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Processed food exports from developing countries: patterns and determinants

Prema-chandra Athukorala*
Department of Economics, Research School of Pacific and Asian Studies, The Australian National University, Canberra, ACT 0200, Australia

Kunal Sen
Department of Applied and International Economics, Massey University, Private Bag 11222, New Zealand

A noteworthy recent development in world trade is the rapid expansion of processed food exports. This development and its policy implications have received little attention in the literature on export-led industrialisation in developing countries (DCs). The purpose of this paper is to redress this oversight, firstly by providing an overview of the growth patterns of processed food exports and then examining the determinants of inter-country differences in growth performance. The results point to the growing importance of food manufacturing as a dynamic export line for many DCs. There is also evidence that the policy regime is far more important than resource endowments and other country-specific factors in explaining inter-country differences in export success in this product area, as in the case of conventional manufactured exports. © 1998 Elsevier Science Ltd. All rights reserved

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Introduction

The motivation for this paper stems from the on-going debate on market-oriented policy reforms and industrial restructuring in Chile over the past two decades. Following remarkable economic success achieved through market-oriented policy reforms since the mid-1980s, the Chilean economy is now widely held as a model for other developing countries (Edwards, 1995). The successful expansion of exports is considered one of the key factors that contributed to this impressive growth performance. Compared to other export success stories in the developing world, there is, however, a striking peculiarity in the emerging export pattern in Chile. According to the standard definition used in trade flow analysis,[1] the expansion of

*Corresponding author.
[1]According to this definition manufactured exports consist of all commodities belonging to Sections 5–8 less items 68 (non-ferrous metal) in the Standard International Trade Classification-SITC). Processed/manufactured food items are classified together with the related primary products.

manufactured exports has not 'materialised to any significant extent' (Helleiner, 1994, p. 15) and much of rapid export growth has continued to come from the so-called 'primary sector'.[2] Critics of market-oriented policy reforms draw upon this 'peculiar' Chilean experience to support the view that, under depressed world market conditions, 'radical liberalisation may not encourage restructuring' (Amsden and Van Der Hoeven, 1996, p. 520).

This interpretation is, however, inconsistent with the pattern observed in an analysis of the Chilean national trade data which are compiled according to the broader International Standard Industry Classification (ISIC). These data clearly show that the impetus for export expansion has come *not* from traditional primary goods but from new agro-based manufacturing activities, in particular various fish preparations and processed fruits. While 'conventional' labour-intensive manufactures too have demonstrated impressive growth dynamism in absolute terms, this has been dwarfed by the more dramatic growth record of processed agricultural goods. There is also evidence that these new product lines have many positive attributes according to which the contribution of manufactures to the objectives of industrialisation are normally evaluated (Meller, 1995). These include economy-wide linkages, important learning effects emanating from the mastery of new production technology, higher productivity, international marketing effort and entrepreneurial skills involved in export success.

Is this impressive growth of processed food exports a peculiar Chilean phenomenon, or does it point to an export-success story in which market-oriented reforms have enabled the Chilean economy to benefit from an emerging trend in world trade? It could well be that other developing countries which are endowed with agricultural, livestock and marine resources have also begun to benefit (or have the potential to benefit) from this phenomenon, but the available analyses of trade patterns based on the conventional (SITC-based) commodity classification system have failed to detect this important development (see footnote 1). This paper presents preliminary results of our research motivated by these considerations. We believe that our results have important implications for the current debate on the market opportunities faced by developing countries in the process of export-oriented industrialisation as well as the appropriateness of the standard practices in trade flow analysis.

The approach of the paper is as follows. In the second section a concordance is developed between SITC and ISIC classification systems to delineate processed food from primary agricultural products. The third section analyses the relative importance of processed food in total exports and their composition and product characteristics for a set of developing countries for which systematic data are available for studying the issue at hand. The fourth section attempts to examine the determinants of inter-country variations in food export growth, with emphasis on the relative importance of policy regime, resource endowments and the level of development in explaining inter-country differences in export performance. A final section summarises the findings, derives policy inferences and makes suggestions for further research.

Data compilation

The United Nation (UN) trade data system — the common source of data for the study of international trade patterns — is based on the Standard International Trade Classification (SITC). The SITC does not permit the direct identification of industrial products based on agricultural (and other natural) resources. To deal with this classification problem, we cross-

[2]The share of conventional (SITC-based) manufactures in total merchandise exports amounted to 5.6% in 1994, up from 4.5% in the mid-1980s.

referenced the SITC commodity listing at the 5-digit level to that of the international Standard Industry Classification (a classification by industrial origin) at the 4-digit level, using the UN commodity concordance (UN, 1994).[3] Using the list of commodities so obtained,[4] data were tabulated from UN trade data tapes (SITC Revision 3) held by the International Economic Data Bank (IEDB), Australian National University. Petroleum and petroleum-based products were excluded from the commodity coverage for obvious reasons.

