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The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-1998

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This paper maps recent manufactured export patterns in developing countries, using a new and detailed classification by technology. It argues that export structures, being path-dependent and difficult to change, have implications for growth and development. Low technology products tend to grow the slowest and technology intensive products the fastest. East Asia dominates the scene with 70 percent of developing-world manufactured exports; there is high and rising concentration at the national level. The strategies used to achieve competitiveness differ greatly between countries. Received trade theory cannot explain these patterns without considering learning processes and the policies used to promote them.

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1. Introduction

Export performance by developing countries is highly diverse. Its patterns differ significantly by country and region; over time, moreover, they are changing at different rates and in different directions. A few countries are 'succeeding': they are rapidly expanding export earnings and raising their 'quality' (shifting export structures from low-technology, low-skill, and largely labour-intensive products to high-technology and high-skill products). By contrast, many countries are stagnating in terms of both export earnings and quality. In the middle are countries with reasonable rates of quantity growth but relatively weak improvements in quality. The process of globalisation is increasing rather than reducing the ability of developing countries to integrate successfully with the world economy. While such divergences in export performance are well recognised, its dimensions and forms are perhaps less well known.

The importance of understanding the nature, implications and determinants of developing world export patterns cannot be over-stressed. In a liberalising world, export success is more important than ever to economic performance. It remains directly relevant, as the main means of earning foreign exchange (except for the few countries that have large international service sectors), reaping economies of scale and specialisation, and accessing new technology. It is also of great indirect significance. It is an indicator of the efficiency of the industrial sector, facing more direct (because of liberalization) and intense (because of falling transport costs and the new 'rules of the game') competition than before. Insofar as industrialisation remains an engine of development, structural change and technological growth and modernisation, growing manufactured exports are a sign that this engine is working.

Export success is also increasingly linked to the ability to attract more and better foreign direct investment (FDI). Given increasing globalisation (with the emergence of integrated production systems spanning several countries) and a larger role of MNCs in trade and innovation (UNCTAD, 1999), it is important for countries to secure not just more, but also higher quality, FDI. This means attracting more advanced MNC activities, oriented to international markets, providing advanced technology, using and creating sophisticated skills and taking the host economy into dynamic systems of international production.

This paper provides a comprehensive mapping of recent export patterns, focusing on the technological structure of manufactured exports (an indicator of their 'quality'), as well as their quantity and distribution. It compares developing with developed countries and, within the developing world, the main regions and the leading exporters. It extends an earlier analysis of manufactured

exports by developing countries (Lall, 1998), using (more recent) data up 1998 and a revised technological categorisation of exports. It analyses the main implications of the emerging patterns and provides a simplified analysis of the main drivers of export growth.

Section 2 deals with the role of technology and describes the technological classification used here. Section 3 analyses the main trends in world trade and the comparative performance of developed versus developing countries. Section 4 deals with export performance by developing country groups under various sub-headings. Section 5 deals with the main implications and drivers of export success. Section 7 concludes.

2. Technological structure of exports

2.1 Technology and developing countries' comparative advantage

Why look at the technological structure of exports? That technology plays a significant role in the trade patterns of advanced industrial countries is widely accepted.[2] What needs explaining is why it is important in *developing* countries. Most conventional trade theory assumes that technological activity plays no role in the comparative advantage of developing countries, and that the main determinants remain relative factor endowments.[3] Developing countries are assumed to be

[2] For a recent review see Fagerberg (1996).

[3] In Heckscher-Ohlin (H-O) theories, technology and skills do not appear at all. Production functions are assumed identical across countries, with technology fully diffused across firms and countries. Firms automatically select techniques suited to their relative factor (capital-labour) prices. Once they have made the right choice (i.e. labour-intensive techniques for developing countries), they use the technologies efficiently without lags, learning or effort. Since labour is taken to be homogenous and technology users automatically reach 'best practice' levels, there is inefficiency only if governments intervene to distort factor prices or prevent free trade. Neo H-O theories, incorporating skills as a third factor of production (Keesing, 1966), continue to assume efficient markets for technology and its costless and automatic application. The advantage of developing countries lies in low-skill, labour-intensive activities, with no specific effort, lag, learning or risk involved in using these at best practice. A new version (Wood, 1994) assumes capital to be fully mobile and makes comparative advantage to be dependent two immobile factors, skills and natural resources. Technology remains a permissive, and so irrelevant, factor, presumably flowing across countries with capital. Skills are treated as a generic resource, created by 'the education system ' and generally measured by school enrolments or years of schooling. The possibility that the efficient use of technology needs skills and knowledge *specifically* related to those technologies, acquired only by prolonged experience and problem solving with those technologies, is ignored. Even technology-based (product cycle and other neo-technology) theories direct their attention to developed countries and neglect technological learning in developing countries. They take comparative advantage to depend on 'innovation' – discrete improvements to products or processes (or shifts of the production function). Thus, the measures used relate to R&D, patents or new product introduction (for clear exposition and testing in the context of a semi-industrial country, Portugal, see Courakis and Roque, 1988 and 1992). The use of existing technologies or their adaptation to local conditions (reaching or moving along the production function) remains automatic and costless. As they grow and wages rise, their comparative advantage adjusts automatically to the new factor price configuration: thus, richer developing countries will use more capital or skill-intensive technologies than do poorer ones (on the 'stages' approach to comparative advantage see Balassa, 1979). In these models, countries optimise their competitiveness by facilitating technology inflows and opening their economies to trade, licensing and (particularly) foreign direct investment. Strategic or 'new' trade theories, while eschewing assumptions of perfect markets, also concentrate on advanced countries. Abstracting from factor endowments, they use scale and (more recently) agglomeration economies to explain trade patterns (Krugman, 1991). Its main focus is intra-industry trade between industrial countries; in developing countries, trade remains mainly between industries and is explained by traditional factor endowments. Interestingly, 'learning' appears in some models as an explanatory variable, but it is taken as a form of scale economies over time: passive, automatic and predictable, dependent only on the volume of production. As such, it raises no policy issues, apart from the possibility of gaining first mover advantages. Some analysts also note the existence of cumulative causation,

technological followers, importing innovations from developed countries and using them passively. International technology markets are taken to be efficient: firms in developing countries can find, select, buy and transfer the technologies they need without additional cost (apart from the legitimate price of the technology or equipment) or effort. More importantly, once they import the technology, they can use it efficiently, again without extra cost or effort. There is no difference, in other words, between *capacity* (physical plant, equipment or blueprints) and *capability* (the ability to use these efficiently). Comparative advantage then depends entirely on factor endowments, and any attempt to change this – apart from providing the conditions for faster accumulation of factors – is by assumption inefficient. Thus, all governments have to do to optimise comparative advantage is 'get prices right' so that firms will select the techniques appropriate to their factor prices.

Considerable firm-level research under the broad heading of 'technological capability' analysis suggests that this approach is oversimplified and focuses on the wrong determinants of comparative advantage. The capability approach gives a different depiction of how firms become technically efficient, and leads to different policy conclusions. This literature (reviewed by Lall, 2000) shows that there is a significant difference between 'capacity' and 'capability'. Firms in developing countries operate with imperfect knowledge of technological alternatives. Finding technologies is a difficult, often costly, process. Once technology is imported, its efficient use requires creating new skills and knowledge to master its tacit elements. Tacit elements vary greatly by technology. In some activities the learning process is costly, prolonged, risky and unpredictable and involves serious externalities and coordination problems (skills and technology 'leak' out to other firms, or there is collective learning between firms). In others, the process is relatively easy, short and predictable, with negligible externalities. While all learning can face market failures that prevent, curtail or distort it, the extent and spread of failures vary significantly by activity. Policies to correct the failures thus have to vary by activity – more difficult technologies tend to call for greater intervention to help firms overcome learning costs and coordination problems.

