UNITED NATIONS UNIVERSITY
UNU-WIDER
World Institute for Development Economics Research

Research Paper No. 2008/28

Export Productivity and Specialization in China, Brazil, India and South Africa

Amelia U. Santos-Paulino*

March 2008

Abstract

This paper analyses the patterns of export productivity and trade specialization profiles in the China, Brazil, India and South Africa, and in other regional groupings. In doing so, the investigation calculates a time varying export productivity measure using highly disaggregated product categories. The findings indicate that export productivity is mainly determined by real income and human capital endowments. Importantly, the study reveals significant differences in the export productivity and specialization patterns of countries with comparable per capita income levels. For instance, China's export productivity and implied export sophistication is in line with that of countries with higher per capita incomes, including some OECD industrial economies.

Keywords: export productivity, trade specialization, comparative advantage

JEL classification: C23, F1, O5, O40

* UNU-WIDER, Helsinki; email: amelia@wider.unu.edu

This study has been prepared within the UNU-WIDER project on the Southern Engines of Global Growth.

UNU-WIDER acknowledges the financial contributions to the research programme by the governments of Denmark (Royal Ministry of Foreign Affairs), Finland (Ministry for Foreign Affairs), Norway (Royal Ministry of Foreign Affairs), Sweden (Swedish International Development Cooperation Agency—Sida) and the United Kingdom (Department for International Development).

ISSN 1810-2611 ISBN 978-92-9230-074-6

Acknowledgements

I am indebted to Miguel León-Ledesma for helpful discussions in the early stages of the research. I also thank José R. Sánchez-Fung, and participants at the UNU-WIDER Project Meeting on 'The Southern Engines of Global Growth—China, India, Brazil and South Africa' held 12-13 January 2007 in Beijing, China, and at the Global Development Network (GDN) 8th Annual Conference on 14-16 January 2007 for helpful comments and suggestions. Leticia Arroyo-Abad provided excellent research assistance. The usual disclaimers apply.

Acronyms

EXPT export productivity index

LAC Latin America and the Caribbean

RCA revealed comparative advantages

UNU World Institute for Development Economics Research (UNU-WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Typescript prepared by Liisa Roponen at UNU-WIDER

1 Introduction

China and India's outstanding economic performance and their remarkable role in the global economy have generated a great amount of attention and research. This largely reflects their active international trade activities and their role in financial markets. This is also echoed in their rapidly growing exports, and in their increasing demand for imports. Economic performance in Brazil and South Africa has been less dramatic. However, these countries are growth engines for developing countries in general, and for their regional neighbours in particular.

The specialization pattern and an increasing higher value added of the exports of China, India, Brazil and South Africa have important implications on productivity and economic growth in these countries. Existing research shows that the variety of goods that a country produces and exports is affected by knowledge spillovers and specialization which, in turn affects economic growth (Busson and Villa 1997; Amable 2000; Hausmann, Hwang and Rodrik 2007; Rodrik 2006). Moreover, the available evidence implies that a country's pattern of specialization and exports could be as important as openness to international trade. In this regard, Farberger (2000) shows that countries that have managed to increase their presence in the technologically most progressive industries (e.g., electronics) have experienced higher productivity growth than other countries (see also Farberger 1994).[1]

Moreover, understanding the determinants of export patterns is paramount to economic performance in general, and to development economics in particular. For developing countries, exports are a major source of foreign exchange, a way to maximize economies of scale and specialization, and a channel to new technologies and knowledge spillovers (Lall 2000; Santos-Paulino 2002).[2] Greenaway, Morgan and Wright (1999) study export-growth dynamics, and demonstrate that there is not only a strong positive connection between exports and growth, but that the composition of those exports is important in determining the strength of growth.

In this regard, the pattern of exports and specialization has evolved during the last years in developing countries, particularly in China, Brazil, India and South Africa (CIBS) and other newly industrialized countries. Several trends have emerged, including: first, a decline in the relative importance of primary product exports (principally food), which initially were weighty in most cases; second, initial importance and subsequent relative decline in textile, clothing and footwear exports from these economies; and, third, a rise in the export share of skill-, capital- and technology-intensive goods, such as electrical machinery, chemicals and pharmaceuticals, computer and communications equipment. Notably, some of these goods embody advanced, international best-practice technology.

This paper seeks to understand the patterns of export productivity and trade specialization in CIBS. To achieve that end, the study estimates a time varying export

---

1 Lucas (1988, 1993) and Grossman and Helpman (1991) develop theoretical models in which countries that specialize in technologically progressive/high tech activities will evidence high rates of productivity growth compared to other countries.

2 See also Falvey et al. (2004) for an assessment of exporting and its impact on exports and productivity growth at the firm level. The authors show that exporting has a sizeable impact on industry productivity growth, which is independent of the links between exporting and firm productivity.

productivity measure using highly disaggregated product categories, and analyses the determinants of export productivity. The study also assesses the trade specialization profiles of CIBS and other country groupings by estimating trade specialization indexes which help to better understand export productivity in these economies.

The rest of the paper is organized as follows. Section 2 describes the trade specialization indicators and the composition of exports under various taxonomies. Section 3 analyses export productivity. Section 4 concludes.

2 Trade specialization

To illustrate how specialization might affect a country's export productivity, a set of well-known trade specialization indicators is examined using detailed industry level data, namely the inter-industry specialization, the trade dissimilarity, and the export concentration indexes (Amable 2000).[3] These variables reflect the structure of exports and imports of a country. This section also looks at the composition of the CIBS and other countries' export baskets using Lall's (2000) industry classification at a very fine level of disaggregation. This will also aid in further understanding the export productivity patterns in the countries under study.

2.1 Trade specialization indicators

Inter-industry specialization index

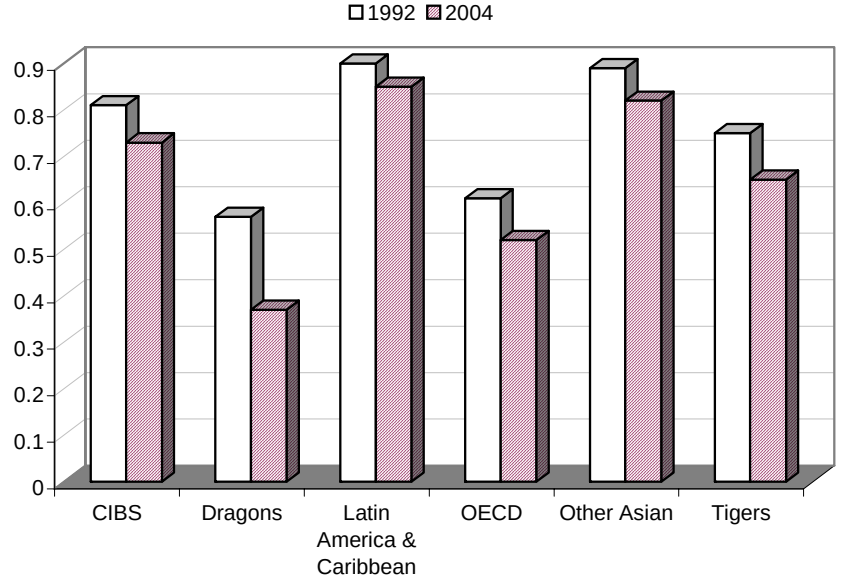
The index also, known as the Michaely index, assesses the dimensions of a country's export performance and competitiveness (Michaely 1962). It also monitors the evolution of export diversification for products and for markets. The index is defined as:

$$I_j = \frac{1}{2}\sum_k \left| \frac{X_{jk}}{X_j} - \frac{M_{jk}}{M_j} \right| \tag{1}$$

where k is the product and j is the country. X represents total exports and M total imports. The higher I_j, the more trade balances are dissimilar between industries, implying that inter-industry specialization is more pronounced. A country's specialization pattern should reflect such structural phenomena as factor endowment, economies of scale, relative gap of factor productivity, or specific advantages of firms and industries. Developing countries in general, and CIBS, Latin American and other developing nations in Asia, are highly specialized in comparison to other higher income (e.g., OECD) economies, although the degree of specialization decreased marginally over the period analysed. Such patterns can be observed in Figure 1 and Table A6 in the Appendix. For instance, in the CIBS and the 'dragons' (Hong Kong, Singapore or South Korea), the specialization profiles are associated with relatively high growth rates.