To avoid selection bias, we started extracting data for all developing countries (96) covered in the UN data system. The countries finally chosen for the study (37 in number) were the ones for which data were available in the required form on a consistent basis for the period 1970–94. Despite data availability, the city states of Hong Kong and Singapore were excluded from the country coverage as, given the nature of the resource endowment, food processing was never an export option available to them.[5]

Patterns and product characteristics

Patterns

As is well-known, world merchandise trade over the past three decades has been characterised by a rapid growth of manufacturing exports. Based on the conventional definition,[6] their share in total exports increased from 66% in 1970 to 81% in 1994. This increase has been closely associated with the rapid expansion of manufacturing exports form developing countries. The developing-country share in world manufacturing exports increased from 6% in 1970 to 24% in 1994 (Table 1). Moreover, the share of manufacturing in total exports of developing countries increased from 27% to 79% between these two years.

While this structural change in world merchandise trade is now well-documented in the literature, a related development that has attracted relatively less attention is the significant increase in the share of processed food in total non-manufactured exports (total merchandise exports less SITC manufactures). Their share in world non-manufacturing trade increased from 26% in 1970 to 37% in 1994 (Table 1). This sharp rise in the share of processed food in world non-manufacturing exports is observed both in the case of developing and developed countries. The share of processed food in non-manufacturing exports increased from 30% in 1970 to 41% in 1994 for the former set of countries while for the latter set of countries, it increased from 24% in 1970 to 35% in 1994.

A detailed examination of the factors behind the growth of processed food in world trade is beyond the scope of this paper. However, *a priori* reasoning and some scattered evidence suggest a number of factors. A widely observed feature of consumer behaviour in the global economy has been an increasing 'internationalisation of food habits' — the increased importance of imported processed items (canned fruits and vegetables, cereals and breakfast foods, etc.) in food consumption patterns in developed countries as well as in large sections of the population in many developing countries. Factors such as international migration, the communications revolution and international tourism have contributed to this phenomenon. This may

[3]In the SITC system, processed food items are contained in divisions 0: food and beverages, 1: tobacco and 4: vegetable oils. The comparable sections in the ISIC system are industry groups 311–314.
[4]This list is omitted for reasons of space and is available from the authors on request.
[5]A significant amount of processed food from other neighbouring resource-rich countries is routed through these counties as part of entrepot trade. They also undertake some final stage processing of these items.
[6]See [1].

Table 1 Merchandise exports by major category and region

Categories			Developed countries	Developing countries	World
Total exports	US$ Billion	1970	229.7	38.5	268.2
		1994	287.9	916.1	3785.6
Manufacturing exports*	US$ Billion	1970	167.1	10.5	177.6
		1994	2342.0	725.1	3066.6
Non-manufacturing exports†	US$ Billion	1970	62.6	28.0	90.6
		1994	527.9	191.1	718.9
of which:					
Processed food exports	US$ Billion	1970	15.3	8.4	23.7
		1994	186.2	77.4	263.6
Processed food as a percentage of:					
Total exports		1970	6.6	22.0	8.8
		1994	6.5	8.4	7.0
Non-manufacturing exports		1970	24.4	30.2	26.2
		1994	35.3	40.5	36.7

*SITC 5–8 less 68.
†Total non-oil export less manufacturing exports as defined.
Source: Authors' computations based on UN trade data (Series D) tapes held in the International Economic Data Base of the Australian National University.

have provided a significant demand-side impetus to the growth of processed food exports from developing countries. On the supply-side, improvements in food technology, refrigeration facilities and transportation have made processed food items easily tradable across national boundaries.

Not all developing countries have, however, shared in the growth of processed food exports in the world economy (Table 2). Among the 37 countries, we find that some countries have performed far better than others in this area. For example, Bangladesh,[7] Bolivia, Chile, Indonesia, Korea, Malaysia and Thailand had annual growth rates close to or exceeding 15% in 1970–94.[8] In contrast, Cameroon, the Dominican Republic, Ghana, Nicaragua, Nigeria, Sudan, Senegal, Tanzania and Zambia exhibited annual growth rates of 5% or less. There is some indication that generally countries belong to the high- and middle-income groups (following the World Bank classification) have performed better compared to countries in the low-income category. Among the low-income countries, Bangladesh is a notable exception, with a growth rate of processed food exports that is more than double that of any other low income developing country.

Disaggregating exports by major category, we find that the growth rate of processed food has generally been significantly higher than that of primary products (Table 2). The growth

[7]Bangladesh's growth rate is for the period 1975–94.
[8]Another country which has experienced high growth in processed food exports (16% during 1980–94) in recent years, yet we were not able to include in our country sample for want of required data coving the full study period, is China. For details on China's experience in this regard see Fang (1996).

