. Both fixed and random effects are performed in this study. Equation (1) is rewritten in terms of fixed and random effects models as follows:

$$PROEX_{i,t} = \alpha_0 + \alpha_1 CS_{i,t} + \alpha_2 OPEN_{i,t} + \alpha_3 DC_{i,t} + \alpha_4 PIS_{i,t} + \alpha_5 FDI_{i,t} + \alpha_6 RER_{i,t} + \alpha_7 ROAD_{i,t} + \beta_i + \chi_t + \varepsilon_{i,t} \quad (2)$$

where β_i is the cross-sectional fixed effect for processed food exports of country *i*, to control for country specific characteristics,[12] χ_t is the time effect to control for time-specific shocks. Inclusion of the latter is to capture some time varying variables that may be missing from the simple specification in equation (2), and $\varepsilon_{i,t}$ is the independently and identically distributed error terms across countries and years.

[10] Because of data limitations, we opt to use total FDI data to proxy the role of MNEs in food industry. Non-FDI channels that could also perform by MNEs are not included in this paper. See also footnote 16 for non-FDI channels.

[11] Note that other infrastructure variables such as electric power consumption and transport services to total trade are also included but it becomes statistically insignificant and assumes an incorrect sign. This could result from small sample sizes of these variables leading to specification error.

[12] Note that world demand would be included in the cross-sectional fixed effect as this variable does not vary significantly across developing countries.

VI. Results

Table 6 reports the estimation result of the panel model. Random effect estimation is a preferred technique to fixed effect estimation in this study because the former model performs better in terms of key diagnostic tests, particularly normal distribution and stationarity of the error terms. The estimation results are corrected for serial correlation and heteroskedasticity. A limitation of the random effect estimator, compared to the fixed effect counterpart, is that it can yield inconsistent and biased estimates if the unobserved fixed effects are correlated with the remaining component of the error term. However, this is unlikely to be a serious problem in this study because the number of explanatory variables (*N*) is larger than the number of "within" observations (*T*) (Wooldridge 2002, chapter 10). The Hausman test could not provide an appropriate measure in choosing between random and fixed effects in this study because the model tends to violate two key assumptions of applying the Hausman test, namely strict exogeneity and homoskedasticity (Wooldridge 2002, chapter 10). Note that two-stage least squares is applied in this study to redress the possibility of simultaneity problem that could emerge between real GDP per capita and processed food exports.[13] Natural logarithms are applied to all variables. Because of better explanatory power and diagnostic tests, the estimation result reported in Table 6 is based on the model in which trade to GDP and the GDP deflators are used as proxies of trade policy regime and the RER, respectively.[14]

The statistically positive significance of real GDP per capita (*CS*) in the share of processed food exports in total agricultural exports (*PROEX*) supports the hypothesis that fast growing developing countries are relatively well placed to benefit from emerging trading opportunities in processed food (see Table 6, column B). This is because processed food products are rather luxurious in nature, compared to traditional food products, so that a large domestic market is needed to enable firms to achieve economies of scale and to reduce costs more easily to break into foreign markets. In addition, while production technology in improving and controlling the quality of processed food products tends to be more advanced in high- and middle-income groups, the ability to access world market becomes easier as various costs are reduced. A 1% increase in real GDP per capita would increase the share of processed food exports in total agriculture exports (*PROEX*) by almost 1%. A relatively elastic coefficient associated with *PROEX* implies that an improvement in GDP per capita is more important for processed food products than traditional agricultural exports resulting in structural changes in agricultural exports. The positive relationship between processed food exports and real GDP per capita is also found in Jaffee and Gordon (1993) and Athukorala and Sen (1998). In particular, the latter applies to a pooled cross-section procedure, with the first difference, to estimate the determinants of processed food exports for 36 developing countries during 1970–1994. The elasticity associated with the growth of per capita income is 1.2%. The slight differences in the estimation results would come from both different time periods and country coverage and differences in econometric procedures.

[13] The lagged value of real GDP growth per capita is applied as an instrumental variable.
[14] Results of other alternatives are available from the authors on request.

Table 6: Estimation Results

	Column A PROEX		Column B PROEX	
	Coefficient	**Coefficient**	**T-statistics**	**T-statistics**
Constant	-8.61	-3.11*	-8.94	-2.22*
CS	0.96	2.91*	0.99	1.86*
OPEN1	1.20	2.28*	1.34	1.51**
CS*OPEN1	-0.16	-2.46*	-0.18	-1.50**
DC	0.03	1.84*	0.06	1.87*
RER	0.02	0.22		
FDI	0.01	0.30		
PIS1	-0.02	-0.89	-0.02	1.58**
ROAD^2	0.01	6.55*	0.01	4.04*
Asiadummy	0.03	0.12		
Latindummy	-0.02	-0.14		
Europedummy	-0.02	-0.06		
No. of observations (group)	256 (79)		262 (79)	
R-sq	overall = 0.43		overall = 0.43	
SE	0.23		0.24	
Residual (unit root)	-5.44		-2.73	

* 5% significance, ** 10% significance.