The capability approach suggests that comparative advantage depends more on the national ability to master and use technologies than on factor endowments in the usual sense.[4] Given the market failures facing capability building, this in turn devolves to one or both of two things that improve technological learning. The first is government policies to overcome the failures in learning in domestic firms. The second is the attraction of FDI that brings in new technologies and is better

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externalities and path dependence as determinants of competitiveness (Venables, 1996). However, this applies to agglomeration, not technological learning.

[4] This is in the spirit of neo-technology trade theory, though, as noted in the previous footnote, such theories focus on innovation rather than learning to use existing technologies. However, Courakis and Roque (1992) take neo-technology analysis of comparative advantage in the direction of the capability approach by differentiating between innovation and adaptation within technological activity. They measure adaptive capabilities (in the case of Portugal with respect to its trade with more advanced countries) by human capital and R&D expenditures.

able to overcome the market failures involved in deploying them. The latter option may itself require selective policies to overcome failures in the FDI process itself.[5] Moreover, the two sources of capability building complement each other when more advanced activities are involved: FDI in complex activities and functions needs advanced domestic capabilities. These points are illustrated in the empirical sections below.

In this approach, therefore, patterns of comparative advantage between developing countries vary *according to national policies for technological learning and technology import*, even if they have similar 'endowments' of labour, capital or skills. Traditional theories of comparative advantage may be relevant in cases where their assumptions conform to the specific conditions of capability building in given industries and locations, not as general rules. For instance, H-O factor price ratios can affect trade patterns in activities in which technological conditions approximate perfect competition, i.e. no scale economies, universally available technologies and easy learning. These apply to simple labour-intensive technologies where small firms can make undifferentiated products, easily mastering the technologies involved: under these conditions, relative wage differences *per se* become an important competitive factor. However, this represents one end of the technological spectrum; it does not mean that H-O assumptions are generalisable across the industrial sector.

The evolution of export patterns then depends on the interaction of technical progress internationally, the degree of exposure to foreign competition (for countries without free trade), the strengthening of local capabilities (with and without FDI) and the rate of wage increases. Given rising wages, sustaining export growth in a world of intensifying competition and rapid technical change necessarily involves *technological deepening*. 'Deepening' can take one or both of two main forms: upgrading quality and technology within existing activities and moving from technologically simple to complex activities. Both need domestic capability building, FDI or a mixture of the two. The evidence presented here indicates the different strategies used by major exporters.

There are two other points on export structures. First, *different export structures have different implications for growth and effects on domestic industrial development.* Technology intensive structures offer better prospects for future growth because their products tend to grow faster in trade: they tend to be highly income elastic, create new demand, and substitute faster for older products. This is why high technology industries within industrial and semi-industrial countries are growing

[5] FDI flows can face information and coordination failures (UNCTAD, 1999). Information failures arise from the lack of full knowledge by investors of conditions in particular locations; coordination failures arise when factor markets and institutions in host economies do not meet needs of potential investors. The remedy for the former is FDI promotion and targeting, and for the latter ensuring that the technological, skill and other needs of investors are met. Countries that have been successful in using FDI for technology upgrading have employed both policies intensively.

faster than other industries.[6] They also have greater potential for further learning because they offer more scope for applying new scientific knowledge.[7] They have larger spillover effects in terms of creating new skills and generic knowledge that can be used in other activities. Simple technologies, by contrast, tend to have slower growing markets, more limited learning potential, smaller scope for technological upgrading and less spillover to other activities. They are also more vulnerable to easy entry by lower wage competitors, substitution by technical change and market shifts. However, this vulnerability means that activities with simple technologies can enjoy rapid trade growth – as wages rise, production can be shifted relatively easily from high to low wage areas within relatively stable markets and technologies.[8] However, this is more of a once-for-all adjustment than a base for sustained growth as far as a particular country is concerned. Once a low wage advantage is exploited, it becomes essential to move into technology intensive activities.

Second, export structures are not, as received theory suggests, flexible and fully responsive to changing factor prices; if they were, countries need not worry about which structure they have. In the capability approach, structures are, while certainly not rigid, *path dependent and difficult to change.* They are the outcome of long, cumulative processes of learning, agglomeration, institution building and business culture. Moving from a low technology structure to a high technology one is thus difficult, and may involve a broad and integrated set of policy interventions (Redding, 1999, Rodrik, 1996). It is therefore important for analytical and policy purposes to examine national export structures, particularly to see how quickly they have changed over time.

2.2 Technological structure of exports

Having established a case for looking at export structures, let us present the categorisation used here. Given the nature of the export data, it is not possible to capture all aspects of technological upgrading from national statistics. Ideally, the data should allow us to distinguish between the level of technology used in the activities involved and its upgrading over time at a fairly disaggregated level. They do not. What we have on a comparative basis for a reasonable sample of countries is export data at the 3-digit SITC level (we use revision 2, which is less detailed than revision 3, but goes further back in time). This level, while not highly aggregated, can put together activities at different levels of technological complexity under the same product category. For instance, telecommunications

[6] According to data collected by the NSF (1998), high technology production by 68 developed and newly industrialising countries grew nearly 3 times faster over 1980-95 than total manufacturing production (5.9% and 2.7% respectively). The NSF also provides export figures for these countries. High technology exports grew at 11.2% while all manufactured exports grew at 6.5% per annum in this period; the figures are slightly different from those below (the country and time coverage is different) but the trends shown are very similar.

[7] The theoretical implications of low and high technology specialisation have been analysed in several articles. See, for instance, Rodrik (1996), Redding (1999), Stokey (1991) and Young (1991).

[8] This also applies to low technology segments of otherwise high technology activities: the relocation factor then interacts with technological dynamism to create exceptionally rapid trade growth. See below.

apparatus can include highly advanced mobile telephone technology as well as simple plastic telephone receivers. It also cannot distinguish between quality differences within given products: high value fashion clothing from mass-produced items. Moreover, it cannot show the *process* involved in making the same product in different locations. Thus, a high technology product like semiconductors can involve genuinely high-tech processes in the USA and relatively simple assembly in Malaysia. In our data both would appear equally technologically advanced. For the same reason, the data cannot show technological upgrading *within* given product categories.

These problems are inherent to trade data and to all analyses based on them, except those using very detailed product categories and small country samples. Nevertheless, what we have provides insights into important aspects of technological structures. Even at the 3-digit level the data give considerable technological differentiation. The structures that emerge differ enormously across countries, and the findings they suggest are plausible and useful. We have enough information on local processes to allow roughly for differences in technology content in the qualitative analysis. The loss of information on quality upgrading within product categories is unfortunate, but we cannot deal with this in any consistent manner.

There are many ways to categorise products by technology. A commonly used method (based on Pavitt, 1984) is to distinguish between resource-based, labour-intensive, scale-intensive, differentiated and science-based manufactures. This is difficult to use because the analytical distinctions are unclear and there are large overlaps between categories. The OECD (1994) suggests a more detailed classification based on technological activity within each category. The scheme used here combines both, and extends them to take account of product groups or clusters of particular export interest to the developing world. Table 1 shows the scheme.