Table 2 Processed food exports and growth rate of exports by category

Country/country group	Processed food				Annual compound growth		
	1970		1994		Processed food	Primary products*	Manufacturing
	US$mn	%	US$mn	$			
Low-income countries							
Burundi	0.2	–	6.3	–	13.7	5.1	11.8
Bangladesh	5.1†	0.1†	319.0	0.7	21.8‡	0.7‡	14 c
Cameroon	24.4	0.6	36.8	0.1	1.7	7.5	3.8
Ghana	33.4	0.8	119.4	0.3	5.3	3.3	21.4
Honduras	19.3	0.5	148.0	0.3	8.5	4.4	7.7
India	210.8	5.3	2283.6	5.0	9.9	6.4	12.3
Ivory Coast	46.9	1.2	409.8	0.9	9.0	7.1	9.0
Kenya	19.0	0.5	140.3	0.3	8.3	7.7	9.3
Madagascar	23.3	0.6	88.6	0.2	5.6	2.5	5.8
Nicaragua	54.3	1.4	148.7	0.3	4.2	2.0	1.9
Nigeria	78.4	2.0	103.2	0.2	1.1	– 0.1	15.6
Pakistan	39.1	1.0	313.0	0.7	8.7	3.6	11.6
Sri Lanka	21.7	0.5	142.6	0.3	7.8	3.6	25.8
Sudan	16.1	0.4	48.0	0.1	4.6	0.4	17.0
Senegal	89.6	2.2	300.5	0.7	5.0	3.4	– 0.5
Tanzania	21.2	0.5	70.2	0.2	5.0	2.5	3.6
Zambia	4.3	0.1	8.9	–	3.1	– 0.8	14.4
Middle-income countries							
Bolivia	1.0	–	136.6	0.3	20.5	3.8	15.0
Colombia	39.2	1.0	662.3	1.4	11.8	7.9	16.8
Costa Rica	39.0	1.0	326.6	0.7	8.9	10.2	14.6
Dominican Republic	133.2	3.3	372.2	0.8	4.3	6.8	24.6
El Salvador	19.9	0.5	133.6	0.3	7.9	3.3	7.1
Guatemala	46.6	1.2	379.9	0.8	8.7	5.6	7.3
Indonesia	64.6	1.6	3402.1	7.4	16.5	9.5	31.0
Peru	406.8	10.2	1145.8	2.5	4.3	5.1	15.5
Philippines	359.9	9.0	1486.2	3.2	5.9	9.3	17.8
Thailand	60.2	1.5	7097.4	15.5	19.9	8.9	28.8
Tunisia	20.4	0.5	187.2	0.4	9.2	8.0	19.2
Turkey	123.2	3.1	2074.7	4.5	11.8	7.8	23.0
High-income countries							
Argentina	648.5	16.2	4611.7	10.0	8.2	6.7	12.7
Brazil	528.2	13.2	8390.1	18.3	11.5	7.2	17.4
Chile	33.0	0.8	2025.3	4.4	17.2	7.6	14.8
Korea	63.7	1.6	2192.8	4.8	14.7	12.4	20.6
Mexico	272.4	6.8	1787.9	3.9	7.8	9.4	20.0
Malaysia	167.7	4.2	5041.7	11.0	14.2	6.5	24.9
Taiwan	158.6	4.0	3753.4	8.2	13.2	12.4	18.1
Uruguay	103.1	2.6	511.6	1.1	6.7	8.1	12.0
Total sample countries	3996.1	100.0	50,405.9	100.0	10.6	7.1	18.2
All developing countries	8444.3	77,353.4	9.2	7.3	17.6		

*Non-manufacturing exports (as defined in Table 1) less processed food; †figure for 1975; ‡growth rate is for the period 1975–95 — less than 0.05%.

Source: Authors' computations based on UN trade data (Series D) tapes held in the International Economic Data Base of the Australian National University.

performance of conventional manufactured goods is generally superior, but there is a significant number of countries which have achieved higher or comparable growth in processed food exports.[9] Interestingly, one observes a stronger correlation between manufacturing export growth and processed food export growth than that between primary products export growth and processed food export growth — the correlation coefficient between the former two was 0.41 as compared to a correlation of 0.34 for the latter two for the period 1970–94. High-performing Asian economies such as Indonesia, Korea, Malaysia and Thailand, who have performed remarkably well in manufacturing exports, have also recorded impressive growth in processed food exports. There is convincing evidence that the domestic policy regime is the key determinant of the expansion of manufacturing exports from developing countries (Sachs and Warner, 1995). Viewed from this perspective, the closer correlation between growth rates of manufacturing and processed food exports provides some support for the hypothesis that the nature of the policy regime has played a more important role than resource endowments in contributing to the growth of processed food exports from developing countries. We test this hypothesis more explicitly in the next section.