CS = real GDP per capita (constant 2000 US$); *OPEN1* = trade to GDP; *DC* = domestic credit over GDP; *PIS1* = agriculture price instability; *RER* = real exchange rate (*eP*/P*); *FDI* = foreign Direct Investment Inflows as a percentage of GDP; *ROAD* = road density.

Note: (i) Time effects were not included in the fixed effect model because of their statistical insignificance.
(ii) Two-stage least square is performed. The lag value of real GDP per capita is used as an instrument.

The coefficient on *OPEN1* is positive and statistically significant. A 1% rise of *OPEN1* would lead to an increase in the share of processed food in total agricultural exports by 1.34%, other things being equal. Providing robust statistical support, superior export performance in processed food is closely linked with the openness of the trade policy regime. The relatively high value of the coefficient associated with *OPEN1* points out that the nature of trade policy regime is crucial in explaining intercountry differentials in export performance of processed food. Interestingly, the interaction term of *OPEN*1 with real GDP per capita (*CS*) becomes statistically significant. This implies that an increase in the degree of trade policy openness would result in less importance of domestic size in explaining the share of processed food in total agricultural exports. Compared to firms in the traditional agriculture sector, the size of the domestic market becomes less important in helping firms in the processed food sector to achieve economies of scale and reduce costs to break into foreign markets. A 1% increase in *OPEN*1 would lead to a decline in importance of *CS* by 0.18 percentage point so that the coefficient associated with *CS* would decline to 0.81.

In terms of trade facilitation, the estimated coefficient associated with road density (*ROAD*) is statistically significant in determining changes in the structure of agriculture exports (*PROEX*1). The statistical significance in this equation implies that an improvement in infrastructure, especially transportation, would benefit the processed food industry more than traditional agricultural products since the former tends to involve more

numerous members of food supply chains[15] than the latter. The coefficient corresponding to domestic credit (DC) also becomes statistically significant, reflecting the ability to access credits would help to expand processed food production and exports. A 1% expansion in domestic credit leads to 0.06% increase in the share of processed food exports in total agricultural exports.

Favorable macroeconomic conditions, in terms of price stability, are also important in expanding processed food exports. Price instability could eventually lead to a loss in cost competitiveness since risks and uncertainties related to costs of production could increase substantially, thereby reducing investment incentives in the processed food industry.

Interestingly, a statistical insignificance of the coefficient associated with FDI is revealed. This implies that an involvement of MNEs in processed food industries seems unlikely to stimulate processed food exports. The statistical insignificance of FDI in the processed food industry may result from the fact that there are some MNEs that tend to be involved only in the domestic market. This is particularly true for manufacturing food production, such as confectionery and ready-to-eat products. Because technology and capital used to produce these products are mobile in the world food market, and raw materials of these products are relatively nonperishable and inexpensive to transport, MNEs tend to locate their production close to consumers, and sell products mainly in domestic market. Thus, the positive effect from FDI to processed food exports, especially in terms of technology and export spillovers, could be distorted by the nature of processed food industry.[16]

We found statistical insignificance in the regional dummy coefficients, which could be used to reflect geographical proximity. Since processed food still contains some characteristics of traditional agricultural products, particularly perishability, geographical proximity becomes statistically insignificant in changing the structure of agricultural exports. However, Jongwanich (2009) found that geographical proximity seems to be one of the important factors in determining the ability to expand volume of processed food exports. In particular, it was found that coefficients associated with Asia, Europe, and Latin America are statistically significant. The significance of these three regional dummy variables could reflect the cost advantages emerging from their shortened distance from the key export destinations of processed food products, which are Europe, Japan, and

[15] According to King and Venturini (2007) there are five key processes involved in the processed food industry, namely, input supply, primary production, processing manufacturing, wholesale/retails/exports and consumers.

[16] Note that in the food industry, especially processed food, an involvement of foreign firms could also occur through non-FDI channels. Non-FDI channels refer to involvement of MNEs in the host countries' industries without equity participation. The relationship between MNEs and local suppliers would resemble general arm's length transactions in that these buyers and local suppliers contact each other to negotiate their commercial contracts, i.e., price, quantity, quality, delivery, and payments. This implies that if both FDI and non-FDI channels are included in the quantitative analysis, the positive and significant relationship between the role of MNEs and export performance of processed food may be revealed. However, the non-FDI channel could not be captured directly in quantitative analysis. To clearly understand the role of non-FDI channel, especially MNE buyers, firm interviews must be conducted. See for example Kohpaiboon (2006) for four case studies of Thai processed food industries and the involvement of non-FDI channels.

US. In particular, the coefficient associated with Europe is the highest among these three regional dummy variables. This could be because developed Europe is the largest export destination for processed food products so that developing countries in Europe could get more cost advantages than other developing countries in expanding their processed food exports.