Table 1: Technological Classification of Exports

Classification	Examples
Primary products	Fresh fruit, meat, rice, cocoa, tea, coffee, wood, coal, crude petroleum, gas
Manufactured products	
Resource based manufactures	
Agro/forest based products	Prepared meats/fruits, beverages, wood products, vegetable oils
Other resource based products	Ore concentrates, petroleum/rubber products, cement, cut gems, glass
Low technology manufactures	
Textile/fashion cluster	Textile fabrics, clothing, headgear, footwear, leather manufactures, travel goods
Other low technology	Pottery, simple metal parts/structures, furniture, jewellery, toys, plastic products
Medium technology manufactures	
Automotive products	Passenger vehicles and parts, commercial vehicles, motorcycles and parts
Medium technology process industries	Synthetic fibres, chemicals and paints, fertilisers, plastics, iron, pipes/tubes
Medium technology engineering industries	Engines, motors, industrial machinery, pumps, switchgear, ships, watches
High technology manufactures	
Electronics and electrical products	Office/data processing/telecommunications equip, TVs, transistors, turbines, power generating equipment
Other high technology	Pharmaceuticals, aerospace, optical/measuring instruments, cameras
Other transactions	Electricity, cinema film, printed matter, 'special' transactions, gold, art, coins, pets

Judgement is inevitably involved in assigning products to categories. The classification is based on available indicators of technological activity in manufacturing and on the author's knowledge of industrial technology. It conforms to most analysts' conception of the technological ranking of manufactured products. It differs from my earlier classification (Lall, 1998) in that the processed foods like sugar, cheese, vegetable preparations are now classified as resource based manufactures rather than as primary products. This makes the manufactured category larger than the usual classification (which generally places all SITC items under headings 0 to 4 under primary products). The full list of products is given in Annex Table 1.

Primary products (and special transactions, excluded completely below) do not need much analysis in terms of the technological basis of comparative advantage. Within manufactured exports, the technological categories and sub-categories are as follows:

- *Resource based* (RB) products tend to be simple and labour-intensive (e.g. simple food or leather processing), but there are segments using capital, scale and skill-intensive technologies (e.g. petroleum refining or modern processed foods). Since competitive advantages in these products arises generally — but not always — from the local availability of natural resources, they do not raise important issues for competitiveness. However, the segments with skill and technology intensive technologies do raise important competitiveness issues. We draw a distinction between *RB1, agriculture-based* products and *RB2, others*.

- *Low technology* (LT) products tend to have stable, well-diffused technologies. The technologies are primarily embodied in the capital equipment; the low end of the range has relatively simple skill requirements. Many traded products are undifferentiated and compete on price: thus, labour costs tend to be a major element of cost in competitiveness. Scale economies and barriers to entry are generally low. The final market grows slowly, with income elasticities below unity. However, there are exceptions to these features. There are particular low technology products in high quality segments where brand names, skills, design and technological sophistication are very important, even if technology intensity does not reach the levels of other categories. We should note that products of major interest to developing countries tend to be in the lower quality segments, and are really based on simple technologies and price rather than quality competition. We distinguish between *LT1, textile, garment, footwear* ('fashion') cluster and the *LT2, other low technology* products. The former group has undergone massive relocation from rich to poor countries, with assembly operations shifting to low wage sites and complex design and manufacturing functions retained in advanced countries. This relocation has been the engine of export growth in this industry, though the precise location of export sites in textiles and clothing has been

influenced strongly by trade quotas (under the Multi-Fibre Agreement as well as offshore assembly provisions and regional trade agreements like NAFTA). Other exports that have benefited from active relocation in this group are toys, sports and travel goods and footwear. Simple metal products have not shared in this particular process, perhaps because they are not equally prone to undifferentiated mass-assembly operations, or because skill needs are somewhat higher.

- *Medium technology* (MT) products, comprising the bulk of skill and scale-intensive technologies in capital goods and intermediate products, are the heartland of industrial activity in mature economies. They tend to have complex technologies, with moderately high levels of R&D, advanced skill needs and lengthy learning periods. Those in the engineering and automotive sub-groups are very linkage-intensive, and need considerable interaction between firms to reach 'best practice' technical efficiency. We divide them into three sub-groups. *MT1, automotive products*, are of particular export interest to newly industrialising countries, particularly in East Asia and Latin America. *MT2, process industries*, mainly chemicals and basic metals, are different in their technological features from *MT3, engineering products*. Process industries have stable and undifferentiated products, often with large-scale facilities and considerable technological effort in improving equipment and optimising complex processes. Engineering industries emphasise product design and development. Many have mass assembly or production plants and extensive supplier networks (SMEs are often important here). Barriers to entry tend to be high. The relocation of labour-intensive processes to low wage areas occurs but is not widespread: products are heavy and need advanced capabilities to reach world standards.

- *High technology* (HT) products have advanced and fast-changing technologies, with high R&D investments and prime emphasis on product design. The most advanced technologies require sophisticated technology infrastructures, high levels of specialised technical skills and close interactions between firms, and between firms and universities or research institutions. However, some products like electronics have labour-intensive final assembly, and their high value-to-weight ratios make it economical to place this stage in low wage areas. These products lead in new international integrated production systems where different processes are separated and located by MNCs according to fine differences in production costs. We separate *HT1, electronic and electrical products* from *HT2, other high-tech products*. Apart from electronics, other high-technology products (generating equipment, aircraft, precision instruments and pharmaceuticals) remain rooted in economies with high levels of skills, technology and supplier networks. Their comparative advantage continues to be ruled by the usual technological factors

At some risk of simplification, we place RB and LT products together as having *'easy' technologies*, with the main drivers of competitiveness being natural resource endowments in the former case and low wages in the latter. MT and HT products have *'difficult' technologies*, with high skill, complex learning and demanding technological activity. The obvious exceptions, as noted, are heavy low-technology products in the LT groups that are not readily amenable to relocation to low wage areas, and at the high end, electronic products that are.

Note that this classification, based on the complexity of technology within each activity, is not meant to suggest that some categories of exports remain competitive without technological effort. All industrial activities, regardless of the level of technology, need to constantly upgrade technologies to retain international competitiveness (this also applies to many primary products). The nature of capabilities and the kinds of technological effort needed differ, of course, but there is no activity that is immune to technical change. The same applies to technology upgrading via FDI. Multinationals transfer technology to developing countries in each category, but their role differs. It is higher where cost-driven relocation is particularly important, especially in highly complex and differentiated products (where there are integrated production systems), and where local capabilities are weak.

3. Patterns worldwide and by development levels

Let us start with the major product categories, considering four sub-periods between 1985 and 1998. Table 2 gives growth rates and market shares for exports by the world, developed and developing countries.[9]

Table 2: Growth rates and market shares of exports (% per annum)

	All products	Primary	All Mfg.	RB	LT	MT	HT
Growth 1985-98							
World	8.6%	3.4%	9.7%	7.0%	9.7%	9.3%	13.1%
Developed	8.4%	4.4%	8.8%	7.0%	8.5%	8.5%	11.3%
Developing	8.7%	1.3%	12.5%	6.0%	11.7%	14.3%	21.4%
Growth 1985-90							
World	13.1%	5.6%	14.9%	11.4%	16.3%	15.1%	17.4%
Developed	14.0%	7.9%	14.7%	12.7%	15.4%	14.7%	16.2%
Developing	9.1%	1.3%	15.4%	4.9%	18.4%	19.3%	26.7%
Growth 1990-95							
World	8.2%	4.4%	8.9%	7.4%	8.3%	7.8%	13.2%
Developed	7.0%	4.9%	7.2%	6.2%	6.2%	6.6%	10.1%
Developing	12.0%	2.7%	15.3%	10.3%	11.3%	16.6%	25.4%
Growth 1995-98							

[9] Transition economies in Eastern Europe and Central Asia are excluded because of the very patchy nature of the data available over the period. Developed economies are defined to include Israel South Europe but not Turkey (which is included in the Middle East group). Developing countries are defined to include the South Africa, the mature Asian Tigers, China and Asian transition economies (like Vietnam), and all Latin American countries (including Mexico). Data for 1998 have several missing values for developing countries like Bangladesh, Sri Lanka and many African countries, none of which are major exporters in the developing world. Data for 1980 could not be used because they had missing values for major Latin American exporters.