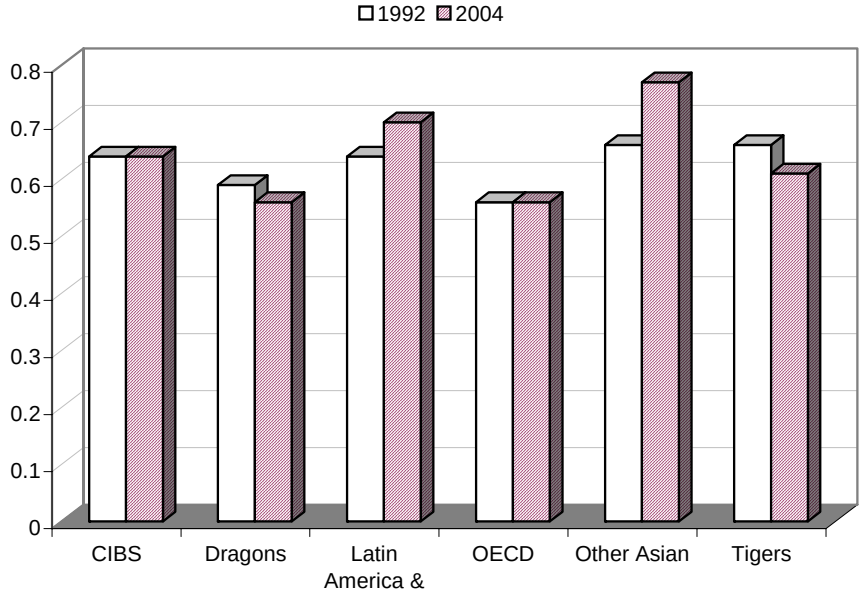
3 Data compilation based on ComTrade, HS1992 at 6 digits.

Figure 1
Inter-industry specialization index



Source: Appendix Table A4.

Figure 2
Trade dissimilarity index



Source: Appendix Table A5.

Trade dissimilarity index (TDI)

This indicator reflects the adequacy of a country's trade pattern or specialization, that is, it considers the uncertainty in the real growth of exports. The indicator tries to predict structural changes in a country's exports. Also, it evaluates if a change in the behaviour of exports is oriented towards more dynamic products demanded by the rest of the world, or by the main trade partners of a country. This index is calculated as follows:

$$A_j = \frac{1}{2}\sum_k \left| \frac{X_{jk}}{X_j} - \frac{X_k}{X} \right| \qquad (2)$$

The trade dissimilarity indicator is higher when a country exports commodities in an industry with relatively low international demand. Typically, more advanced or larger countries have lower dissimilarity indexes (i.e. their trade structure is rather similar to world's trade) than less developed and smaller economies. Most of the developing countries in the sample fall under the mid-range of specialization, except for South Africa, India and other Asian economies. In the period covered, the dissimilarity index evidenced little variation, whereas China's trade structure converged more towards the structure of global trade. As indicated by the empirical exercise in Amable (2000), a decrease in the TDI has a potential positive impact on the trade pattern of growth.

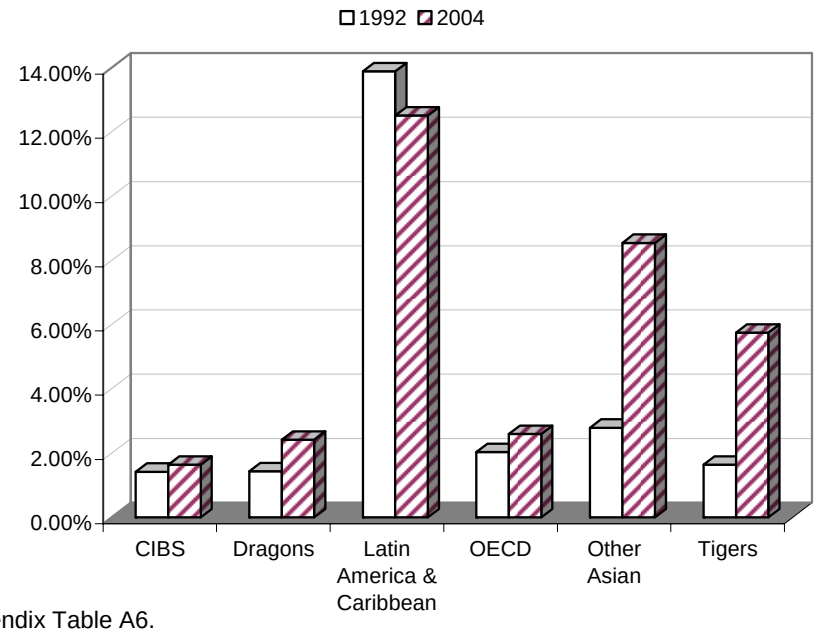
Export concentration

The Herfindahl-Hirschmann (H-H) export concentration index measures the degree to which country's *j* exports are dispersed over various products (UNCTAD 2005). It is normalized to obtain values ranking from 0 to 1 (where 1 is maximum concentration), and is computed using the formula:

$$XHERF_j = \sum_i \left[\frac{X_{ij}}{X_i} \right]^2 \qquad (3)$$

Over the 1992 period, India and South Africa recorded a low degree of export diversification, according to the H-H index. In the Latin America region, export concentration is very pronounced in comparison to other developing country groups, where some countries are affected by the weight of a single exporting product or commodity (e.g., copper in Chile). In Brazil, export diversification is also relatively low in comparison with China. This might have serious implications for economic performance in the region, especially in terms of competition from fast-growing developing economies such as China and India. Some authors suggest that high export concentration (or even a slight reversal in export diversification) is mostly determined by a dynamic growth of specialized exports, which tend to expand much faster than other exports (Ng and Yeats 2003).

Figure 3
Export concentration index



Source: Appendix Table A6.

2.2 Exports composition analysis

Lall (2000) identifies export sectors which promote dynamic comparative advantages, where the processes are described on the basis of technology-intensity, skills and capability-building criteria. The following taxonomies are provided: Primary products; Resource-based products; low-tech products; medium-tech products; high-tech products.[4] This mapping is presented in Figures 4 and 5. In this study, the classification is done at a very fine level of detail using UN COMTRADE (3-digit SITC Rev2).

The composition of exports and the technological specialization of different regions are greatly diverse, and this is partly explained by the countries' strategies to promote exports.[5] The results show that manufactured exports dominate in developing countries, particularly resource- and low technology-based manufacturing. However, East Asian countries (e.g., Singapore and South Korea) have a considerable share of high-technology/high skills exports, which are not necessarily a 'statistical illusion', as Lall (2000) expresses it. That is, they specialize not just in low technology-labour intensive (assembly operations) but in processes with a large domestic content and underlying technology and innovation. It is also worth noting the significant decrease in the share of primary products exports in China: from more than 12 per cent in 1990 to around 2 per cent in 2004, and low-medium technology manufactures, and an accompanying increase in engineering and high-technology products during the same period, the latter increasing by more than 500 per cent (Figure 4a and 4b). This performance can be rationalized by the importance of the electronics sector, with an emphasis on product design—mostly high skills with intensive linkages, in contrast with the low technology-labour embodied manufacturing activities that ruled until the early 1990s. India also portrays significant shares of primary product and low-medium technology manufactured exports. However, the proportion of primary products' exports (mostly foodstuff) has decreased by around 50 per cent during the last decade. There has also been a compositional shift from low technology to medium technology manufactures (i.e., more skill- and scale-intensive processes such as engineering). The country has recently emerged as a platform for global research and development (R&D) manufacturing activities mostly in software, pharmaceutical and service sectors. However, this information is not shown in the standard industry and trade data. Therefore, the proportions of engineering and high technology exports are lower than otherwise should be. This might bias the empirical estimates, particularly the export productivity figures.

The case of Latin America is more complex to rationalize, given the heterogeneous nature of specialization in the region. For example, Chile represents an outlier in terms of its specialization in minerals and resource-based manufactures, which are basically concentrated in copper. Latin America's revealed comparative advantages are well

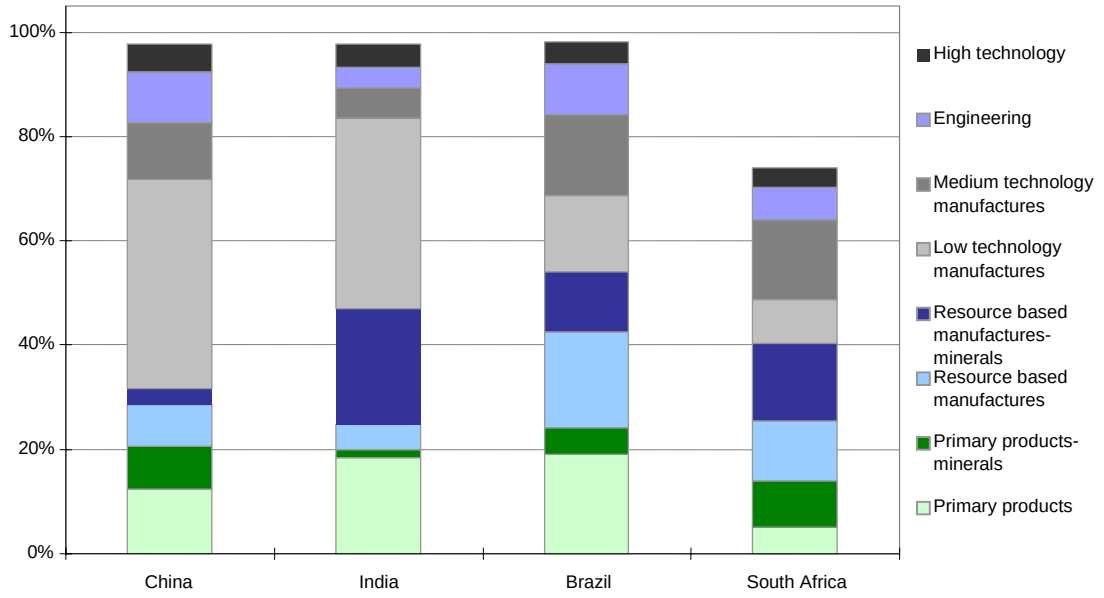
---

4 The detailed classification criteria and the sectors' taxonomies are presented in Tables A7, A8, and A9 in the Appendix.