VII. Implications for Developing Asia

As discussed in Section III, Asia has performed better than other regions in exporting processed food products over the past three decades, followed by Latin America and Europe. In Asia, processed food exports were concentrated in some countries of East and Southeast Asia, i.e., PRC, Malaysia, Indonesia, and Thailand. Over the past decade, the structural change of processed food has occurred in Asia. Southeast Asia has become less important and been replaced by countries in East Asia. Although the share of processed food exports in South Asia has been relatively stable, it was significantly lower than that in the early 1980s. This section reviews factors that support and constrain an expansion of processed food exports in Asia by combining the revealed coefficients in the previous section with recent developments in the independent variables in Asia as well as in other regions. Table 7 shows movements of the relevant independent variables in developing Asia and other regions during 1990–2005 while Figure 9 reveals the movements of these variables in each country of developing Asia during 1995–2005. It is found that size of domestic market, trade openness, and price stability tend to support an expansion of processed food exports in Asia, East Asia in particular. However, inadequate infrastructure and inability to overcome food safety standards are constraining an expansion of processed food exports, particularly in South Asian countries.

The level of income per capita in Asian countries, particularly in the PRC and India, increased noticeably during 2001–2005. On average, income per capita in Asia grew by 5.8%, compared to 4.9% and 1.3% in Europe and Latin America, respectively, during this period. Rising incomes have been associated with growing health consciousness and urbanization that contribute to changing dietary patterns of consumers. Although there are differences in the pace and specific features of these dietary changes, there has been a common shift toward increased consumption of processed food products, which have relatively high unit values and high income elasticity of demand, compared to staple food products. The expansion of domestic demand for processed food would help firms to reduce costs and achieve economies of scale to break into world markets.

Trade policy movements toward more liberalization in Asia also helps boost exports of processed food. Even though an index of trade to GDP could roughly measure the trade policy regime in a country, this index might, to some extent, reflect a possibility of exporters to break into the world market. In Asia, the ratio of trade to GDP has increased

continuously over the past two decades. The ratio increased to 60% in 2001–2005, from 44% in 1991–1995. The index was higher in Latin America, the second largest exporter of processed food. Exporters of processed food in Southeast Asian countries, Malaysia and Thailand in particular, are likely to benefit most from more trade liberalization. The ratio of trade to GDP, by contrast, was lowest in South Asia. This is consistent with the implied tax rate on international trade and transactions, which shows the highest level in South Asia (7%), compared to an average of 2% in Asia, 3% in Latin America, and 5% in Europe. Box 1 also shows that the average applied tariff rate on processed food in India tends to be higher than that in Southeast and East Asian countries. In particular, higher tariff on unprocessed food in India may distort incentives to produce and export processed food products.

Even though trade liberalization tended to be more pronounced in Southeast Asia, tariff escalation still limits expansion of processed food exports.[17] As mentioned in Box 1, distortions in the agricultural sector, particularly processed food, are still higher than in the manufacturing sector although many rounds of multilateral trade liberalization resulted in a decline in tariff and nontariff barriers. In particular, tariff escalation in the processed food industry provides incentives for producers to produce and sell in the domestic market. Rae and Josling (2003) found positive and high values of the effective rate of protection in the processed food industry in Asia, the Association of Southeast Asian Nations, and the PRC (0.24), compared to 0.014 in the US, and 0.04 in Australia, which are relatively close to their nominal rate of protection. They also found that comprehensive trade policy reforms in developing countries could contribute to growth in processed food exports, i.e., allowing developing countries with a comparative advantage in food production to expand exports and take advantage of increased market access to other developed and developing countries.

Price stability in terms of agricultural prices as well as general producer and consumer prices also help facilitate processed food exports. In particular, the fluctuation of agricultural prices in Asia over the past decade was far lower than that in Latin America and Europe. The low level of agricultural price fluctuations helps to reduce uncertainties of firms relating to costs of production. The relative stability of agricultural prices in Asia may be attributed to the development of contract coordination, which represents an intermediate institutional arrangement between spot market trading and the vertical integration of production and marketing functions (Jaffee and Gordon 1993).[18]

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[17] Tariff escalation is also evident in developed countries (Box 1). The raw materials often enter the developed markets with low or zero tariffs, either under a preferential system or as a reflection of the desire not to burden the importer's processing sector. However, an escalation of tariff level in developed countries could inhibit the growth of processing activities in developing countries (Rae and Josling 2003).

[18] Note that in some countries, agriculture price stability may be a result of implementing considerable price controls, floor prices, or buffer stocks. However, the effectiveness of such policies in controlling prices has been doubtful, especially over the medium to long term. Such policies would lead to market distortion and misallocation of resources, thereby adversely affecting producers and trade incentives.

Based on historical data, the relatively poor development of infrastructure tends to constrain the expansion of processed food exports in Asia.[19] Road density in Latin America and Europe was more than 6 kilometers/1,000 population during this period; it was only 2 kilometers/1,000 population in Asia. This could have implications for resource allocation to expand processed food production and exports. Land development, improved irrigation system, upgrading production technology, and improved physical infrastructure would result in agricultural and infrastructure development; would help firms to control quality of raw materials; and reduce risks of facing food safety standards imposed by developed countries.