World	2.1%	-1.9%	2.7%	-0.4%	1.8%	2.5%	6.1%
Developed	1.7%	-2.3%	2.2%	-0.9%	1.4%	2.0%	5.6%
Developing	2.8%	-1.1%	3.5%	0.9%	2.2%	3.1%	7.0%
Shares of products in world exports, 1985 & 1998							
1985	100%	21.7%	73.8%	21.1%	13.7%	30.2%	12.4%
1998	100%	11.5%	84.2%	14.5%	15.8%	32.8%	21.1%
Shares of developing countries in world exports, 1985 & 1998							
1985	24.3%	52.1%	16.4%	26.3%	26.7%	8.3%	10.7%
1998	25.0%	39.7%	23.3%	23.7%	34.5%	15.3%	27.0%

Source: Calculated from UN Comtrade data provided by UNCTAD.
Note: 'Other' transactions are not shown here, and account for the difference between total exports and primary plus manufactured products.
Acronyms: RB: resource based manufactures, LT: low technology manufactures, MT: medium technology manufactures and HT: high technology manufactures.

There are several points of note:

1. Taking the period 1985-98 as a whole, manufactured exports grew nearly three times faster than primary exports for the world. Within manufactures, RB products grew the slowest and HT the fastest; this ranking applies to all sub-periods and for both developed and developing countries. Products with a 'natural' comparative advantage (primary and RB together) are clearly not very dynamic in world trade; their combined share of world exports has declined from 43% to 26% over the 13 years. At the other end, HT products lead in dynamism, recording a 9 point rise in share. LT and MT products are growing at almost the same pace, with the former slightly in the lead in two of the three sub-periods. While MT products still constitute the largest single category in trade, at current rates of growth the few HT products (18 in number in the SITC classification, compared to around 60 in MT) that are growing so rapidly will soon overtake them in value. The two 'complex' categories (MT and HT) together comprise 54% of total world, and 64% of manufactured, exports in 1998.

2. While overall growth rates over 1985-98 are almost equal for developed and developing countries, this is due entirely to a spurt by developed countries in the late 1980s. Since 1990, total exports by developing countries have outperformed those by developed ones. More interestingly, the early lead of the developed countries is due entirely to their *performance in primary rather than manufactured product exports.* In 1985-90, their primary exports grew over three times faster than for developing countries. In 1990-95, the lead dropped to 1.7 times, and in 1995-98 it was reversed. This pattern is intriguing – liberalization should have led developing countries to exploit their (static) advantage in primary products more than developed ones. The actual outcome may reflect different factors: the expansion of agricultural exports by developed countries (because of subsidies or dumping of food stocks or bringing new land into cultivation) or their faster technological progress (in primary product production or transportation).

3. In manufacturing, the developing world leads in growth rates, with its lead over developed countries *rising with technological intensity*. In RB, the developed countries grow faster for 1985-98 (the difference is 1 percentage point in their favour), probably reflecting the same factors that drive primary exports. This difference is again concentrated in the late 1980s, and is reversed in the 1990s. In the other three export groups, developing countries lead over the period by 3.2 points in LT, 5.8 in MT and 10.1 in HT. This is again counter-intuitive: theory suggests that industrial countries should do better in competing in technology-intensive products.

4. The sub-period 1985-90 saw a boom period for world trade. In the early 1990s the overall growth rate for manufactured exports fell by 40%, and by a further 70% in 1995-98. While the slowdown affected all categories of products, growth performance was generally related to technology intensity. Primary products did worst, followed by RB, LT and MT products. HT products consistently had the highest growth rates.

5. The share of the developing world in total world exports rose marginally over 1985-98. However, this was the result of offsetting trends in primary and manufactured products, a loss in the former just outweighed by a gain the latter. Thus, its share of manufactured exports rose by 7 percentage points. Within manufactured products, it lost shares in RB but gained in the others. The largest increase in its share, 16.3 points, was in HT products.

What does this suggest about the 'drivers' of export dynamism? As expected, technology-intensity was a powerful force for export growth. The rapid growth of developing country HT exports, however, reflected the interaction between the relocation of simpler HT processes with fast growing markets driven by innovation and new demand. Relocation was the main force behind the growth of low technology exports (within developed countries, say from North to South Europe but more significantly from developed to developing countries). Most such products had low overall demand growth and slow rate of technical change, though they had considerable design and quality upgrading. Primary and RB products lost ground over the period, a combination of slow innovation and lack of wage-cost driven relocation. MT products were largely driven by demand growth and innovation; pure relocation to take advantage of low wages existed but were not a powerful force. The main exception was the automobile industry in Mexico, with considerable relocation of US facilities to take advantage of lower wages.[10]

[10] Automotive exports are also rising rapidly in MERCOSUR (Argentina and Brazil), but this is not driven by wage cost differences as much as the rationalisation of production by MNCs. The process here is similar to the restructuring of the industry going on in Europe.

Table 3 shows the growth, market shares and values of developing country manufactured exports by sub-categories for the period. The main features are:

1. By growth rates, the lead worldwide and for both country groups is taken by electronics, followed by other HT products. Most LT and MT sub-categories cluster around 9-10% growth rates, led by 'other' LT products. The distribution is similar in the developing world, with electronics in the lead, but with auto products taking second place (largely because of the small initial base). The faster growth in RB products by the developed world is due to 'other' RB products rather than agro-based products, suggesting that specialisation in faster growing products or more rapid technological progress is at work.

2. In market shares, the largest for developing countries is (expectedly) the textile cluster, but their electronics exports account (unexpectedly) for a third of the world total. They lose shares in 'other' RB products but increase in all others (though marginally in agro-based products). The lowest shares are in 'other' HT (that are, as noted, very complex products not amenable to relocation of labour-intensive processes), followed by auto products (the main exceptions here being the three Latin American countries) and MT engineering products (heavy machinery).

3. Export values also show some interesting trends. Of the four sub-categories that exceed $100 billion in 1998, two are in LT. However, the largest single export category is electronics, where exports ($265 billion) exceed the next group, the textile cluster, by $95 billion (the difference is larger than total agro-based exports). At the other end, the lowest earner is 'other' HT followed by auto and MT process industries.

To conclude, developing countries appear to be doing well in export competitiveness. Not only are their manufactured exports growing rapidly, they are growing fastest in dynamic areas and taking substantial market shares in highly sophisticated, innovative products. A significant part of their high technology growth is, admittedly, something of a statistical illusion: they are specialising in labour-intensive processes within technology-intensive activities.

However, not all their high-tech exports are simple assembly operations. As argued below, the two large Tigers, Korea and Taiwan, have considerable domestic content, technology and innovation underlying their complex exports, with the bulk of exports coming from domestic firms (Lall, 1996). Even an MNC dependent exporter like Singapore has built up advanced manufacturing capabilities, and later entrants like Malaysia are deepening their capabilities. In MT products, a number of countries have developed strong manufacturing, design and marketing capabilities – in foreign affiliates as well as independently – and seem set to continue with high growth rates. In other words,

there are 'real' competitive advantages developing in manufacturing across the whole spectrum of technologies.

Does this mean that there is widespread and significant growth of competitive technological capabilities across the developing world? Unfortunately not: export success is highly uneven, at the regional and country levels. Let us take them in turn.

4. Patterns in the developing world

4.1 Regional shares of developing world exports

Table 4 gives the distribution of manufactured exports by the main regions within the developing world.[11] SSA and LAC are shown with and without their major exporters – South Africa and Mexico, the 'outliers' in their regions.[12] Mexico also appears separately because of the strong impact it exercises on LAC performance. SSA1 is not shown because data for South Africa in 1985 are not available. The figures show large, and generally rising, disparities in export performance across the

[11] 'East Asia' includes all countries in Asia east of Myanmar, including Myanmar and Vietnam (but not Laos or Cambodia for lack of reported data) and China, and excludes Japan and Central Asian transition countries. 'South Asia' comprises India, Pakistan, Bangladesh, Sri Lanka, Maldives, Nepal and Bhutan. 'MENA' (Middle East and North Africa) includes Afghanistan and Turkey as well as all Arab countries (Sudan is counted under SSA). 'SSA' (Sub-Saharan Africa) includes South Africa (SSA1) unless specified (SSA2). 'LAC' (Latin America and the Caribbean) includes Mexico (LAC1) and excludes it (LAC2) when specified.