5 A typical example is the concessions granted under the import substitution industrialization (ISI) strategy ISI restructuring. The main policy tool was trade liberalization or strong export incentives. Incentives were also nurtured under regional trade agreements. China and India in Asia, and Brazil and Mexico in Latin America are examples of industrial policy to develop competitiveness. However, in some instances, ISI deviated from its goals because of deficiently cocoordinated industrial policy to upgrade skills, technology, institutions and infrastructure.

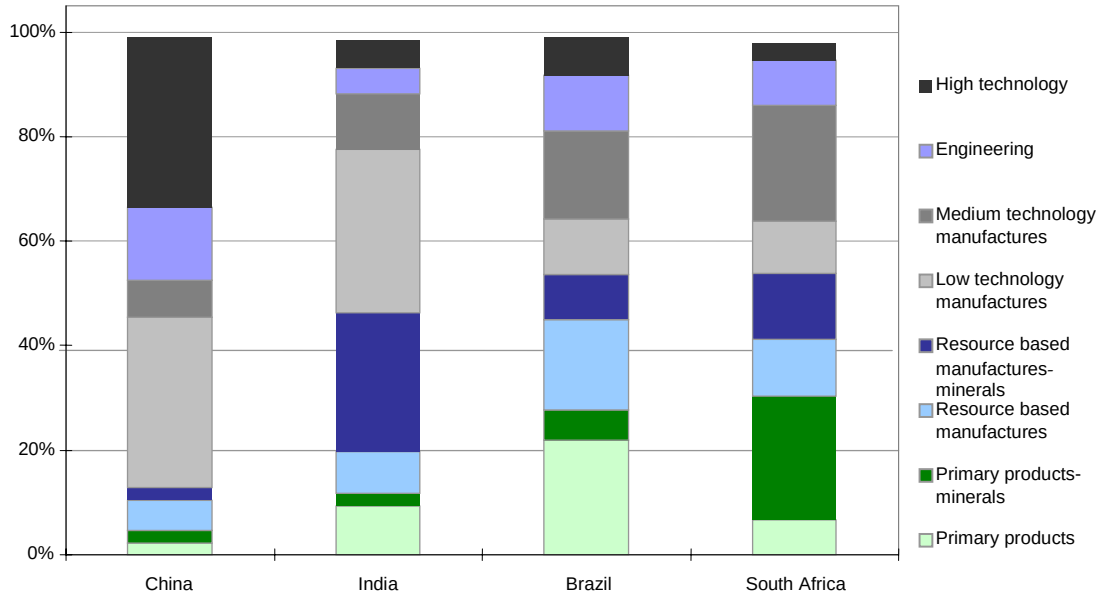
defined within the resource-based manufactures, with the exception of Mexico. Mexico is an outlier, accounting for most of the region's manufactured exports, as a result of labour-intensive export oriented activities by US firms following the North America Free Trade Agreement. Brazil is the main country responsible for Latin America's concentration in resource-based high-tech manufactures and, together with Chile, for its comparative advantage in resource-based low-tech manufactures. Costa Rica is the only Latin American country to reveal comparative advantage in non resource-based high-tech manufactures (Chami Batista 2004).

Figure 4a
Export composition by main sectors, 1990*



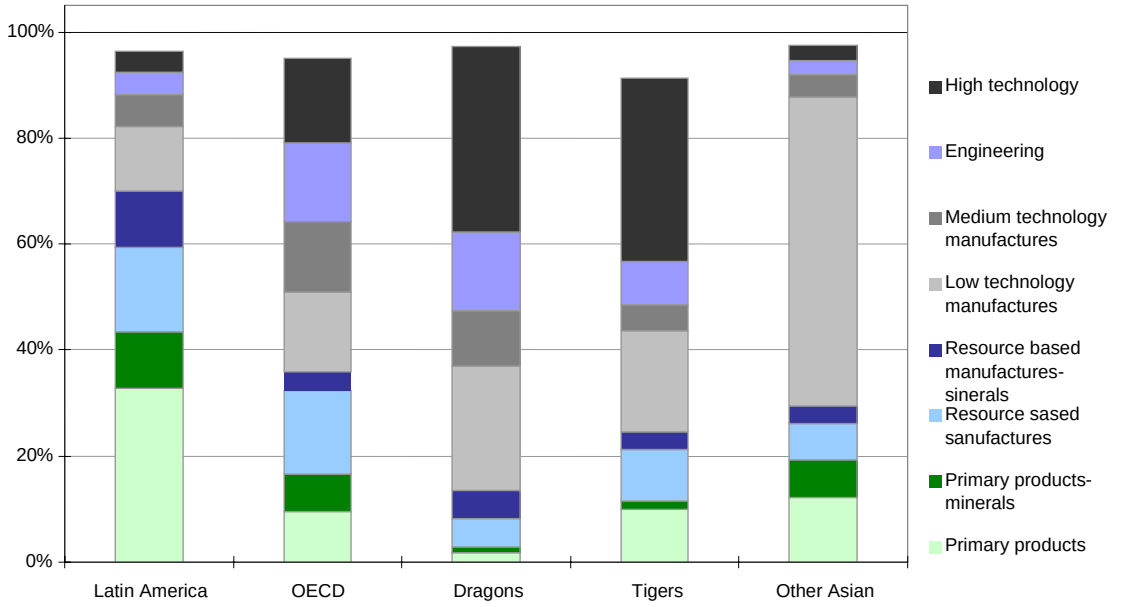
Note: * for South Africa, data refer to the year 2000.

Figure 4b
Export composition by main sectors, 2004



Source: Both Figures 4a and 4b computed from Appendix Table A8.

Figure 5
Mean export composition by main sectors and groups, 1990-2004



Source: Computed from Appendix Table A8.

In Africa, South Africa also distorts Sub-Saharan Africa's figures, as its manufacturing value added and manufactured exports account for more than 50 per cent of the sub-continent's trade. The figures evaluated in this section substantiate the emerging patterns of developing countries exports baskets, particularly in manufacturing. This composition might help to explain exports productivity and its determinants, and cannot therefore be neglected.

3 Export productivity

3.1 Export productivity index

This session documents the estimation of the export productivity index (*EXPY*) developed by Hausmann, Hwang and Rodrik (2007), a quantitative indicator which sorts traded goods in terms of their implied productivity. It represents an improvement in the traditional measures of a country's revealed comparative advantages (RCA), which basically compares the relative proportion of the country's exports of a particular good with relation to those of a country or region, and the dynamic changes in such proportions. Instead, the main contribution of *EXPY* is that it takes a weighted average of the per capita incomes (GDP) of the countries exporting a commodity, where the weight reflects the RCA of each country in that product, that is, an income-productivity level that corresponds to a country's export basket.

First, an income-productivity measure (*PRODY*) associated to each good is calculated. *PRODY* is the weighted sum of the per capita GDP of countries exporting a given product, and thus represents the income level associated with each of these goods. Let

countries be indexed by *j* and goods be indexed by *l*. For any given year, the value of total exports of country *j* equals $X_j = \sum_l x_{jl}$.

Then, the *PRODY* index for good *k* is:

$$PRODY_k = \sum_j \frac{x_{jk} / X_j}{\sum_j \left(x_{jk} / X_j \right)} Y_j \tag{4}$$

where, Y_j denotes the per capita GDP of country *j*. The numerator is the value-share of the commodity *k* in the country's overall export basket. The denominator aggregates the value-share across all countries exporting the good. As explained by Hausmann, Hwang and Rodrik (2007), using export shares instead of export volumes as weights, tries to assurance that an adequate weight is given to exports that are important to smaller poorer countries (i.e., countries with lower per capita incomes).

In turn, export productivity (*EXPY*) for country *i* is given by:

$$EXPY_j = \sum_l \frac{x_{jl}}{X_j} PRODY_l \tag{5}$$

That is, the export productivity indicator is a weighted index of the representative income associated with a country's exports, where the weight is the value share of a particular commodity in the country's total exports.