VIII. Conclusion and Policy Inferences

This paper examines the determinants of structural changes in food exports from developing countries using panel data econometric analysis. Over the past three decades, processed food exports have shown greater dynamism compared to primary exports. In the early 2000s, processed food exports accounted for more than 60% of world food exports and around half of world agricultural exports. The dynamism of processed food exports has been contributed mainly by developing countries while the contribution from developed countries has been relatively stable. Rising incomes, growing health consciousness, urbanization, international migration, communication revolution, and international tourism have contributed to diet upgrades. Declines in tariff and nontariff barriers, both in developed and developing countries, have also facilitated the expansion of processed food trade. However, so far, not all developing countries have been able to reap the benefits from increased demand for processed food products.

The empirical model in this study suggests that trade policy openness and large domestic market size are the key factors that influence export success in processed food products. Good macroeconomic management, especially in terms of price stability, as well as adequate financial support and infrastructure could also facilitate an expansion of processed food exports thereby shifting agricultural exports toward processed food exports.

Compared to other regions, a significant expansion of domestic markets, trade policy openness and price stability help to increase the share of processed food in total agricultural exports in developing Asia. These factors were particularly important for East Asia, the PRC in particular, in expanding processed food exports in the world market. However, inadequate infrastructure tends to be a key constraint for an expansion of processed food exports in developing Asia.

[19] Note that transport services for exports, which is another indicator of infrastructure, also points out that infrastructure development in Asia is still lower than other developing countries. Transport services as a percentage of GDP in Asia was around 0.7, close to that in Latin America, but far lower than developing countries in Europe (2.3% of GDP). The lack of transport services for trade tended to become more serious in East and South Asia than other subregions.

To further develop the processed food industry in developing Asia, both quality and quantity of infrastructure need to be improved. This includes well-developed roads, railways, ports, telephone lines, power systems, terminal markets, storage, and processing facilities. Given the high level of domestic resource content of production, improvement in the agricultural sector would help to stimulate processed food exports in developing Asia. The improvement in the agricultural sector is related to upgrading land quality and irrigation systems as well as the ability to adequately access inputs such as fertilizers. In particular, upgrading production technology is an essential path to improve quality and productivity in the agricultural sector. Improvements in certain technologies would lead to more extended multiple cropping, improved taste and hygiene, and uniform output. Timing (seasonality) of production could be better controlled, thereby reducing risks and enabling producers to diversify their crop/livestock mix. To improve the agricultural sector and processed food industries, the government of developing countries must work to reduce distortions in credit market and to ensure that farmers and firms in processed food industries can adequately and equally access credits.

In addition to providing adequate financial resources, supporting vertical integration, either complete or partial, become important and relevant in the context of processed food industries. Logistic costs associated with the procurement of raw materials and/or the sale of finished products could be reduced. In particular, transport costs can be reduced, especially for bulky and perishable raw materials, as vertical integration involves bringing together in one location formerly distinct operating units. The level of required inventories can be reduced because internal planning allows for a better match of supply and demand in terms of quantity and location. Problems of risks and uncertainties could also be redressed. In particular, variability of supplies and output could be eliminated as more direct control over raw materials can be exercised under completed or even partial vertical integration. The reduction in risks and uncertainties could allow firms to better invest in highly specialized processing and marketing facilities, and to take advantage of potential economies of scale.

Even though tariffs in developing Asia in the agricultural sector have progressively declined, the higher tariff reductions on bulk commodities compared to processed food products still results in tariff escalation. The tariff escalation structure distorts economic incentives to export and provides the perception that a country is still protecting their processing industries, compared to unprocessed (primary) commodities. Trade policy reform that aims to reduce divergence of protection level between stages of production, e.g., a higher uniform cut in tariffs in processed food than unprocessed (primary) commodities would help increase efficiency in the allocation of resources and expanding processed food trade. In some developing Asian regions, South Asia in particular, a significant reduction in tariffs on primary (unprocessed) products would be needed to ensure that the tariff structure does not lead to negative effective protection in the processed food industries.