[12] South Africa by itself accounted for 55 per cent of manufacturing value added in SSA in 1998, and for around 45 per cent of its manufactured exports. Its unusual history and structure means that we should exclude it to get a clear picture of Sub-Saharan African competitiveness. Unfortunately, the UN database does not have South African export figures for 1985. Mexico is an outlier because of its proximity to the USA and the unusual nature of its trading relations. Mexico has long been a base for labour-intensive export-oriented assembly by US firms in its border *maquiladoras*, which were allowed to import duty-free inputs and sell the finished product to the USA with tariffs levied only on the value-added. While this gave it a strong export base in some manufactured products, its performance did not match that of East Asia. The formation of NAFTA in the mid-1990s gave offshore assembly a new fillip and brought Mexico into a position to challenge Asia. NAFTA allowed significant new privileges like allowing local inputs for duty exemption; this led to dramatic rises across all export categories and to a huge rise in FDI from Asia to use Mexico as an export base for the US market. As the data show, it now accounts for more manufactured exports than the rest of Latin America put together.

Table 3: Manufactured Exports by Technological Sub-Categories

	Growth Rates 1985-98 (% p.a.)			Developing World Shares (%)		Values of developing country manufactured exports (current US$ billion)	
	World	Developed	Developing	1985	1998	1985	1998
All manufactures	9.7	8.8	12.5	16.4	23.3	210.2	997.0
RB	7.0	7.0	6.0	26.3	23.7	80.0	175.1
Agro based	*8.8*	*8.4*	*9.1*	*19.9*	*20.6*	*24.3*	*77.4*
Other RB	*5.5*	*5.7*	*4.2*	*31.8*	*26.8*	*55.6*	*97.7*
LT	9.7	8.5	11.7	26.7	34.5	63.8	277.4
Textile cluster	*9.6*	*8.0*	*11.1*	*41.1*	*49.1*	*42.2*	*170.0*
Other LT	*9.8*	*8.8*	*12.8*	*16.9*	*24.1*	*21.6*	*107.4*
MT	9.3	8.5	14.3	8.3	15.3	43.4	254.3
Auto	*9.3*	*8.4*	*20.2*	*3.0*	*10.5*	*4.4*	*51.5*
Process	*8.9*	*7.8*	*13.4*	*11.9*	*20.1*	*14.0*	*75.5*
Engineering	*9.5*	*9.0*	*13.2*	*10.5*	*16.3*	*24.9*	*127.2*
HT	13.1	11.3	21.4	10.7	27.0	23.0	290.1
Electronic	*14.1*	*11.7*	*22.1*	*14.0*	*34.2*	*19.4*	*265.1*
Other HT	*11.0*	*10.7*	*16.1*	*4.8*	*8.6*	*3.6*	*25.0*

Source: As Table 2. For details of each technological category see Annex Table 1.

Table 4: Regional shares of developing countries' manufactured exports (% of developing world total)

	Year	East Asia	South Asia	MENA	LAC1 (incl. Mexico)	LAC2 (exc. Mexico)	Mexico	SSA 1 (incl. S Africa)	SSA 2 (exc. S Africa)
All Manufactures	1985	56.9	4.5	12.9	23.1	16.9	6.2	N/A	2.6
	1998	69.0	3.8	6.0	19.3	8.9	10.4	1.8	0.8
RB	1985	34.6	3.8	23.8	32.9	30.7	2.2	N/A	4.9
	1998	47.5	4.7	15.0	28.0	24.0	4.0	4.8	1.4
Agro based	1985	*55.1*	*2.2*	*4.5*	*32.0*	*30.4*	*1.6*	*N/A*	*6.2*
	1998	*55.1*	*1.7*	*4.9*	*33.1*	*28.3*	*4.6*	*5.3*	*2.4*
Other RB	1985	*25.6*	*4.5*	*32.3*	*33.3*	*30.8*	*2.5*	*N/A*	*4.3*
	1998	*41.4*	*7.2*	*23.1*	*23.1*	*20.6*	*2.5*	*4.4*	*0.6*
LT	1985	71.7	8.3	7.3	11.9	10.2	1.7	N/A	1.8
	1998	70.2	8.5	7.2	12.6	5.4	7.2	1.5	0.2
Textile cluster	1985	*69.9*	*11.6*	*8.1*	*9.5*	*8.5*	*1.0*	*N/A*	*0.9*
	1998	*67.3*	*12.1*	*9.1*	*10.4*	*4.9*	*5.5*	*1.1*	*0.8*
Other LT	1985	*75.2*	*1.7*	*5.7*	*16.6*	*13.5*	*3.1*	*N/A*	*0.8*
	1998	*74.9*	*2.9*	*4.2*	*16.0*	*6.3*	*9.7*	*2.0*	*0.3*
MT	1985	63.4	2.0	7.1	25.8	17.5	8.3	N/A	1.8
	1998	63.8	1.8	4.4	28.1	10.2	17.9	1.9	0.2
Auto	1985	*40.6*	*2.7*	*5.9*	*50.3*	*32.9*	*17.4*	*N/A*	*0.4*
	1998	*39.8*	*1.4*	*2.9*	*54.2*	*16.9*	*37.3*	*1.7*	*0.1*
Process	1985	*53.4*	*2.3*	*13.8*	*28.2*	*25.2*	*3.0*	*N/A*	*2.3*
	1998	*65.6*	*3.3*	*8.4*	*19.9*	*13.0*	*6.9*	*2.8*	*0.5*
Engineering	1985	*73.0*	*1.7*	*3.5*	*20.1*	*10.4*	*9.7*	*N/A*	*1.7*
	1998	*72.5*	*1.1*	*2.6*	*22.4*	*5.8*	*16.6*	*1.3*	*0.1*
HT	1985	81.0	1.1	1.8	14.8	6.6	8.2	N/A	1.3
	1998	85.5	0.6	0.7	12.9	2.1	10.8	0.4	0.0
Electronic	1985	*84.7*	*0.5*	*0.7*	*14.0*	*5.1*	*8.9*	*N/A*	*0.1*
	1998	*87.2*	*0.3*	*0.6*	*11.8*	*1.2*	*10.6*	*0.2*	*0.1*
Other HT	1985	*60.3*	*4.5*	*8.2*	*19.2*	*15.2*	*4.0*	*N/A*	*7.8*
	1998	*66.9*	*4.2*	*1.9*	*25.0*	*12.2*	*12.8*	*0.0*	*0.3*

Source: As Table 2. For the composition of the regional groups see footnote 12.

developing world, with enormous concentration of competitive capabilities in East Asia.

Total manufactured exports: With nearly 70 per cent of the total, East Asia dominates the developing world. Moreover, its share rises over time at the cost of all the other regions. The largest loss of share is by LAC2 (excluding Mexico, which on its own has a healthy increase); the Latin American region now accounts for less than 20% of the developing world's manufactured exports, from nearly one-quarter in 1985. It is followed by MENA, which retains second position but after a hefty fall in market shares; its performance is strongly influenced by Turkey, the dominant exporter in the region. S Asia, despite its substantial industrial sector, suffers deterioration in its already small share, the legacy of decades of import-substitution that it still has not shaken off. Sub-Saharan Africa starts from a more marginal position. The share of SSA2 falls to an almost insignificant level, to less than 1 per cent of the developing world's total (and under 0.2% of the world total). Including S Africa raises the figure to a paltry 1.8% (0.4% of the world).