Table 3 summarises data on the relative importance of processed food exports compared to (a) total exports, (b) total non-manufacturing exports, and (c) total ISIC manufacturing exports for the individual countries in 1970, 1980, 1990 and 1994. For most countries, processed food as a share of non-manufacturing exports has increased sharply over the period 1970–94. This pattern is particularly notable for countries with a superior overall export record during the period such as Chile, Thailand, Indonesia, Malaysia, Turkey, Tunisia, Guatemala, El Salvador and Sri Lanka. The importance of processed food in overall export performance is, however, not clearly observable when their share in total exports is used as the performance criteria because of the superior performance of (conventionally defined) manufacturing exports. For most countries, the share of processed food in total exports has remained stable or even fallen over time. This is particularly evident in the case of middle and high income developing countries, where in several instances, growth of manufacturing exports has far exceeded the growth rate of processed food exports.

A comparison of the share of processed food in total manufactured exports identified on the basis of the ISIC-based definition clearly suggests that the use of the conventional SITC-based categorisation may lead to a serious underestimation of the manufacturing export potential in several developing countries. For 19 of the 37 countries, processed foods have accounted for at least 20% of total ISIC manufacturing exports in 1994. In general, however, countries which have experienced a sharp increase in manufacturing exports in recent years (in particular, the high performing Asian economies) have witnessed a steady decline in the share of processed food in total ISIC manufacturing exports as the manufacturing sectors of these countries gradually diversified into other product areas.

Table 4 presents data on the commodity composition of processed food exports from developing countries. A notable development revealed by the data is the remarkable shift in the commodity composition over time. Export growth in recent years has come mostly come from commodities that were relatively less important in the 1970s. The most prominent of the new dynamic items has been processed fish, whose share in total processed food exports from developing countries increased from 6.7% in 1970 to 28.4% in 1994. According to disaggregated data for individual countries, in 1994 processed fish alone accounted for 40% of total processed food exports from 17 out of the 37 countries, compared to only four countries in

[9]On this point, see also Teitel (1989) and Athukorala (1991).

Table 3 Share of processed food in total (a), non-manufacturing (b) and ISIC manufacturing* (c) exports

		1970	1980	1990	1994
Low-income Countries					
Burundi	a	1.0	0.8	3.9	6.9
	b	1.0	0.8	4.0	7.1
	c	55.5	16.4	49.4	66.6
Bangladesh	a	2.4	6.1	11.7	10.7
	b	26.7	19	42.5	77.6
	c	2.5	8.3	13.8	11.0
Cameroon	a	10.8	11.4	7	3.1
	b	11.8	12	8.4	3.2
	c	56.0	67.7	29.2	43.6
Ghana	a	7.8	8.7	9.3	9.0
	b	7.9	8.8	11	12.1
	c	94.4	90.4	37.3	26.1
Honduras	a	11.8	18.8	17.7	24.2
	b	12.9	21.5	19.6	28.2
	c	58.4	60.0	65.3	62.8
India	a	10.5	10.5	7.2	8.8
	b	21.9	25.5	26.5	39.5
	c	16.9	15.1	9.0	10.2
Ivory Coast	a	10.1	14.0	20.9	14.7
	b	10.7	14.7	23.8	16.1
	c	62.6	74.7	62.9	62.8
Kenya	a	10.7	10.2	11.6	11.6
	b	12.5	12.5	17.6	14.3
	c	43.1	35.8	25.5	37.6
Madagascar	a	16.8	15.3	25.3	27.3
	b	18.1	16.4	29.6	31.3
	c	69.0	69.7	63.3	67.9
Nicaragua	a	31.1	31.3	40.5	43.2
	b	37.1	36.5	44.3	49.7
	c	66.0	68.9	82.4	76.9
Nigeria	a	15.3	11.5	9.3	11.5
	b	15.5	12.7	15.4	19.8
	c	89.8	55.8	18.9	21.5
Pakistan	a	5.7	4.1	3.3	4.3
	b	13.5	8.5	16.1	34.6
	c	9.0	7.3	3.9	4.7
Sri Lanka	a	6.5	2.6	2.8	4.5
	b	6.6	3.3	6.1	16.4
	c	82.2	10.6	5.0	5.8
Sudan	a	5.5	9.6	12.7	13.4
	b	5.5	9.6	13.1	13.8
	c	98.7	91.8	80.3	79.7
Senegal	a	57.5	49.8	57.8	73.7
	b	71.3	61.2	77.8	78.8
	c	74.8	72.9	69.2	91.9
Tanzania	a	9.6	7.7	11.0	15.7
	b	11.1	9.0	12.8	18.6
	c	41.4	34.1	44.4	49.6
Zambia	a	0.4	1.5	0.9	1.0
	b	0.4	1.5	0.9	1.1
	c	72.9	31.8	21.2	15.0
Middle-income countries					
Bolivia	a	0.5	7.3	9.9	15.2
	b	0.5	7.6	10.6	21.1
	c	12.7	65.6	61.4	35.3
Colombia	a	6.0	8.8	8.8	8.7
	b	6.6	11.0	13.6	15.2
	c	40.2	30.3	20.0	16.7