Table 7: Movements of Independent Variables, 2000–2005

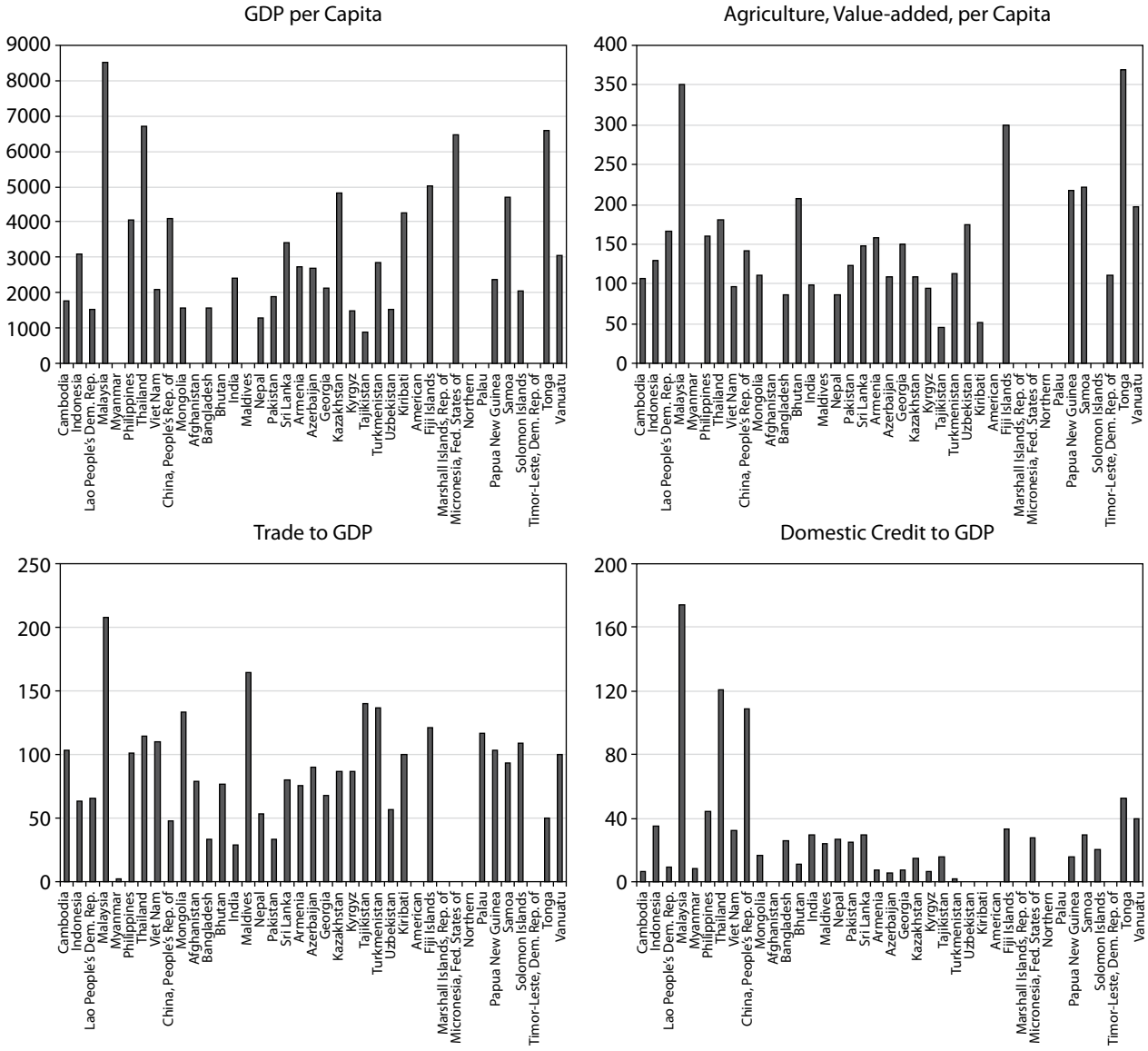
	GDP per Capita (US$)			GDP per Capita Growth (%)			Total Trade to GDP (%)			Domestic credit over GDP (%)		
	1991-95	1996-00	2001-05	1991-95	1996-00	2001-05	1991-95	1996-00	2001-05	1991-95	1996-00	2001-05
Asia	**598.9**	**804.8**	**1067.8**	**7.4**	**5.4**	**6.9**	**44.3**	**46.3**	**59.6**	**65.3**	**75.7**	**82.6**
East Asia	538.3	*829.6*	*1221.0*	*10.9*	*7.6*	*8.8*	*44.3*	*39.2*	*56.5*	*89.5*	*103.5*	*118.3*
Southeast	1217.9	1402.8	*1542.0*	*5.2*	*1.0*	*3.6*	*77.3*	*101.4*	*109.8*	*65.4*	*81.2*	*59.9*
South Asia	354.4	430.8	519.4	*3.1*	*3.7*	*4.9*	*22.9*	*27.3*	*35.9*	*23.3*	*25.2*	*32.8*
Central Asia	667.4	589.7	691.3	(14.7)	*5.9*	*7.7*	*117.0*	*81.6*	*93.0*	*9.2*	*5.2*	*7.9*
The Pacific	1029.7	1067.0	1069.9	4.1	(0.5)	*0.1*	*99.9*	*104.6*	*104.7*	*24.8*	*22.9*	*22.3*
Latin America	3934.0	4284.0	4387.5	1.9	1.6	1.1	33.3	40.4	46.0	39.4	30.5	27.1
Africa	**1409.2**	**1467.5**	**1605.5**	**(0.9)**	**1.4**	**2.6**	**53.6**	60.0	66.1	40.6	47.6	51.4
Europe	**2233.4**	**2303.1**	**2813.0**	**(5.0)**	**2.5**	**5.6**	**60.4**	68.5	76.4	15.4	17.0	23.4
Middle East	**1617.6**	**1766.6**	**2006.3**	**2.1**	**2.4**	**2.2**	**53.8**	**44.9**	57.2	28.7	35.1	42.5