RB exports: The level of concentration here is the lowest of the main product groups, with no region accounting for 50% of total exports. This may be because the possession of natural resources counts in competitiveness here, and the distribution of resources may be more even than of other determinants of manufacturing competitiveness like technology and skills. However, the other determinants are also very important here. Thus, SSA, despite a strong resource base (reflected in that its RB share is higher than for other product categories), is still the smallest exporting region. What is more, it suffers a decline in market share over time, and the decline is the largest in relation to its initial market share. This suggests strongly that SSA lacks competitive capabilities in the manufacturing end of RB exports.

The region with the largest market share, and the strongest increase, is East Asia, with all the increase coming in RB2 products. This is somewhat surprising, since the largest export-oriented economies in the region are not rich in minerals: the explanation must be that they are import and process efficiently raw materials from elsewhere. The largest loss in market share is in MENA, with the loss concentrated in RB2 products (it has a marginal increase in RB1). It is followed by LAC2, where both sub-categories lose, but again with RB2 accounting for most of the loss. The reasons for this are not obvious, since the region has been regressing to resource-based activities as a result of liberalization (Benavente *et al*. 1997). Mexico by itself has a small increase in RB1. South Asia increases its overall share, with a rise in RB2 more than compensating for a loss in RB1. In SSA2, the loss is similar in both sub-categories.

LT exports: This category starts with very high concentration in East Asia, which has a stronger position in LT2 (non-textile low technology) products like toys, sports goods and light engineering products, than of textile related products. The region loses market shares in both sub-categories, albeit marginally. In fact, a larger loss of share may have been expected in view of fast rising wages in the region; however, significant relocation within the region from high to low income countries offsets the fall in LT exports by the leading Tigers.

The region that gains most is LAC1. This is driven entirely by a 5.5 percentage point rise in Mexico's share, with NAFTA privileges catalysing a massive expansion of low technology exports (in clothing, at the cost of other Caribbean exporters). Other Latin American countries, however, suffer a large drop in LT export shares (the largest of the developing regions) in both groups of products. This may reflect the relatively high wages in the region, but not entirely since many countries have lower wages than major LT exporters in Asia. It also reflects the fact that domestic manufacturers of LT exports are much weaker than in Asia and have not been able to build regional supply chains and marketing connections with buyers in rich countries. This set of capabilities and

networks has allowed Asian exporters to flourish despite rising wages; in fact, it has allowed them to exploit very effectively lower wages elsewhere.[13] By contrast, local firms in Latin America and North Africa have played a less dynamic role, with relatively footloose US MNCs being the most important agents in export growth.

South Asia shows modest gains in share in both categories, somewhat disappointing in view of the fact that textile-related products constitute the bulk of manufactured exports from the region (with relatively little diversification over time). MENA shows a tiny decline in share, a gain in LT1 offset by a fall in LT2. SSA suffers a decline in both sub-categories. Note here that the bulk of LT exports from SSA2 come from Mauritius, the only successful export-oriented economy in the region. Its clothing exports seem, however, to have peaked with rising wages and there has been no diversification into other manufactured exports.

In fact, the lack of export diversification from clothing is an important trend in the manufactured export scene, and has important policy implications. It bears out the point made earlier about the limited learning opportunities and spillovers of low technology activities. Other successful clothing exporters like Sri Lanka, Bangladesh, Pakistan and others in North Africa and the Caribbean have also suffered from this, and their future export prospects are not clear unless they undertake specific interventions to diversify the competitive base. An important case in point is Costa Rica, which has been able to attract a semiconductor plant from Intel by dint of assiduous Singapore-style FDI targeting (Spar, 1998).

MT exports: East Asia again dominates the picture, with a marginal increase in share over time. This reflects conflicting trends in the three sub-groups: it loses share in auto products (where it has a relatively low share) and engineering products (where it is strong), but gains significantly in process industries. South Asia shows similar trends, but with tiny market shares. MENA loses shares in all three categories, with particularly large losses in process industries. This may be due to slow growth of steel or fertiliser exports by the region, but needs further investigation. The story of SSA2, as in other products, is of declines in shares in all categories from already low bases.[14]

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[13] Quotas and rising costs forced the leading garment firms from the Asian NIEs to establish offshore factories in lower-wage countries. Hong Kong and Taiwan Province sourced extensively from Mainland China and Southeast Asian countries (but also spread to South Asia, Africa and the Caribbean), the Republic of Korea used Indonesia, North Korea and the Caribbean region, and so on. The East Asian NIEs exported directly to US buyers from these assembly sites, taking advantage of import quotas in the US market. This phenomenon has become known as *'triangle manufacturing'*. It has changed Asian NIE firms from suppliers to US retailers and merchandisers to important (and fiercely competitive) middlemen in the international commodity chain. Their networks encompass as many as fifty or sixty exporting countries. This development highlights the success of the strategy followed by the Asian NIEs, built around continuous learning, from EPZ through brand-name subcontracting to original brand-name manufacturing (Gereffi, 1999).

[14] It is not clear, moreover, why even small auto exports show up for SSA, since there are no major manufacturers there capable of exporting (this applies to HT products). The explanation must lie in re-exports or sales of used products.

Latin America as a whole shows the largest increases in share in MT products. Most of this comes in auto products, where the region accounts for over half of the developing world's exports in both years. However, it is again Mexico that accounts for the increase – by 1998 it accounts by itself for 37% of total developing country auto exports – while the rest of LAC suffers a massive fall in share. Automobiles and ancillary products are now the single largest industrial exports from Latin America, all handled by OECD MNCs. However the process of restructuring in the main producers (Mexico, Brazil and Argentina) has been very different. In Mexico it has meant integration into the giant and proximate US market, while in the MERCOSUR countries it has meant local integration with some export to other regions. The former has produced much more dynamism than the latter (Mortimore, 1998). LAC2 also loses shares in other MT products, but the increases by Mexico are not sufficient to expand the region's total shares.

HT products: This category is of particular interest since it is the largest and fastest growing export earner in the world. Equally importantly, it has the most beneficial development effects because of its learning potential, generic linkages to other manufacturing and service activities, skill and knowledge spillovers and ability to attract FDI (much of it in the form of integrated production systems). East Asia dominates here more strongly, based on its overwhelming presence in electronics, reaching 87% by 1998. Its performance accounts for this being the largest single manufactured export for the developing world. The only real challenge in HT comes from Mexico, with the rest of LAC losing shares. All other regions are marginal players and also lose shares. In other HT products, South Asia has a small presence.[15] Latin America is larger, presumably due to pharmaceuticals and, for Brazil, in aircraft (the famous 'Embraer' developed by a public sector firm). MENA and SSA2 had significant shares in 1985 (though the total value of developing world HT2 exports was only $3.2 b.) but lose sharply over time. Some of it may be based on genuine local production (e.g. pharmaceuticals) but a large part, certainly in SSA and in Jordan, reflects re-exports (probably to Iraq) or sales of used aircraft.

4.2 Technological distribution of manufactured exports

Table 5 shows the spread of manufactured exports over technological categories. The world as a whole, and the developed countries, shifts from RB to HT products. In the developing world, there is a more marked shift away for 'simple' (RB and LT) to 'complex' (MT and HT) products, but with a massive increase in HT shares. As may be expected, East Asia has the most high-tech export structure (more so than the developed countries) and the most pronounced upgrading; its reliance on LT

[15] This is due almost entirely to the strong growth in Indian pharmaceutical exports, based on copying patented drugs (Lall, 1999). This may come under threat when India enforces strict patent protection in 2005, though some leading firms have started to invest in R&D to produce their own innovations and have teamed up with MNCs to obtain licences.

Table 5: Distribution of manufactured exports over technological categories, 1985 and 1998.