Data sources and definitions are detailed in the Appendix. The trade data are from COMTRADE (HS 1992 at 6 digits). *PRODY* and *EXPY* are estimated using real GDP per capita (1994 constant prices).

3.2 Export productivity in CIBS and other country groups

The basic descriptive statistics on *EXPY* are summarized in Tables 1 to 3, and Figures 6 and 7. They show a high variation in the values of *EXPY* within the sample, and within the country groups. Also, even though the estimations are based on highly disaggregated product categories, there is still a wide variation in the unit values of the commodities produced and exported by different countries.

CIBS, which are main focus of this study, reflect relatively high export productivity in comparison to other developing country groups. This is mostly dominated by China and India, whose *EXPY* values are very large relative to their per capita GDP, and this validates the findings of Hausmann, Hwang and Rodrik (2007). Figure 6 also shows that China's export productivity exceeds that of Brazil, India and South Africa significantly. Furthermore, as shown in Figures 6 and 7, China a low-income country, portrays an export productivity level higher than that of countries that are notably richer (e.g., Mexico). Also the scatter plots in Figure 7 illustrate how China's export productivity level is in the range of such rich countries' productivity as the United Kingdom and the United States. For example, between 1992 and 2004 average *EXPY* in the UK is US$17,747, whereas China's average *EXPY* for the same period is US$14,096, that is, a difference of US$3,650, which is less significant than the relative income gap between the two countries (US$19,662 during 1992-2004 on average). The countries with higher

export productivity records are all high-income economies followed closely by countries with a high-technology based such as Singapore.

Table 1
Export productivity over time

	Brazil	China	India	South Africa	Dragons	LA & Caribbean	OECD	Tigers
1992	11,450.70	10,277.99	8,159.11	–	13,714.54	8,191.97	15,669.89	10,355.92
1993	12,143.63	11,895.99	8,675.43	–	15,129.57	8,829.75	16,031.18	11,898.38
1994	12,527.30	12,604.96	9,087.76	–	15,928.53	8,793.30	17,624.45	12,826.24
1995	12,764.74	13,535.70	9,747.57	–	16,499.97	8,894.55	18,017.29	13,628.92
1996	12,281.75	13,371.15	9,617.41	–	15,995.30	9,115.36	17,411.51	12,578.87
1997	12,716.11	13,803.90	9,650.26	–	16,244.90	9,264.64	17,874.17	13,023.06
1998	12,939.09	13,960.38	9,814.67	–	16,409.69	9,271.92	18,196.16	12,491.18
1999	13,704.27	14,728.72	10,372.38	–	17,487.01	9,732.91	20,219.51	13,355.31
2000	14,365.00	15,455.71	11,265.97	13,287.78	18,235.46	10,175.24	20,659.16	14,413.69
2001	14,006.21	15,641.70	11,847.81	13,794.06	17,987.57	10,176.52	20,586.95	14,538.38
2002	13,931.59	15,991.53	12,115.12	15,222.75	18,382.85	10,690.03	20,751.98	14,426.64
2003	14,282.55	16,051.48	12,210.18	15,133.53	18,376.46	10,946.75	21,099.21	14,468.23
2004	12,321.83	15,941.02	10,984.64	14,366.47	17,954.53	8,245.46	20,634.78	14,374.39

Source: Author's calculations.

Table 2
EXPY summary statistics (by year)

	Mean	Std dev.	Min	Max	Observations	
1992						
overall	11,635.16	3,901.82	5,041.45	18,424.05	N =	37
between		3,901.82	5,041.45	18,424.05	n =	37
within		-	11,635.16	11,635.16	T =	1
1995						
overall	13,061.50	5,260.93	4,735.70	36,200.46	N =	56
between		5,260.93	4,735.70	36,200.46	n =	56
within		-	13,061.50	13,061.50	T =	1
2000						
overall	14,580.02	6,178.34	6,504.07	39,401.93	N =	68
between		6,178.34	6,504.07	39,401.93	n =	68
within		-	14,580.02	14,580.02	T =	1
2004						
overall	14,135.54	6,934.83	2,489.80	37,187.48	N =	61
between		6,934.83	2,489.80	37,187.48	n =	61
within		-	14,135.54	14,135.54	T =	1
1992-2000						
overall	13,195.33	5,372.04	3,601.74	39,401.93	N =	511
between		5,991.76	5,290.03	36,982.91	n =	70
within		1,064.10	8,547.96	20,972.34	T-bar = 7.3	
2001-04						
overall	14,827.61	6,254.05	2,489.80	39,168.53	N =	257
between		6,221.74	5,531.08	38,326.55	n =	70
within		1,090.49	7,174.80	18,614.22	T-bar = 3.67143	

Table 3
Summary statistics (by country groups)

	Mean	Std dev.	Min	Max	Observations
All					
overall	13,741.55	5,730.42	2,489.80	39,401.93	N= 768
between		6,037.54	5,410.55	37,471.50	n = 71
within		1,305.37	6,142.49	22,175.14	T-bar = 10.8169
CIBS					
overall	12,682.91	2,097.77	8,159.11	16,051.48	N = 44
between		1,868.99	10,272.95	14,360.92	n = 4
within		1,294.49	8,863.95	14,637.44	T-bar = 11
Latin America & Caribbean					
overall	9,514.40	2,659.57	2,489.80	16,931.98	N = 307
between		2,396.34	5,410.55	15,337.90	n = 29
within		1,263.70	1,915.34	13,459.47	T-bar = 10.5862
Other Asian					
overall	12,001.34	5,288.00	4,016.85	32,276.31	N = 82
between		5,231.93	6,245.15	23,842.73	n = 10
within		1,674.50	8,010.54	20,434.92	T-bar = 8.2
OECD					
overall	19,010.23	5,162.33	12,121.03	39,401.93	N = 262
between		5,824.02	14,026.28	37,471.50	n = 22
within		1,198.20	15,768.76	21,846.43	T-bar = 11.9091
Dragons					
overall	16,876.96	1,435.65	12,763.79	19,199.00	N = 38
between		532.04	16,551.62	17,483.39	n = 3
within		1,365.51	13,089.13	18,857.79	T-bar = 12.6667
Tigers					
overall	13,383.66	1,730.33	10,056.70	16,271.36	N = 35
between		1,114.86	12,098.65	14,323.94	n = 3
within		1,489.26	9,714.86	16,464.71	T-bar = 11.6667

This pattern might reflect the composition of both countries' export baskets (as noted in section 2.2), dominated mostly by high comparative advantages commodities and productive sectors. Moreover, as Rodrik (2006) and Hausmann, Hwang and Rodrik (2007) assert, China has a well-balanced and diversified export basket. China's phenomenal success in evolving to a specialization in the production and export of highly sophisticated/high skills/technology products is not just the result of classical comparative advantages of specialization, increasing international trade or the massive foreign direct investment into the country. It has been very much shaped by timely government intervention in manufacturing, mostly consumer electronics (Rodrik 2006).

India's performance, besides the role of export composition in the productivity performance, has benefited from a combination of domestic efforts including progressive economic policies, intellectual property right laws compliant with the World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), and a high intellectual infrastructure. That has worked alongside emerging trends such as the internationalization of R&D activities (engendering high science-based product and development), the globalization of economic and production systems, and the evolution in global communication. The

sustained development of the service sector, mainly the miscellaneous sector which includes software, has also contributed to the country's remarkable performance in recent years.

In the instance of Brazil (and other Latin American countries), exports are heavily concentrated in primary products or resource-based manufactures, which tend to have lower export productivity and, hence, lower productivity values.