Continued overleaf

Table 3 Continued

		1970	1980	1990	1994
Costa Rica	a	17.0	16.1	13.9	9.4
	b	20.9	22.5	19.0	16.1
	c	47.5	36.1	33.9	18.5
Dominican Republic	a	62.3	52.2	15.9	10.3
	b	64.6	68.4	55.8	49.7
	c	94.5	68.9	18.2	11.5
El Salvador	a	8.8	8.6	10.3	16.5
	b	12.3	13.6	16.7	30
	c	23.3	19.2	21.2	26.9
Guatemala	a	16.1	13.8	23.9	25.8
	b	22.3	18.2	31.9	37.9
	c	36.5	36.1	48.9	44.7
Indonesia	a	9.1	11.8	12.2	11.3
	b	9.3	12.8	32.6	35.7
	c	84.2	59.2	16.3	14.1
Peru	a	39.2	13.7	19.3	29.6
	b	39.8	17.4	24.2	35.1
	c	96.5	39.2	48.5	65.2
Philippines	a	34.5	28.6	15.6	11.5
	b	37.4	36.3	25.4	20.8
	c	82.0	57.4	28.7	20.6
Thailand	a	8.8	13.5	18.9	15.9
	b	9.2	18	51.9	58.6
	c	65.1	34.9	22.9	17.9
Tunisia	a	11.5	2.4	5.2	4.2
	b	14.3	3.7	17.7	18.2
	c	36.8	6.1	6.8	5.1
Turkey	a	21.0	15.2	9.2	11.6
	b	23.0	20.9	30.1	43.8
	c	70.1	35.8	11.7	13.6
High-income countries					
Argentina	a	36.7	29.2	32.2	32.6
	b	42.7	38.4	47.0	51.5
	c	72.5	54.9	50.5	47.0
Brazil	a	19.4	31.3	22.6	19.7
	b	22.4	50.4	48.2	44.9
	c	59.3	45.2	29.9	26.0
Chile	a	2.7	10.3	14.3	18.4
	b	2.8	11.4	16.1	22.1
	c	38.2	52.8	55.8	52.1
Korea	a	7.7	6.6	3.0	2.3
	b	33.6	64.4	55	47.0
	c	9.1	6.9	3.1	2.4
Mexico	a	23.3	9.5	6.8	3.3
	b	35.1	19.9	22.2	27
	c	41.0	15.3	8.9	3.6
Malaysia	a	10.7	16.5	11.2	9.3
	b	11.5	22.0	32.8	45.1
	c	60.3	39.9	14.6	10.4
Taiwan	a	11.2	7.6	3.8	4.1
	b	46.9	70.3	54.9	51.6
	c	12.8	7.9	3.9	4.3
Uruguay	a	44.3	29.9	28.5	26.7
	b	55.4	48.1	46.6	46.8
	c	68.9	44.0	42.3	38.3

*Manufacturing defined as all commodities belonging to Section 3 of the International Standard Industry Classification (ISIC).

Source: Authors' computations based on UN trade data (Series D) tapes held in the International Economic Data Base of the Australian National University.

Table 4 Composition of processed food exports from developing countries (percentage shares)

Categories of processed food	1970	1980	1990	1994
Processed meat products	10.4	6.0	7.3	7.8
Dairy products	0.3	0.4	0.8	0.8
Processed fish products	6.7	11.5	26.4	28.4
Flour and cereals	0.9	1.1	2.0	2.7
Preserved fruits	3.4	3.3	7.2	5.0
Preserved vegetables	25.7	26.8	14.3	12.1
Sugar and molasses	23.7	23.9	9.4	7.5
Coffee extracts and chocolates	2.2	3.7	2.6	2.5
Preserved animal feeds	10.3	7.7	9.8	8.7
Margarine and food preparations	0.6	0.9	1.7	2.3
Beverages	3.0	1.4	2.7	3.2
Tobacco products	4.6	4.0	6.9	7.0
Animal oils	7.3	9.2	8.7	11.5
Vegetable oils	9.6	12.1	9.6	12.5

Source: Authors' computations based on UN trade data (Series D) tapes held in the International Economic Data Base of the Australian National University.

1970. There has also been an increase in the share of preserved fruit in processed food over time, though not as spectacular as in the case of processed fish. On the other hand, shares of 'traditional' items such as meat products, sugar and molasses, animal feeds, tobacco products and vegetable oils have either fallen or fluctuated erratically over time.

Characteristics

The emphasis on manufactured exports expansion in developing countries is rooted in the belief that, compared to primary commodities, manufactured goods have some intrinsic characteristics that contribute to superior growth performance. Employment potential, improvement in the terms of trade, knowledge and technology spillovers are among the most emphasised of these characteristics. To what extent do processed food exports meet these criteria?