	Real Exchange Rate (2000=100)			Agriculture Price Fluctuation*			Road Density (kilometers/1,000 population)		
	1991–95	1996–00	2001-05	2001-05	2001-05	2001-05	1991-95	1996-00	2001-05
Asia	**95.1**	**96.1**	**98.8**	**8.68**	**8.29**	**6.87**	**1.7**	**1.7**	**2.0**
East Asia	101.3	97.6	98.9	*8.95*	*7.06*	*6.59*	*1.1*	*1.1*	*1.4*
Southeast	83.5	95.1	100.1	*11.10*	*18.42*	*10.89*	*2.0*	*1.9*	*1.8*
South Asia	89.8	95.7	99.8	*6.55*	*4.51*	*4.69*	*2.4*	*2.7*	*3.0*
Central Asia	58.4	70.2	73.2	*19.46*	*16.30*	*9.94*	*4.7*	*4.7*	*3.2*
The Pacific	49.3	63.3	78.5	*2.16*	*8.93*	*9.85*	*3.8*	*4.2*	0.6
Latin America	**99.7**	**96.0**	**119.0**	**19.51**	**18.12**	**12.31**	**5.7**	**5.5**	**6.0**
Africa	160.4	106.4	92.5	**18.02**	**10.78**	**13.64**	**4.0**	**4.3**	**4.2**
Europe	**105.9**	**86.8**	**80.6**	**28.42**	**16.28**	**17.93**	**6.0**	**6.2**	**6.5**
Middle East	**153.6**	**125.6**	**184.8**	**17.15**	**9.66**	**6.76**	**2.5**	**2.6**	**2.7**

*Agriculture price fluctuation is an absolute value of the deviation of actual prices from their trends and an increase in real exchange rate refers to real depreciation.

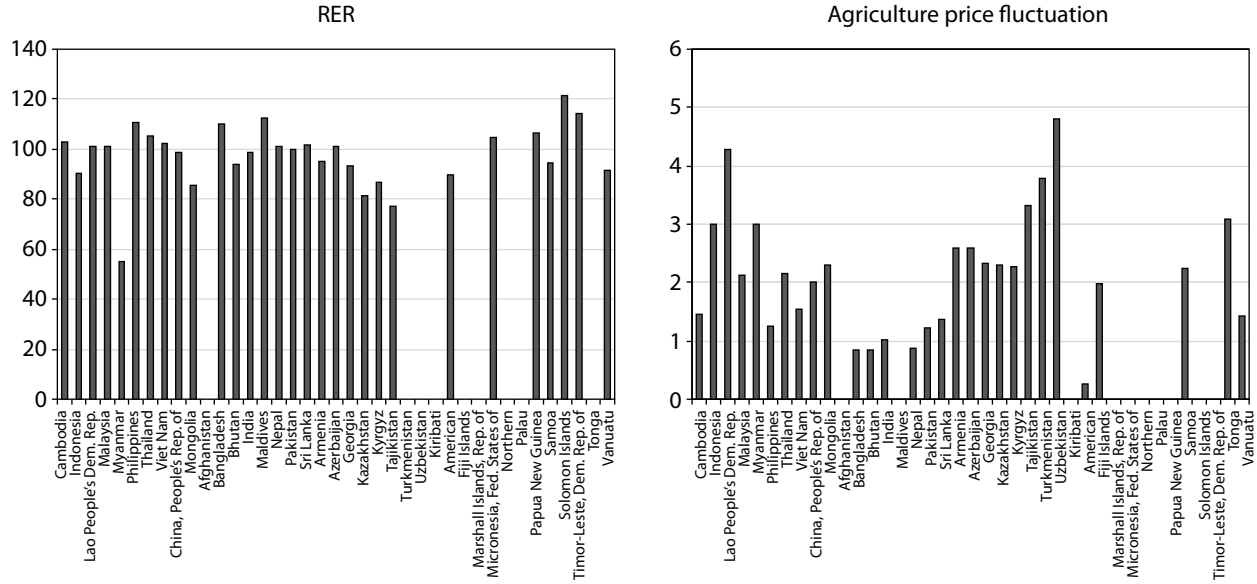
Source: *World Development Indicators* CD-ROM (World Bank 2008).

Figure 9: Movements of Key Independent Variables in Asia and the Pacific, 1995–2005



continued.

Figure 9: *continued.*



RER = real exchange rate.

Note: (1) Because of data limitations, information on some Asian and the Pacific countries is not complete.
(2) Unit measurements are the same as Table 7, except agriculture price fluctuation, which in this figure is reported in the logarithm formula.
(3) RER is during 2001–2005. An increase refers to real depreciation.

Source: *World Development Indicators* CD-ROM (World Bank 2008).