Figure 6a
Export productivity in CIBS

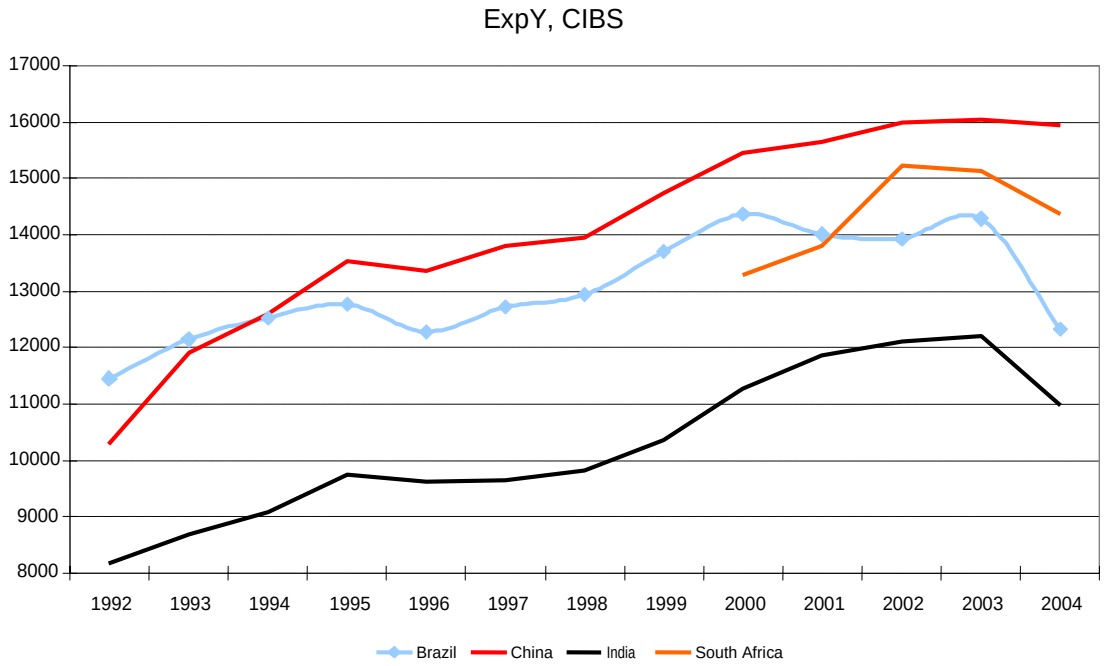
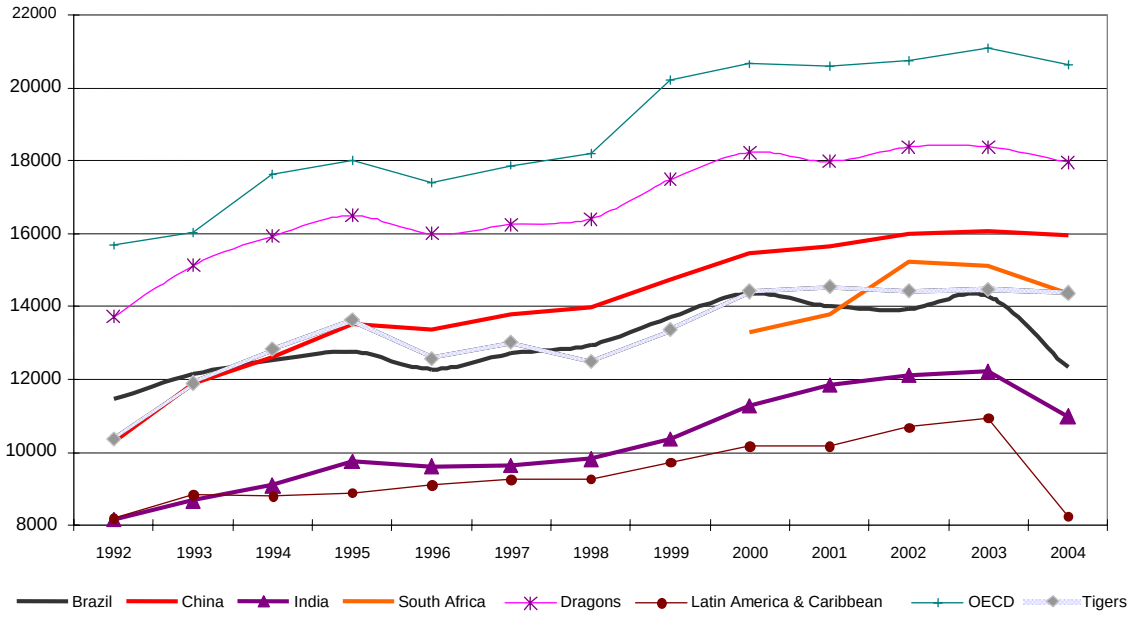
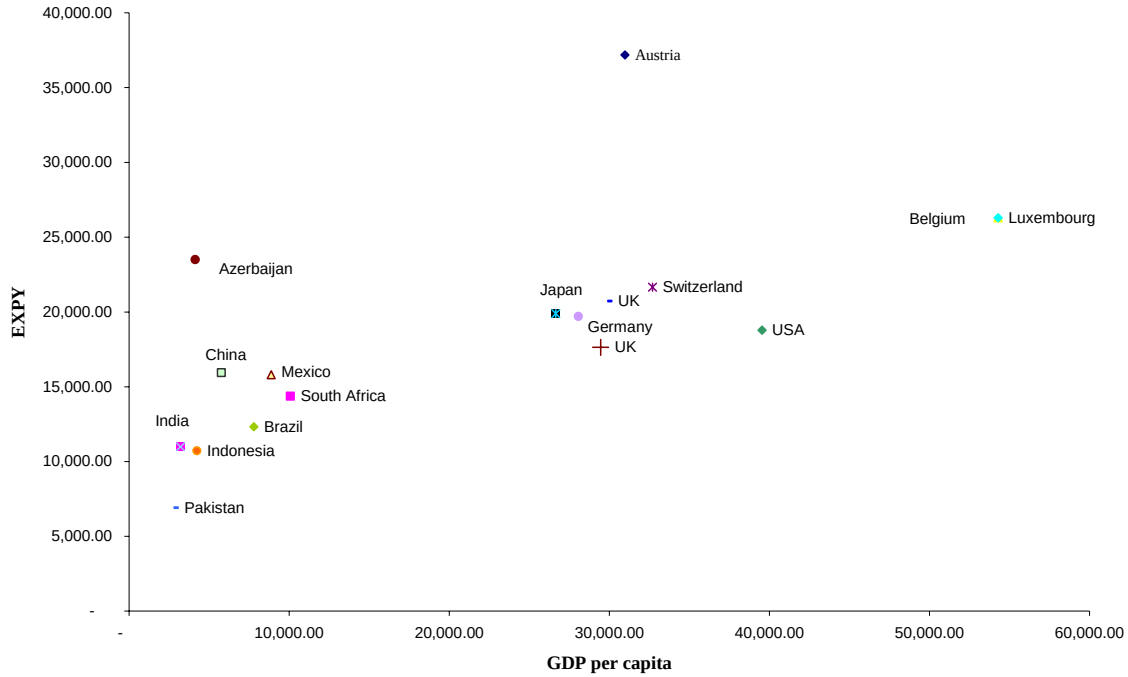


Figure 6b
Export productivity in CIBS and other country groups



Source: Both Figures 6a and 6b computed from Table 1.

Figure 7
Correlation of export productivity and real GDP per capita in selected countries



Source: Computed from Table 1.

3.3 Determinants of export productivity

According to standard export growth estimations, export performance can be regarded mainly as a function of external demand (or foreign GDP) and relative prices. As stated by Hausmann, Hwang and Rodrik (2007), besides the high correlation between per capita GDPs and *EXPY*, specialization patterns are determined by a country' fundamentals, that is human and physical capital endowments, labour, and natural resources, alongside the quality of their institutions. Considering these economic and idiosyncratic factors, export productivity (*EXPY*) is defined as:

$$EXPY_{it} = \alpha_i + \partial_t + \beta_1 RER_{it} + \beta_2 PCY_{it} + \beta_3 HC_{it} + \beta_4 EF_{it} + \beta_5 Land + \beta_6 POP + \varepsilon_{it} \qquad (6)$$

where α_i and ∂_t are country-specific and year-specific effects in panel data, *LRER* is the real exchange rate (a proxy for relative prices), *LHC* is human capital, *EF* measures the degree of economic freedom,[6] and *POP* is the country size (population). The variables and data sources are described in the Appendix.

To test for the effects of the determinants of export productivity, (6) is estimated using two forms of panel data models for a sample of around 60 countries, over the period 1990-2004. The first is the fixed effects estimator which includes dummy variables to

6 The Heritage Foundation's index of economic freedom measures ten specific factors, including freedom in the business environment, trade, fiscal policy, government, monetary policy, investment, financial, property rights, and corruption. The lower scores on a factor the higher the level of government interference in the economy and the lower the economic freedom.

account for individual country-specific effects. The second is the dynamic panel data model based on generalized methods of moments (GMM) (Arellano and Bond 1991, 2001). This estimation controls for the endogeneity of other explanatory variables. The instruments used are based on lagged values of the explanatory variables.