Regarding the employment potential of resource-based manufacturing (including processed food), the received view based on standard trade theory (Heckscher–Ohlin model) is that an abundant supply of labour is not a key determinant of comparative advantage in international production (Roemer, 1979; Findlay, 1985). The dominant costs in the production process of resource-based products are capital charges and raw material inputs, and the most important factor substitution appears to be towards greater capital intensity to reduce raw material costs. Whether this generalisation is applicable to processed food is debatable. As we have already noted, there is no clear relationship between income levels (which is generally correlated with the availability of capital) and processed food export growth. Furthermore, unlike in the case of further processing of resources such as minerals and timber, final stages of food processing appear to be labour-intensive. This implies that the expansion of the processed food sector can have a strong positive effect on employment generation in the typical labour-surplus developing economy. While further research is needed on this subject, this view finds support from the

available factor proportion estimates for manufacturing production in China (Fang, 1996, Table 12) and Malaysia (Alavi, 1996, Table 5.4).

Whether export diversification will lead to terms of trade gains depends on the degree of income and price elasticities of demand for the commodities concerned. The data we have already analysed relating to overall demand trends suggest that processed food exports are superior to primary products in terms of these criteria. The results of the extensive analysis of the new dynamic agricultural exports by Islam (1988) and estimates of elasticities reported in Islam and Subramanian (1989) and Fang (1996) further corroborate this view. Preliminary results of our research-in-progress on agricultural exports from Thailand suggest that terms of trade movements of processed fish and fruit exports closely resemble that of traditional manufactured goods.

We believe that in terms of potential 'spread effects', processed food would be even superior to conventional manufactured goods. highly import-dependent. Processed food industries have a large domestic resource content and generally tend to be closely related to activities in the rural sector. By contrast, the production of conventional manufactured exports in developing countries is generally highly import dependent. This naturally implies lesser spread effect (through input linkages) on the domestic economy. Another aspect of spread effects of export performance is knowledge spillover—learning through interaction with foreign buyers, exposure to foreign technology and improving quality standards in face of stringent export competition. In a firm-level study of export performance in Chile, Meller (1995) undertakes an in-depth comparative analysis of process food exports and conventional manufactured exports relating to this aspect. According to his findings knowledge spillover from food exports is comparable, or even superior, to that from exports of labour intensive manufactured goods.

Determinants

From the study of the relative performance of developing countries in processed food exports in the previous section, we drew the hypothesis that inter-country differences in growth rates is influenced more by the trade policy regime (as in the case of conventional manufactured exports) than by resource endowments. More specifically, while resource endowments is obviously a pre-requisite, differences in country-specific resource endowments is relatively less important in explaining cross-country variation in the growth rate of processed food exports. In this section, we proceed to test this hypothesis by undertaking a cross-country econometric analysis.

The variable that we wish to explain is the annual compound growth rate of processed food exports over the period 1970–94 (denoted by *GPF*). The explanatory variables are outward-orientation (openness) of the policy regime (*OPEN*), agricultural resource endowment (*RE*), the growth rate of per capita income (*GY*) and the country size proxied by population (*POP*). Regarding *OPEN*, we postulate that the more outward-oriented the policy regime of a country, the greater is the ability to exploit new trading opportunities emerging in world markets and the higher is the export growth rate. *GY* is chosen as an explanatory variable to capture the potential positive influence of domestic demand expansion on export growth (Teitel, 1989, p. 325). The underlying hypothesis is simply that the production for the domestic market must be lucrative enough to enable firms to achieve economies of scale and thus to reduce costs enough to break into foreign markets. In developing countries processed food items normally belong to the 'luxury' consumer goods category. Domestic income growth is therefore a good proxy for domestic demand growth. *POP* is used as a proxy for the country size. A stylised

fact observed relating to trade orientation of nations is that forces working toward greater specialisation through foreign trade would be weaker in a larger country (Michaely *et al*., 1991, p. 118; Sachs and Warner, 1995, pp. 27–31). However, POP may also be capturing the favourable impact of domestic market size (operating through scale economies at the formative stage of output expansion) on export expansion. Whatever the nature of underlying causation is, it is necessary to control for the country size in order to delineate the impact of *OPEN* on export performance. Thus, the general model is:

$$GPF = F(OPEN, RE, GY, POP)$$

For the reasons discussed above, the sign of the regression coefficients of *OPEN*, *RE* and *GY* is expected to be positive, while that of *POP* can go either way.