Appendix 1: List of Processed Food Products

Products	SITC	Product description
1. Meat products (SITC 01)	01	Meat and preparations
2. Dairy products (SITC 02-025)	02	Dairy products
	025	Eggs and egg yolks, fresh, dried or preserved
3. Fish products (SITC 03)	03	Fish, crustacean and mollusks and preparations thereof
4. Flour and cereals (SITC 046+047+048-0483-0488)	046	Meal and flour of wheat and flour of meslin
	047	Other cereal meals and flour
	048	Cereal, flour or starch preparations of fruits or vegetables
		Macaroni, spaghetti and similar products
	0483	Malt extract, cereals preparations with less than 50%
	0488	of cocoa
5. Vegetables (SITC 056-05645)	056	Vegetables, roots and tubers, prepared or preserved
	05645	Tapioca, sago and substitutes obtained from starches
6. Fruit, fresh or dried (SITC 058+05645)	058	Fruit, preserved and fruits preparations
7. Eggs and egg products (SITC 025)	025	Eggs and egg yolks, fresh, dried or preserved
8. Sugar preparations and honey (SITC 06-0611-0615)	06	Sugar, sugar preparations and honey
	0611	Sugars, beet and cane, raw, solid
	0615	Molasses
9. Coffee extracts, instant tea, cocoa-based products (SITC 0712+0722+0723+074)	0712	Coffee extracts, essences or concentrates
	0722	Cocoa powder, unsweetened
	0723	Cocoa butter and paste
	074	Tea and mate
10. Edible products and preparations (SITC 0149+0583+0483+0488 +098)	0149	Other prepared or preserved meat or meat offal
		Jams, jellies, marmalades, etc, as cooked preparations
	0583	Macaroni, spaghetti and similar products
		Malt extract, cereals preparations with less than 50%
	0483	of cocoa
	0488	Edible products and preparations
	098	
11. Processed vegetable oils (SITC 4 -4113-4232-4233-4234 -4239-4241-4242-4243-4244-4314	4	Animal and vegetable oils, fats and waxes
	4113	Animal oils, fats, and greases
	4232	Soya bean oil (crude refined or purified)
	4233	Cotton seed oil (crude refined or purified)
	4234	Groundnut (peanut) oil (crude refined or purified)
	4239	Other fixed vegetable oils, soft (crude refined or purified)
		Linseed oil (crude refined or purified)
	4241	Palm oil (crude refined or purified)
	4242	Coconut oil (crude refined or purified)
	4243	Palm kernel oil (crude refined or purified)
	4244	Waxes of animal or vegetable origin (crude refined
	4314	or purified)

Source: Athukorala and Jayasuriya (2005) but fresh fruits, vegetables, and nuts are excluded from the list of processed food products.

Appendix 2: Total Periods and Country Coverage in Econometric Analysis

Period	Included countries	Period	Included countries	Period	Included countries	Period	Included countries
1996-98	Albania	1993-95	Egypt	1999-01	Kenya	1993-95	Peru
1999-01	Albania	1996-98	Egypt	2002-04	Kenya	1996-98	Peru
2002-04	Albania	1999-01	Egypt	1993-95	Kyrgyzstan	1999-01	Peru
1990-92	Algeria	2002-04	Egypt	1996-98	Kyrgyzstan	2002-04	Peru
1993-95	Algeria	1990-92	El Salvador	1999-01	Kyrgyzstan	1990-92	Philippines
1996-98	Algeria	1993-95	El Salvador	2005-06	Kyrgyzstan	1993-95	Philippines
1999-01	Algeria	1996-98	El Salvador	1993-95	Latvia	1996-98	Philippines
2002-04	Algeria	1999-01	El Salvador	1996-98	Latvia	1999-01	Philippines
2002-04	Argentina	1993-95	Ethiopia	2002-04	Latvia	2002-04	Philippines
1996-98	Azerbaijan	1996-98	Ethiopia	1996-98	Lithuania	1993-95	Poland
1999-01	Azerbaijan	1999-01	Ethiopia	1999-01	Lithuania	1996-98	Poland
2002-04	Azerbaijan	2002-04	Ethiopia	2002-04	Lithuania	1999-01	Poland
1990-92	Bangladesh	1990-92	Fiji	1990-92	Madagascar	2002-04	Poland
1993-95	Bangladesh	1993-95	Fiji	1993-95	Madagascar	1996-98	Romania
1996-98	Bangladesh	2002-04	Gabon	1996-98	Madagascar	1999-01	Romania
1999-01	Bangladesh	1993-95	Gambia	1999-01	Madagascar	2002-04	Romania
2002-04	Bangladesh	1996-98	Gambia	1990-92	Malaysia	1996-98	Russia
1996-98	Belize	1999-01	Gambia	1993-95	Malaysia	1999-01	Russia
1999-01	Belize	2002-04	Gambia	1996-98	Malaysia	1996-98	Saint Kitts
1990-92	Bolivia	1996-98	Georgia	1999-01	Malaysia	1999-01	Saint Kitts
1993-95	Bolivia	1999-01	Georgia	2002-04	Malaysia	1990-92	Saint Lucia
1996-98	Bolivia	2002-04	Georgia	1993-95	Malawi	1993-95	Saint Lucia
1999-01	Bolivia	1990-92	Ghana	1996-98	Malawi	1996-98	Saint Lucia
2002-04	Bolivia	1996-98	Ghana	2002-04	Malawi	1999-01	Saint Lucia
1993-95	Brazil	1999-01	Ghana	1996-98	Mali	1996-98	Saint Vincent
1996-98	Brazil	2002-04	Ghana	1999-01	Mali	1999-01	Saint Vincent
1999-01	Brazil	1993-95	Grenada	2002-04	Mali	2002-04	Saint Vincent
2002-04	Brazil	1996-98	Grenada	1990-92	Mauritius	1990-92	Senegal
1996-98	Bulgaria	1999-01	Grenada	1993-95	Mauritius	1993-95	Senegal
2002-04	Bulgaria	1990-92	Guatemala	1996-98	Mauritius	1996-98	Senegal
1996-98	Burundi	1993-95	Guatemala	1999-01	Mauritius	1999-01	Senegal
1999-01	Burundi	1996-98	Guatemala	2002-04	Mauritius	2002-04	Senegal
2002-04	Burundi	1999-01	Guatemala	1990-92	Mexico	1996-98	Seychelles
1999-01	Cameroon	1996-98	Guyana	1993-95	Mexico	2002-04	Seychelles
2002-04	Cameroon	1999-01	Guyana	1996-98	Mexico	1990-92	Sri Lanka
1993-95	Cape Verde	1990-92	Honduras	1999-01	Mexico	1993-95	Sri Lanka
1996-98	Cape Verde	1993-95	Honduras	2002-04	Mexico	2002-04	Sri Lanka
1999-01	Cape Verde	1996-98	Honduras	1996-98	Mongolia	1990-92	Thailand
1993-95	Central African	1999-01	Honduras	1999-01	Mongolia	1993-95	Thailand
1996-98	Central African	1990-92	Hungary	2002-04	Mongolia	1996-98	Thailand
1999-01	Central African	1993-95	Hungary	1990-92	Morocco	1999-01	Thailand
1990-92	Chile	1996-98	Hungary	1993-95	Morocco	1990-92	Togo
1993-95	Chile	1999-01	Hungary	1996-98	Morocco	1993-95	Togo
1996-98	Chile	2002-04	Hungary	1999-01	Morocco	1996-98	Togo
1999-01	Chile	1990-92	India	2002-04	Morocco	1999-01	Togo