1985	RB	RB 1	RB 2	LT	LT 1	LT 2	MT	MT 1	MT 2	MT 3	HT	HT 1	HT 2
World	23.7%	9.8%	13.8%	18.6%	8.3%	10.3%	40.9%	12.2%	9.7%	19.0%	16.8%	10.9%	5.9%
Developed	21.0%	9.6%	11.5%	16.1%	5.8%	10.3%	44.7%	14.3%	10.3%	20.1%	18.2%	11.4%	6.8%
Developing	38.0%	11.6%	26.5%	30.4%	20.1%	10.3%	20.6%	2.1%	6.7%	11.9%	11.0%	9.3%	1.7%
East Asia	23.1%	11.2%	11.9%	38.3%	24.7%	13.6%	23.0%	1.5%	6.3%	15.2%	15.6%	13.8%	1.8%
South Asia	32.3%	5.6%	26.7%	55.8%	51.8%	4.0%	9.2%	1.3%	3.4%	4.5%	2.8%	1.1%	1.7%
MENA	70.1%	4.0%	66.1%	17.1%	12.6%	4.5%	11.3%	1.0%	7.1%	3.2%	1.6%	0.5%	1.1%
LAC 1	54.2%	16.1%	38.2%	15.7%	8.3%	7.4%	23.1%	4.5%	8.2%	10.4%	7.0%	5.6%	1.4%
LAC 2	61.1%	18.4%	42.7%	16.2%	8.9%	7.3%	18.9%	3.6%	8.8%	6.5%	3.8%	2.5%	1.3%
SSA 2	70.7%	27.3%	43.3%	10.1%	7.0%	3.0%	13.8%	0.3%	5.9%	7.6%	5.5%	0.5%	5.0%

1998	RB	RB 1	RB 2	LT	LT 1	LT 2	MT	MT 1	MT 2	MT 3	HT	HT 1	HT 2
World	17.3%	8.9%	8.4%	18.8%	8.2%	10.6%	38.9%	11.5%	8.8%	18.6%	25.1%	18.2%	6.9%
Developed	16.8%	9.1%	7.7%	15.5%	5.2%	10.2%	43.2%	13.6%	9.1%	20.5%	24.5%	16.0%	8.5%
Developing	17.6%	7.8%	9.8%	27.8%	17.1%	10.8%	25.5%	5.2%	7.6%	12.8%	29.1%	26.6%	2.5%
East Asia	12.1%	6.2%	5.9%	28.3%	16.6%	11.7%	23.6%	3.0%	7.2%	13.4%	36.0%	33.6%	2.4%
South Asia	21.7%	3.4%	18.3%	61.6%	53.6%	8.0%	12.1%	1.9%	6.5%	3.7%	4.6%	1.9%	2.8%
MENA	44.3%	6.4%	37.9%	33.7%	26.1%	7.6%	18.8%	2.5%	10.6%	5.7%	3.3%	2.5%	0.8%
LAC 1	25.4%	13.3%	12.1%	18.1%	9.1%	8.9%	37.1%	14.5%	7.8%	14.8%	19.4%	16.2%	3.2%
LAC 2	47.2%	24.5%	22.6%	16.8%	9.3%	7.5%	29.1%	9.8%	11.0%	8.3%	6.9%	3.5%	3.4%
SSA 1	46.0%	22.4%	23.6%	22.6%	10.5%	12.0%	25.8%	4.9%	11.6%	9.3%	5.7%	3.0%	2.7%
SSA 2	51.3%	38.6%	12.7%	35.0%	27.4%	7.6%	11.5%	0.6%	7.7%	3.2%	2.2%	0.7%	1.5%

Source: Table 2. SSA1 is not shown in 1985 because data for South Africa are not available.

products falls over time, particularly in the textile group. LAC also has a complex structure but mainly because of MT products (particularly autos); as noted, the Mexican presence is very significant, but even without it the region's exports retain a large weight of process industries and RB products.

Both MENA and SSA2 reduce their very heavy dependence on RB products over time, but remain specialised in simple manufactured products by raising their reliance on LT products, especially in the textile cluster (Turkey and Morocco in MENA and Mauritius in SSA2). However, MENA raises its reliance on HT and MT slightly, while SSA2 does the reverse. South Asia shows a similar trend to MENA, but with a much heavier reliance on LT products.

The regions' relative export strengths show up more clearly in their '*revealed comparative advantage*' (RCA) indices.[16] Table 6 gives RCA indices (including primary products) for the developed and developing countries as well as for the main developing regions for 1985 and 1998. RCAs for the developed world are remarkably stable over time. There are slight rises in primary and RB products and slight falls in the other three categories (including HT products). There is more alteration in the developing world, with primary and RB products losing their advantage to the others, and the largest increase coming in HT products.

[16] RCAs measure the world market share of a given exporter in a particular product or product group relative to its market share for all products.

Table 6: RCAs by technological categories in developing regions, 1985 and 1998

	Primary 85	Primary 98	RB 85	RB 98	LT 85	LT 98	MT 85	MT 98	HT 85	HT98
Developed countries	0.641	0.735	1.000	1.003	0.973	0.852	1.232	1.150	1.215	1.009
Developing countries	2.147	1.590	1.081	0.949	1.098	1.384	0.340	0.613	0.439	1.083
East Asia	1.132	0.643	0.892	0.742	1.880	1.601	0.514	0.644	0.848	1.524
South Asia	1.441	1.453	1.245	1.216	2.737	3.180	0.205	0.301	0.150	0.178
MENA	3.368	4.973	1.074	1.242	0.333	0.869	0.1000	0.234	0.034	0.063
LAC 1	2.289	2.305	1.523	1.232	0.560	0.806	0.375	0.799	0.277	0.647
LAC 2	2.163	3.309	1.824	1.850	0.128	0.607	0.326	0.507	0.160	0.186
SSA 1	-	3.028	-	1.786	-	0.806	-	0.446	-	0.151
SSA 2	3.779	5.250	0.704	1.365	0.128	0.855	0.080	0.136	0.077	0.040

Source: as Table 2.

As expected, East Asia is the main driver of the developing world's push up the technology ladder, with some support from LAC1 (that is, from Mexico). East Asia's 1998 RCA in HT exceeds that of developed countries as a whole, and slightly lags its RCA in LT products. Its lowest RCAs are in primary and MT products; it is the only developing region with a revealed comparative disadvantage in primary products and the only one for which this figure is lower in 1998 than 1985.

The highest RCAs for South Asia are in LT and primary products, with RB products close to the latter; its lowest are in HT products. The region has the highest revealed advantage in LT products in the developing world, bearing out what was said earlier about its heavy dependence on textile-related exports and its slow technological upgrading. SSA2, MENA and LAC show strong advantages in primary and RB products; while the latter two show some improvement in RCAs in HT products, SSA2 regresses over the period.

It is interesting to look at the correlation coefficients of country level per capita manufactured exports with *RCAs by technological categories* across the world in 1985 and 1995.[17] There is a strong, positive and significant (at the 1% confidence level) correlation between per capita export values between RCAs in HT products, and the coefficient increases over time (0.59 in 1995 and 0.54 in 1985). There is also a strong, positive and significant correlation for MT products, but it falls over the period (0.32 and 0.36 respectively). LT and RB products have negative correlations in both years and the coefficients become more negative over 1985-1995. The coefficients are significant at the 5% level (except for LT in 1985, which fails to reach significance). This serves to confirm that the largest and most successful exporters in the world specialise in HT and MT products and that specialisation in HT products is increasingly related to export success.