The results from the empirical estimations are reported in Table 4. The findings are consistent with previous studies of *EXPY* determinants (e.g., Hausmann, Hwang and Rodrik 2007; Rodrik 2006). *EXPY* specialization patterns are highly correlated with per capita incomes, a result that is in line with the basic statistics and graphical analyses presented in the previous section. That is, a 1 per cent increase in per capita GDP will boost export productivity by 0.5 per cent, on average. Human capital also has a positive and significant impact on *EXPY*, confirming that high levels of education increase the productivity of a country's exports. This also reflects the positive linkage between the level of education and exports' sophistication. Country size, measured by population and land area, is also a significant determinant of *EXPY*. The estimated economic freedom coefficient (a proxy for institutional quality) implies that a more liberal economic and political regime will increase the productivity of exports, although marginally. The paper includes a dummy variable to control for potential country-level

Table 4
Determinants of export productivity

	(1)	(2)	(3)	(4)	(5)	(6)
	FE	GMM	FE	GMM	FE	GMM
Log GDP per capita	0.491 (13.50)**	0.625 (3.53)**	0.554 (10.01)**	0.730 (2.71)*	0.368 (4.39)**	0.697 (3.75)**
LREER	-0.361 (2.35)*	-0.565 (2.12)*	-0.511 (2.74)**	-0.352 (2.22)*	-0.316 (2.19)*	-0.358 (2.73)*
Log human capital			0.247 (2.03)*	0.238 (2.51)*	0.176 (2.34)*	0.201 (2.75)**
Economic freedom					-0.03 (2.17)*	-0.173 (2.48)*
Log population			0.050 (2.66)*	0.059 (2.51)*	0.069 (2.14)*	0.113 (2.64)*
Log land area			-0.007 (0.38)	-0.057 (2.39)*	-0.015 (0.690)	-0.013 (2.20)*
High-tech countries					0.118 (1.71)	0.132 (1.93)*
CIBS					0.024 (2.689)*	0.117 (2.61)*
Constant	4.853 (14.8)**	2.056 (7.83)**				0.669 (4.21)**
Diagnostic statistics						
Wald test	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sargan test	[0.147]	[0.125]	[0.224]	[0.666]	[0.583]	[0.440]
Observations	745	603	192	177	306	302

Notes: Figures in parenthesis ( ) are absolute t-ratios, and figures in brackets [ ] are p-values. * and ** indicate that a coefficient is significant at the 5 and 1 per cent level, respectively.

Arellano-Bond dynamic panel-data estimations, system GMM. The Wald test is for the joint significance of the regressors, and the Sargan test is of over-identifying restrictions. The tests for serial correlation (no reported) are asymptotically distributed as standard normal variables (Arellano and Bond 1991, 2001).

impacts on export productivity, and the results confirm the productivity enhancing effects in countries with significant high technology and engineering exports.[7] A dummy controlling for CIBS is also considered, and it carries a positive and statistically significant coefficient.

As far as the real exchange rate is concerned, the elasticity confirms the response of exports in the expected direction (i.e., the exports reaction to a real devaluation). The magnitude of the response, however, might be indicating the diverse sample under study. For instance, Senhadji and Montenegro (1999) suggest that for industrial and developing countries such elasticities are around -1.5. For developing countries, though, low price elasticities might imply that export competitiveness does not depend on relative prices, as suggested by Santos-Paulino (2002).

4 Conclusions

During the last five decades, the world economy in general, and developing countries above all, have evidenced major changes in production capabilities and trade structures, which in turn are translated into greater openness to world markets. Although the emergence of dynamic Asian economies led by China and India could be explained by the general process of globalization, there are endogenous factors that are inherent of most Asian societies, such as the quality of human capital, pragmatic approach to economic reforms, government support at all level, political stability, to name a few.[8] Other emerging countries such as Brazil and South Africa have managed to establish themselves as growth engines in their regions mostly as a result of their significant trade and investment activities. They are closely interrelated with other major players such as China and India also through the trade and investment nexus, which magnifies their potential implications in developing countries, and their neighbouring countries in particular.

This study has focused on understanding the patterns of export productivity and trade specialization in CIBS and other countries. To this end, a time varying export productivity measure using highly disaggregated product categories is estimated, and the determinants of export productivity are analysed. The study also assesses the trade specialization profiles of CIBS and other country groupings, by estimating trade specialization indexes which help to further understand export productivity in these economies.

The empirical findings indicate that export productivity is, *inter alia*, determined by the countries' fundamentals, that is, real income and human capital endowment. Also, real exchange rates, country size, and institutional features explain the productivity of exports in the economies analysed. Most importantly, the study confirms that there are important differences in the export productivity and specialization patterns of otherwise similar countries (that is, countries with comparable per capita income levels).

---

7 The variable is defined as 1 for countries with high-technology exports share above 20 per cent of total exports and 0 otherwise.

8 For instance, Chow (2002) recognizes most of these factors as the explanation of China's recent economic transformation and success.

However, this is not the case of China, and in lesser extent India, where export productivity and implied export sophistication are in line to that of richer countries, such as some middle-income and OECD industrial economies. The results confirm the importance of not just the volume of exports (and trade), but the types of specialization patterns, which seem to be favoured by higher-income/more technologically developed product categories. The results can be also interpreted as evidence of productivity-enhancing effects of higher technology manufactured exports and of productivity-limiting effects of primary resource based exports.

References

Amable, B. (2000), 'International Specialization and Growth'. *Structural Change and Economic Dynamics*, 11: 413-31.

Arellano, M., and S. Bond (1991). 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and Application to Employment Equations'. *Review of Economic Studies*, 58 (2): 227-9.

Arellano, M., and S. Bond (2001). 'Panel Data Models'. In J. Doornik and D. Hendry (eds), *Econometric Modelling Using PcGive 10*, vol. 3. London: Timberlake Consultants TCL, 63-69.

Beach, W. W., and T. Kane (2007). 'Methodology: Measuring the 10 Economic Freedoms'. In *The Heritage Foundation 2007 Economic Freedom Index*. Washington, DC: The Heritage Foundation.

Bensidoun, I., G. Gaulier, and D. Unal-Kesenci (2001). 'The Nature of Specialization Matters for Growth: an Empirical Investigation'. CEPII Document de travail, 13. Paris: CEPII.

Busson, F., and P. Villa (1997). 'Croissance et spécialisation'. *Review Economique,* 48 (6): 1457-83.

Chami Batista, J. (2004). 'Latin American Export Specialization in resource-based Products: implications for Growth'. *Developing Economies*, 42 (3): 337-70.

Chow, G. (2002) *China's Economic Transformation*. Malden, MA and Oxford: Blackwell.

Farberger, J. (1994). 'Technology and International Differences in Growth Rates'. *Journal of Economic Literature*, 32 (3): 1147-75.

Farberger, J. (2000). 'Technological Progress, Structural Change and Productivity Growth: A Comparative Study'. *Structural Change and Economic Dynamics*, 11 (4): 393-411.

Falvey, R., D. Greenaway, Z. Yu, and J. Gullstrand (2004). 'Exports, Restructuring and Industry Productivity Growth'. Research Paper 2004/40. Nottingham: University of Nottingham.

Greenaway, D., C. W. Morgan, and P. W. Wright (1999). 'Export Composition, Exports and Growth'. *Journal of International Trade and Economic Development*, 8: 41-52.

Grossman, G. M., and E. Helpman (1991). *Innovation and Growth in the Global Economy.* Cambridge, MA: MIT Press.

Hausmann, R., J. Hwang, and D. Rodrik (2007). 'What You Export Matters'. *Journal of Economic Growth*, 12 (1): 1-25.

Lall, S. (2000). 'The Technological Structure and Performance of Developing Country Manufactured Exports, 1995-1998'. *Oxford Development Studies,* 28 (3): 337-69.

Lucas, R. E. (1988). 'On the Mechanics of Economic Development'. *Journal of Monetary Economics*, 22 (1): 3-42.

Lucas, R. E. (1993). 'Making a Miracle'. *Econometrica,* 61 (2): 251-72.

Michaely, M. (1962). *Concentration in International Trade, Contributions to Economic Analysis*. Amsterdam: North-Holland Publishing Company.

Ng, F., and A. Yeats (2003). 'Major Trade Trends in East Asia: What Are Their Implications for Regional Cooperation and Growth?'. WB Policy Research Working Paper 3084. Washington, DC: World Bank.

Rodrik, D. (2006). 'What's So Special about China's Exports?'. NBER Working Paper 11947. Cambridge, MA: National Bureau of Economic Research.

Santos-Paulino, A. U. (2002). 'Trade Liberalization and Export Performance in Selected Developing Countries'. *Journal of Development Studies,* 39 (1): 140-64.

Senhadji, A. S., and C. E. Montenegro (1999). 'Time Series Analysis of Export Demand Equations: A Cross-Country Analysis. *IMF Staff Papers*, 46 (2).

UNCTAD (2005). *Handbook on Statistics 2005*. Geneva: New York and Geneva: United Nations.

Appendix

A1 Data definitions and sources

Trade data used in the calculations of the trade specialization indicators and PRODY and *EXPY* are from UNCTAD's COMTRADE Dataset. Exports and imports are compiled based on the 1992 Harmonized System (HS) at 6 digits. GDP data are from Penn World Tables, constant 1994 prices.