continued.

Appendix 2: *continued.*

1990-92	PRC	1993-95	India	1993-95	Mozambique	1990-92	Tunisia
1993-95	PRC	1996-98	India	1996-98	Mozambique	1993-95	Tunisia
1996-98	PRC	1999-01	India	1999-01	Mozambique	1996-98	Tunisia
1999-01	PRC	2002-04	India	1996-98	Nicaragua	1999-01	Tunisia
2002-04	PRC	1990-92	Indonesia	1999-01	Nicaragua	2002-04	Tunisia
1990-92	Colombia	1993-95	Indonesia	2002-04	Nicaragua	1990-92	Turkey
1993-95	Colombia	1996-98	Indonesia	1996-98	Niger	1993-95	Turkey
1996-98	Colombia	2002-04	Indonesia	1999-01	Niger	1996-98	Turkey
1999-01	Colombia	1996-98	Iran	2002-04	Niger	1999-01	Turkey
1990-92	Costa Rica	1999-01	Iran	1990-92	Oman	2002-04	Turkey
1993-95	Costa Rica	2002-04	Iran	1993-95	Oman	2002-04	Uganda
1996-98	Costa Rica	1990-92	Jamaica	1996-98	Oman	1996-98	Ukraine
1999-01	Costa Rica	1993-95	Jamaica	1999-01	Oman	1999-01	Ukraine
2002-04	Costa Rica	1996-98	Jamaica	1990-92	Pakistan	2002-04	Ukraine
1996-98	Croatia	1999-01	Jamaica	1993-95	Pakistan	2002-04	Uruguay
1999-01	Croatia	2002-04	Jamaica	1996-98	Pakistan	1990-92	Venezuela
2002-04	Croatia	1990-92	Jordan	1999-01	Pakistan	1993-95	Venezuela
2005-06	Croatia	1996-98	Jordan	2002-04	Pakistan	1996-98	Venezuela
1996-98	Dominica	1999-01	Jordan	1990-92	Panama	1999-01	Venezuela
1999-01	Dominica	2002-04	Jordan	1993-95	Panama	1993-95	Zambia
1990-92	Ecuador	1993-95	Kazakhstan	1996-98	Panama	1996-98	Zambia
1993-95	Ecuador	1996-98	Kazakhstan	1999-01	Panama	1999-01	Zambia
1996-98	Ecuador	2002-04	Kazakhstan	1990-92	Paraguay	1990-92	Zimbabwe
1999-01	Ecuador	1990-92	Kenya	1993-95	Paraguay	1993-95	Zimbabwe
2002-04	Ecuador	1993-95	Kenya	1996-98	Paraguay	1996-98	Zimbabwe
1990-92	Egypt	1996-98	Kenya	1999-01	Paraguay	2002-04	Zimbabwe

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About the Paper

Juthathip Jongwanich and Nedelyn Magtibay-Ramos show that over the past three decades, there has been a rapid expansion of processed food exports in developing countries, replacing traditional agriculture exports. Trade policy openness, large domestic market, good macroeconomic management, as well as adequate infrastructure help to promote the structural shift of food exports toward high value-added food products. However, they point out that tariff escalation structure in the agriculture sector and the relatively poor development of infrastructure in developing Asia tend to constrain the expansion of processed food exports.

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