We expect that there might be important interactions between *OPEN* and the other three explanatory variables (*RE*, *GY*, *POP*) in their impact on *GPF*. If the nature of the trade regime is the dominant determinant of export success then the impact of *RE*, *GY* and *POP* on *GPF* could be smaller in magnitude for open (outward oriented) economies compared to the average impact for all countries under study. Openness (outward orientation) is likely to reduce the important of domestic demand growth (*GY*) as a factor in determining scale economies. Likewise efficiency gains emanating from outward orientation could reduce the importance for export performance of relative cost advantages arising from differences in the resource endowment as measured by *RE*. Finally, the natural trade constraining effect and/or scale-economy considerations captured by *POP* may be of relatively less importance for exporters in outward oriented countries. After incorporating these interactions, the simple linear specification[10] of our estimating equation is:

$$GPF_i = \alpha + \beta_1 OPEN_i + \beta_2 RE_i + \beta_3 GY_i + \beta_4 POP_i + \beta_5 OPEN_i{*}RE_i + \beta_6 OPEN_i{*}GY_i + \beta_7 OPEN_i{*}POP_i + \mu_i$$

where i is country subscript and μ denotes a white noise error term.

The openness is measured in terms of a binary index (that takes value 1 for open economies and zero otherwise) based on Sachs and Warner (1995). Sachs and Warner (1995) employ the following policy criteria to distinguish countries with closed (inward-oriented) policy regimes from those with open (outward-oriented) policy regimes: (i) non-tariff barrier coverage of intermediate and capital goods imports 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. Using the detailed information provided in this study on the chronology of trade policy reforms of individual countries, we identified a country as open if *none* of the above five conditions was applicable for the period from 1982 (the mid-year of the study period) though to 1994 (end of the sample period).[11]

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[10]We tested the linear specification against the log-linear specification of the model (that is, a specification in which all variables except *OPEN*, which is a binary variable, are expressed in logarithms) using for alternative tests: *PE*-, *BM*-, *DL*- and *S*-tests. (For details and references on these tests See Pesaran and Pesaran, 1997, Sections 10.9 and 18.8). All these tests rejected the log-linear specification over the linear specification. The test results are available from the authors on request.

[11]The open economies are: Bolivia, Chile, Indonesia, Ivory Coast, Korea, Sri Lanka, Malaysia, Thailand and Taiwan.

RE is proxied by the share of food, both processed and unprocessed (corresponding to SITC categories 0, 1 and 4) in total exports in 1970. *GY* is the annual compound growth of per capita income over the period 1971–94. The variable *POP* is the population (in millions) of the country in the mid year (1982) of the sample period.[12] Pre-testing of the original sample of 37 countries using the Cook (1977) ratio indicated that Bangladesh was a clear outlier among the countries considered.[13] The regression analysis was, therefore undertaken excluding Bangladesh from the sample.

The results are reported in Table 5.[14] Equation (1) is the basic specification without the interaction terms. Equation (2) corresponds to the complete model. The only variable that has

Table 5 Determinants of growth of processed food exports (*GPF*) from developing countries: regression results[a]

Independent variables/test statistics	Equation (1)	Equation (2)	Equation (3)
Constant	5.649 (3.035)	2.156 (1.089)	2.101 (1.073)
OPEN	6.538 (4.080)**	16.578 (4.635)***	16.774 (4.749)***
RE	–0.003 (0.145)	0.039 (1.573)*	0.041 (1.583)*
GY	0.683 (1.468)*	1.246 (2.161)**	1.238 (2.168)**
POP	0.004 (0.869)	0.005 (1.171)	0.006 (1.331)*
*OPEN*RE*	–0.140 (3.127)***	–0.140 (3.167)***	
*OPEN*GY*	–1.180 (1.984)**	–1.160 (1.902)**	
*OPEN*POP*	0.017 (0.680)		
F	9.176***	8.448***	9.964***
F/R^2	0.483	0.598	0.600
S.E.	3.462	3.052	3.025
RESET	0.828	0.117	0.025
NORM	0.436	1.791	1.719
HET	1.182	0.146	0.187

[a]*t*-ratios of regression coefficients are given in brackets with statistical significance denoted as: *** 1%, ** 5% and * 10%. Sample size is 36.

Test statistics: *RESET* = Ramsey test for functional form mis-specification; *NORM* = Jarque–Bera test for normality of error term; and *HET* = White test for heteroskedasticity. *RESET* and *HET* statistics are based on the *F*-distribution, while the *NORM* statistic is distributed as χ^2. The related null hypothesis is not rejected at the 1% level in all cases.

[12]Data on per capita income and population are obtained from World Bank (1984, 1994).

[13]As noted in the first section, Bangladesh had one of the highest growth rates in processed food exports among developing countries during the period under consideration, although it was a 'closed economy' during much of this period. This remarkable export performance in the context of a seemingly unfavourable policy environment is an issue that needs further investigation, but is beyond the scope of this study.