Other data definitions:

Variable	Source
Inter-industry specialization index (*Ij*)	based on ComTrade
Trade disimilarity index (*Aj*)	based on ComTrade
Export concentration index (*XHERFj*)	based on ComTrade
Population (*POP*)	Penn World Tables
Real gross domestic product (GDP) per capita	Penn World Tables
GDP	based on Penn World Tables
Labour force with secondary education (% of total)	World Development Report
School enrolment, secondary (% gross)	World Development Report
School enrolment, secondary (% net)	World Development Report
Heritage index of economic freedom	The Heritage Foundation (http://www.heritage.org)
Real effective exchange rate index (1995 = 100), is a measure of the value of a currency against a weighted average of several foreign currencies, divided by a price deflator or index of costs.	International Monetary Fund, International Financial Statistics

Appendix Table A1
Sample of countries

Country	Group	Country	Group
Argentina	LAC	Malaysia	Tigers
Armenia	Other Asian	Mexico	LAC
Australia	OECD	Nepal	Other Asian
Austria	OECD	Netherlands	OECD
Azerbaijan	Other Asian	New Zealand	OECD
Bangladesh	Other Asian	Nicaragua	LAC
Barbados	LAC	Norway	OECD
Belgium	OECD	Pakistan	Other Asian
Belize	LAC	Panama	LAC
Bolivia	LAC	Paraguay	LAC
Brazil	CIBS	Peru	LAC
Canada	OECD	Philippines	Tigers
Chile	LAC	Portugal	OECD
China	CIBS	Rep. of Korea	Dragons
China, Hong Kong SAR	Dragons	Saint Kitts and Nevis	LAC
China, Macao SAR	Other Asian	St Lucia	LAC
Colombia	LAC	St Vincent & the Grenadine	LAC
Costa Rica	LAC	Singapore	Dragons
Cuba	LAC	South Africa	CIBS
Denmark	OECD	Spain	OECD
Dominica	LAC	Sri Lanka	Other Asian
Dominican Rep.	LAC	Suriname	LAC
Ecuador	LAC	Sweden	OECD
El Salvador	LAC	Switzerland	OECD
Finland	OECD	Thailand	Tigers
France	OECD	Trinidad and Tobago	LAC
Germany	OECD	Turkey	Other Asian
Greece	OECD	Turkmenistan	Other Asian
Grenada	LAC	United Kingdom	OECD
Guatemala	LAC	Uruguay	LAC
Guyana	LAC	USA	OECD
Haiti	LAC	USA (before 1981)	OECD
Honduras	LAC	Venezuela	LAC
Iceland	OECD	Viet Nam	Other Asian
India	CIBS		
Indonesia	Other Asian		
Ireland	OECD		
Italy	OECD		
Jamaica	LAC		
Japan	OECD		
Luxembourg	OECD		

Appendix Table A2
Number of observations per economic region

Year	CIBS	Dragons	Latin America & Caribbean	OECD	Other Asian	Tigers
1992	3	2	11	14	5	2
1993	3	3	17	17	5	2
1994	3	3	23	20	5	2
1995	3	3	24	20	4	2
1996	3	3	25	20	5	3
1997	3	3	27	20	6	3
1998	3	3	24	20	6	3
1999	3	3	28	22	8	3
2000	4	3	28	22	8	3
2001	4	3	28	22	7	3
2002	4	3	26	22	6	3
2003	4	3	24	22	9	3
2004	4	3	22	21	8	3

Appendix Table A3
Observations (number of countries per year)

Year	Observations
1992	38
1993	48
1994	58
1995	57
1996	61
1997	63
1998	59
1999	67
2000	68
2001	68
2002	65
2003	66
2004	63

Appendix Table A4
Inter-industry specialization index

Year	China	India	Brazil	South Africa	CIBS	Dragons	LAC	OECD	Other Asian	Tigers
1992	0.76	0.86	0.79	–	0.81	0.57	0.90	0.61	0.89	0.75
1993	0.76	0.87	0.79	–	0.81	0.46	0.88	0.61	0.88	0.72
1994	0.75	0.85	0.77	–	0.79	0.43	0.89	0.59	0.85	0.70
1995	0.72	0.84	0.76	–	0.78	0.42	0.89	0.58	0.86	0.69
1996	0.73	0.84	0.76	–	0.78	0.41	0.87	0.57	0.86	0.71
1997	0.73	0.83	0.75	–	0.77	0.40	0.86	0.56	0.84	0.70
1998	0.73	0.84	0.75	–	0.77	0.40	0.86	0.55	0.87	0.70
1999	0.71	0.85	0.76	–	0.77	0.38	0.87	0.54	0.85	0.68
2000	0.68	0.81	0.76	0.70	0.74	0.37	0.87	0.54	0.86	0.67
2001	0.68	0.81	0.76	0.70	0.74	0.38	0.86	0.54	0.83	0.66
2002	0.67	0.81	0.74	0.74	0.74	0.37	0.85	0.53	0.81	0.65
2003	0.67	0.79	0.74	0.77	0.74	0.36	0.86	0.53	0.82	0.64
2004	0.67	0.78	0.75	0.72	0.73	0.37	0.85	0.52	0.82	0.65

Appendix Table A5
Trade dissimilarity index

Year	China	India	Brazil	South Africa	CIBS	Dragons	LAC	OECD	Other Asian	Tigers
1992	0.62	0.68	0.63	–	0.64	0.59	0.64	0.56	0.66	0.66
1993	0.61	0.70	0.63	–	0.65	0.55	0.62	0.56	0.67	0.65
1994	0.61	0.69	0.64	–	0.65	0.56	0.63	0.56	0.69	0.66
1995	0.59	0.70	0.65	–	0.65	0.56	0.63	0.55	0.67	0.64
1996	0.58	0.70	0.64	–	0.64	0.56	0.64	0.55	0.81	0.64
1997	0.57	0.71	0.64	–	0.64	0.56	0.65	0.55	0.73	0.62
1998	0.58	0.71	0.64	–	0.64	0.57	0.66	0.54	0.78	0.64
1999	0.59	0.72	0.66	–	0.66	0.57	0.68	0.57	0.74	0.64
2000	0.55	0.70	0.63	0.72	0.65	0.55	0.68	0.57	0.69	0.61
2001	0.54	0.70	0.62	0.70	0.64	0.56	0.68	0.57	0.76	0.61
2002	0.54	0.70	0.62	0.67	0.63	0.55	0.69	0.57	0.79	0.62
2003	0.55	0.69	0.63	0.70	0.64	0.56	0.69	0.57	0.76	0.61
2004	0.54	0.70	0.62	0.70	0.64	0.56	0.70	0.56	0.77	0.61

Appendix Table A6
Export concentration index, %

Year	China	India	Brazil	South Africa	CIBS	Dragons	LAC	OECD	Other Asian	Tigers
1992	0.38	2.73	1.15	–	1.42	1.43	13.89	2.03	2.79	1.64
1993	0.36	3.15	1.09	–	1.53	1.13	13.19	2.74	2.56	1.47
1994	0.30	2.79	1.21	–	1.44	1.28	13.48	2.21	5.72	1.48
1995	0.27	2.72	1.23	–	1.41	1.66	14.13	2.14	2.27	1.54
1996	0.30	2.02	1.27	–	1.20	1.76	16.30	2.32	10.67	2.77
1997	0.30	2.09	1.41	–	1.26	2.00	14.85	2.16	8.36	3.45
1998	0.32	2.73	1.29	–	1.45	2.00	11.43	2.00	7.16	5.67
1999	0.34	3.54	1.26	–	1.71	2.01	15.68	2.20	9.39	6.90
2000	0.37	2.49	1.25	7.02	2.78	2.11	14.02	2.72	12.43	5.41
2001	0.42	2.47	1.31	4.98	2.29	2.03	14.47	2.62	10.80	4.30
2002	0.53	2.62	1.34	1.74	1.56	2.17	13.35	2.65	9.97	4.62
2003	0.68	2.34	1.33	1.67	1.50	2.25	11.05	2.60	9.10	4.54
2004	0.79	2.77	1.22	1.78	1.64	2.42	12.51	2.60	8.55	5.75

Appendix Table A7
Export basket-industry classification criteria

Category	Key determinants	Major subdivisions	3 digit SITC sectors
Primary			
	Very thin processing of natural resources	– Foodstuffs, cotton/wool, minerals	48
Resource-based			
	Simple, labour-intensive, but some activities are capital intensive	– *Agro*-based: Prepared meats/fruits, beverages, wood products, vegetable oils	35
		– *Other*: Ore concentrates, petroleum/rubber products, cement, cut gems, glass	27
Low-tech			
	Stable well-diffused technologies, with some design and skill intensity; technology primarily embodied, labour intensive	– *Textile, garments and footwear:* Textile fabrics, clothing, headgear, footwear, leather manufactures, travel goods	20
		– *Other*: Pottery, simple metal parts/structures, furniture, jewellery, toys, plastic products	24
Medium-tech			
	Skill and scale intensive, lengthy learning periods	– *Process*: Synthetic fibres, chemicals and paints, fertilizers, plastics, iron, pipes/tubes	22
	Intensive linkages	– *Automotive*: Passenger vehicles and parts, commercial vehicles, motorcycles and parts	5
	Intensive linkages	– *Engineering*: Engines, motors, industrial machinery, pumps, switchgear, ships, watches	31
High-tech			
	Advanced and fast-changing, high R&D, emphasis on product design, generally high skills	– *Electronic/electrical*: Office/data processing/telecommunications equipment, TVs, transistors, turbines, power generating equipment	11
		– *Other*: Pharmaceuticals, aerospace, optical/measuring instruments, cameras	7
Total			230

Appendix Table A8
Mean export composition by main sectors, CIBS, %

	Primary products	Primary products-mineral*	Resource based manufactures	Resource based manufactures-mineral*	Low-tech manufactures	Medium-tech manufactures	Engineering	High technology	Total
				China					
1990	12.51	8.04	7.92	3.11	40.16	10.98	9.57	5.34	97.64
1991	11.77	6.34	7.80	2.46	42.76	11.54	10.13	5.72	98.53
1992	9.73	5.49	7.97	2.18	50.08	5.28	9.53	8.75	99.01
1993	8.70	4.75	8.04	1.80	51.18	4.97	9.77	9.86	99.08
1994	8.35	3.79	7.84	1.81	50.73	5.73	10.10	10.71	99.05
1995	6.15	3.80	8.84	2.27	46.34	7.85	10.61	13.01	98.87
1996	5.91	4.08	8.92	1.91	45.70	6.44	11.17	14.90	99.03
1997	5.40	4.03	7.81	2.06	46.41	6.63	10.88	15.62	98.86
1998	5.07	3.18	7.20	1.84	45.52	6.42	11.72	18.16	99.12
1999	4.80	2.67	6.87	1.88	44.10	5.99	12.11	20.55	98.97
2000	4.26	3.07	6.57	2.19	41.21	6.88	12.36	22.39	98.93
2001	3.88	3.03	6.75	2.14	39.67	6.17	13.22	23.99	98.86
2002	3.55	2.58	6.46	1.97	38.14	5.79	13.61	26.88	99.00
2003	3.10	2.36	5.87	2.17	35.17	6.08	13.90	30.31	98.98
2004	2.29	2.41	5.73	2.40	32.52	7.14	14.04	32.47	99.00
				India					
1990	18.35	1.49	4.91	22.32	36.52	5.78	3.90	4.49	97.75
1991	17.29	1.69	5.87	20.13	38.19	6.94	3.41	4.64	98.16
1992	15.92	2.11	6.81	20.40	39.76	6.40	3.07	3.50	97.96
1993	17.34	1.86	6.71	21.02	37.40	6.99	2.98	3.73	98.03
1994	15.35	1.89	7.08	19.35	39.41	7.76	3.02	3.98	97.83
1995	17.71	1.52	7.61	18.88	37.01	7.90	2.81	4.51	97.95
1996	18.46	1.51	8.39	16.27	37.28	7.59	3.32	5.00	97.82
1997	18.29	1.30	7.61	16.01	37.96	7.29	3.71	5.14	97.30
1998	17.43	1.04	7.17	17.01	39.64	6.40	3.71	4.57	96.95
1999	14.32	1.54	7.74	19.49	39.28	6.35	3.52	4.94	97.18
2000	12.51	1.72	7.95	19.93	38.49	7.39	3.86	5.35	97.21
2001	11.97	1.91	8.42	20.40	35.95	7.66	4.08	6.16	96.55
2002	11.31	2.03	8.48	22.05	34.49	8.54	4.12	6.11	97.13
2003	10.72	2.10	8.91	21.54	34.69	9.56	4.68	6.22	98.42
2004	9.41	2.38	7.88	26.54	31.35	10.52	4.95	5.38	98.41

Appendix Table A8 (con't)

Note: * Mineral refers to precious metals, minerals, and subproducts (including oil).

Appendix Table A8 (con't)
Mean export composition by main sectors, CIBS, %

	Primary products	Primary products-mineral*	Resource based manufactures	Resource based manufactures-mineral*	Low-tech manufactures	Medium-tech manufactures	Engineering	High technology	Total
				Brazil					
1990	19.05	5.08	18.47	11.38	14.71	15.44	9.77	4.31	98.21
1991	18.28	5.22	16.59	11.12	16.17	16.64	10.05	4.30	98.36
1992	17.60	4.82	17.98	9.21	17.08	18.15	9.85	3.95	98.64
1993	17.90	4.19	17.96	8.75	17.91	17.43	10.72	3.71	98.57
1994	20.07	3.81	19.84	8.21	15.48	16.09	10.96	3.59	98.04
1995	17.45	4.37	24.18	7.43	14.37	15.53	10.53	3.49	97.36
1996	19.60	3.74	21.89	7.71	14.07	15.33	10.44	4.13	96.91
1997	22.13	3.44	19.90	7.14	12.24	17.12	10.31	4.73	97.00
1998	19.01	2.85	21.51	8.31	11.82	17.86	9.93	6.21	97.49
1999	18.79	3.54	22.21	7.95	11.95	15.07	9.09	8.47	97.07
2000	16.66	3.96	18.53	8.35	12.11	16.07	8.72	12.51	96.92
2001	19.85	3.99	18.13	8.69	11.58	14.28	8.17	12.23	96.93
2002	20.03	5.88	18.96	8.33	10.85	14.80	8.11	10.23	97.19
2003	21.17	5.93	19.09	8.32	11.16	15.50	8.75	7.45	97.36
2004	21.99	5.65	17.42	8.59	10.61	16.80	10.55	7.45	99.05
				South Africa					
2000	5.05	8.98	11.47	14.73	8.54	15.20	6.25	3.70	73.93
2001	5.80	9.75	11.66	26.41	8.59	13.89	7.03	3.61	86.72
2002	7.71	13.59	14.19	16.75	10.73	21.69	9.64	3.79	98.08
2003	7.35	20.27	11.98	14.08	10.02	22.42	8.77	3.20	98.08
2003	6.59	23.65	11.05	12.44	9.99	22.27	8.55	3.39	97.94

Note: * Mineral refers to precious metals, minerals, and subproducts (including oil).

Appendix Table A9
Mean export composition by main sectors by country groupings, %

	Primary products	Primary products-mineral*	Resource based manufactures	Resource based manufactures-mineral*	Low technology manufactures	Medium technology manufactures	Engineering	High technology	Total
Latin America									
1990-94	36.04	11.35	13.59	11.12	14.83	5.04	2.93	2.79	97.71
1995-99	33.45	9.06	16.70	10.85	12.15	5.96	3.57	4.11	95.86
2000-04	28.66	11.70	17.30	10.00	9.68	7.23	5.89	5.16	95.62
OECD									
1990-94	11.82	6.90	16.74	4.11	15.68	12.63	14.70	12.89	95.47
1995-99	9.76	6.49	16.16	3.22	14.72	13.38	14.86	16.30	94.89
2000-04	7.22	7.58	14.29	3.65	14.72	13.60	14.93	18.90	94.90
Dragons									
1990-94	2.51	0.96	6.00	6.19	29.00	10.17	15.86	27.31	97.99
1995-99	1.58	1.30	5.37	4.45	22.71	10.60	14.37	36.31	96.70
2000-04	1.00	1.15	4.80	5.26	18.91	10.29	14.40	41.23	97.06
Tigers									
1990-94	14.10	2.30	12.20	4.21	25.08	3.60	6.84	16.78	85.12
1995-99	9.18	1.42	9.23	2.63	18.56	4.50	8.80	39.78	94.09
2000-04	6.31	1.35	7.89	2.71	13.54	6.56	9.29	46.78	94.44
Other Asian									
1990-94	14.21	5.29	6.98	2.80	62.28	3.49	2.02	1.49	98.57
1995-99	11.97	8.31	6.80	4.29	54.52	4.29	2.59	2.61	95.37
2000-04	10.15	8.02	6.38	3.14	57.84	5.10	3.49	4.29	98.43

Note: * Mineral refers to precious metals, minerals, and subproducts (including oil).

Appendix Table A10
Export productivity, top 10 countries, 1992 and 2004 (US$)

1992		2004	
Switzerland	18,424.05	Austria	37,187.48
Iceland	17,186.45	Belgium	34,403.56
Sweden	16,889.57	Luxembourg	26,297.34
Denmark	16,835.70	Azerbaijan	23,506.72
USA	16,636.05	Switzerland	21,661.11
Germany	16,623.63	Ireland	21,454.10
Finland	16,307.88	Iceland	20,728.41
Canada	15,881.47	Finland	20,075.52
Netherlands	15,669.58	Japan	19,896.83
Ireland	15,438.42	Sweden	19,810.35