[14]As already noted, the data set used is cross-sectional, with each country representing a single data point for the study period (1970–94). As the referee has correctly pointed out, the use of inter-country cross-sectional data in econometric estimation has the limitation that long-term averages tend to ignore changes that may have occurred over time in a given country. Such data also make it difficult to control for unobserved country specific differences ('fixed effects'). These limitations can be avoided by using a panel data set compiled by pooling time-series data (preferable in the form of five-year averages, to allow for erratic short-terms fluctuations) for the countries under study. Unfortunately this preferred data choice is not possible given the unavailability of a continuous (rather than a binary) index of the restrictiveness of trade policy regimes (*OPEN*). (Of course, relevant annual data are available on all other variables.) It is of course possible to identify regime shits in individual countries over the study period using information provided in Sachs and Warner (1995). However, given that the overwhelming majority of countries in the sample have not experienced any clear-cut regime shift (closed to open or vice versa) throughout the entire period of study, a pooled time series on *OPEN* constructed in this manner would naturally lack sufficient variability required for robust econometric estimation. For this reason, to generate superior results using a panel data set, one has to begin with a major research effort to construct a continuous index of openness for a sufficient number of countries over a period of adequate length. This is a priority item on our research agenda.

a *t*-ratio of less than unity in this regression is the interaction of OPEN with POP. We therefore re-estimated the equation after deleting this variable [Eq. (3)]. The coefficient estimates for the other variables are remarkably resilient to this variable deletion. All three equations pass the *F*-test for overall statistical significance statistically significant at the 1% level and performs well in terms of the standard diagnostic tests for functional form specification, normality and heteroskedasticity. It is clear from a comparison of equations (1) and (3) (or equation (2)) that the incorporation of the interaction of openness with the other three explanatory variables has greatly improved the results, both in terms of the overall significance of the equation (in terms of the *F*-test) and the statistical significance of most individual regression coefficients.

The coefficient on *OPEN* is significant at the 1% level or better with the expected (positive) sign in all equations, providing robust statistical support for the proposition that superior export performance in process food is closely associated with the openness of the trade regime. The results for *GY* supports the hypotheses that fast growing developing countries are relatively well placed to benefit from emerging trading opportunities in this area. There is also some (albeit weaker) statistical evidence of the relevance of the agricultural resource endowment (*RE*) for success in process food exports. The coefficients on the interaction of *OPEN* with *GY* is statistically significant with the expected sign (negative), supporting our *a priori* expectation that the effect of domestic demand expansion on export performance is smaller the more open the country is to foreign trade. Likewise the result for the interaction of *OPEN* and *RE* is consistent with the view that differences in resource endowments count less for differences in export performance among open economies than that among closed economies. All in all, the proposition that it is the nature of the policy regime and not the initial resource endowment that is crucial in explaining inter-country differentials in growth performance in processed food exports is amply supported by the results of our econometric exercise.

Conclusions

This study has sought to document and analyse at some length a hitherto neglected new development in world trade, namely the increasing importance of processed food as an internationally trade commodity and the new opportunities for developing countries in this sphere. In the absence of any previous systematic analysis, our study has essentially been preliminary and exploratory in nature. Further research is needed to shed light on the developmental implications of this emerging phenomenon for developing countries focusing on employment and terms of trade implications and dynamic spread effects. However, our analysis yields a number of inferences relating to trade policy and trade flow analysis.

There is clear evidence that processed food exports have shown greater dynamism compared to primary exports. In some country cases, the degree of dynamism has even been comparable to that of conventionally-defined manufactured goods. Our analysis of the comparative export performance of sample countries clearly suggests that while resource availability is fundamental, export success in this area depend crucially on the nature of domestic policy. Thus, our findings add to the existing evidence against the widely held ‘demand-constraint’ arguments on the limits to an export-led growth strategy.

There is evidence that these new product lines have many growth-conducive attributes similar to that of standard manufactured goods. These include important learning effects emanating from the mastery of new production technology, higher productivity, and entrepreneurial skills gained through marketing efforts in a competitive environment. Furthermore, given the higher

domestic content of production (that is lower import dependence), these products seem to have greater spillover effects on the domestic economy.

The widespread practice based largely on the experience of resource-poor NICs has been to consider agricultural production and the promotion of manufactured exports as largely separate areas of activity. Our results suggest that to maximise gains from export-led industrialisation, these two areas should be viewed as a continuum in the development process.

In many developing countries, it has become fashionable to place overwhelming emphasis on the promotion of 'new' labour-intensive manufactured exports while neglecting or paying inadequate attention to opportunities for the promotion of agro-based industrial activities. This policy bias is evident both in various export incentive policies and in policies relating to the approval and monitoring of foreign investment. The study suggests that such a bias is significantly, if not totally, rooted in the standard (SITC based) classification procedure adopted in trade flow analysis. There is a clear case, then, for a broader and disaggregated treatment of product lines in order to identify new dynamic product areas with a view to providing clear guidance for policy formulation and evaluation.

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