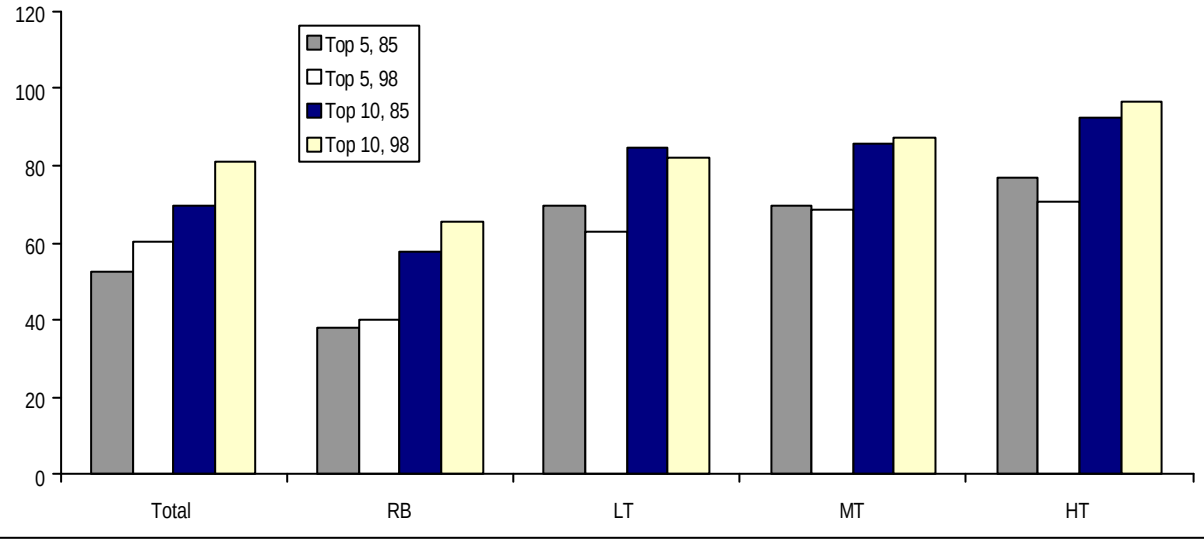
[17] The sample comprises 73 developed and developing countries for which export data are available in both years, excluding very small economies with tiny export values. The significance levels are two-tailed.

4.3 Leading country performance

Export performance in the developing world is concentrated not just at the regional level but also, and to a surprising extent, at the national level. Let us first consider how concentration has evolved over 1985-98 in the main manufactured product categories. Annex Table 2 shows the list of the leading 13 countries in each category in both years, with export values and market shares for the leading exporters. Figure 1 shows the shares of the top 5 and 10 exporters.

Three features of the figure are worth commenting on. First, the overall concentration of manufactured exports is very high: in 1998, for instance, the leading 5 countries account for 60% and the leading 10 for just over 80%, of the total. In other words, export capabilities are very unevenly distributed at the national level. Second, concentration levels rise with technological sophistication, reaching 96% for the top 10 HT exporters in 1998. This is not surprising – given the apparent barriers to building export competitiveness, concentration is bound to be higher the more difficult the technologies.

Figure 1: Shares of top 5 & 10 exporters in developing country mfd. exports, 1985 and 1998 (%)



Third, concentration levels generally rise over time. This suggests that entry barriers (to export competitiveness, not to markets) are rising despite growing trade and investment liberalization. Though restrictions placed by developing country governments on export activity and technology transfer (that may earlier have held back export growth) are falling, the *ability to compete* is not growing automatically in response. This is just what the technological capability approach, with its emphasis on slow, cumulative, path-dependent learning, would predict, but neoclassical theory would not. Since the analytical bulwark of much of adjustment and liberalization in developing countries has

been a simple version of neoclassical approach to technology and trade (Lall, 1996), it is not surprising that many expectations of liberalising economies, particularly in SSA, are belied.

The rise in concentration is not universal. The figures shows small exceptions in LT products at both 5 and 10 country levels and MT and HT products at the 5 country levels. However, the more detailed data in the annex table shows that even in LT products, concentration rises at the 13-country level, and in MT and HT it rises at both 10 and 13 country levels. This is still a very high level of concentration. There is clearly some churning of positions among the leaders but growth for 'outsiders' still seems to have become more rather than less difficult.[18]

The annex table has some other noteworthy features:

1. China has grown rapidly to become the dominant exporter in the developing world. From tenth position overall in 1985, it now leads total manufactured exports as well as RB and LT, and with third position in MT and fifth in HT. This explains why it is seen by many developing countries (not just in the region) as the main competitive threat across the technological spectrum. Much of its export dynamism comes from MNC activity in its Special Economic Zones (counting Hong Kong and Taiwanese firms as MNCs), but a great deal also arises in domestic firms (the new cooperative types of ventures rather than the giant state-owned enterprises).

2. The appearance of Thailand and Philippines in the top group (from nowhere in 1985 to 7 and 9 respectively in 1998). Thailand has broad-based export competence, with domestic firms leading in simpler activities and MNCs in complex ones. Philippines, by contrast, is growing entirely because of MNC activity in the electronics industry, where it has already undertaken Malaysia in the semiconductor industry. Its cheap, technically proficient and English speaking manpower has been a major competitive asset.

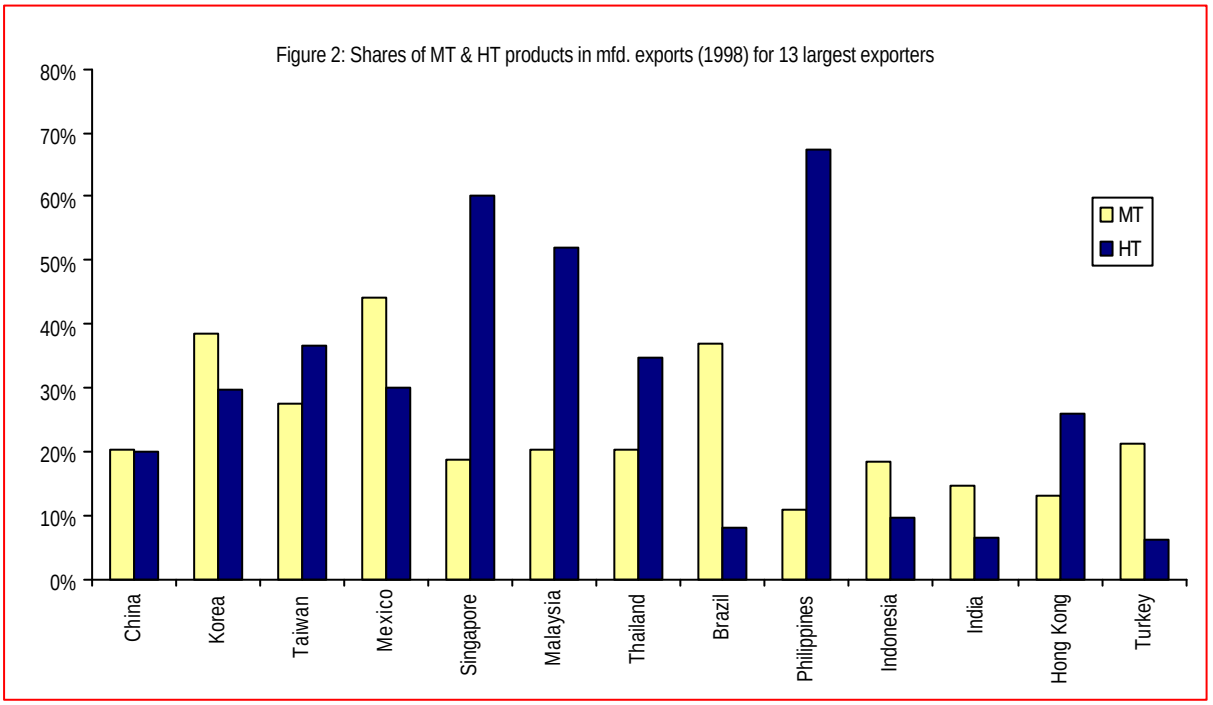
3. The improvement in Mexico's rank (from 7 to 4) for reasons given already, making it by far the most dynamic exporter in Latin America, and the only one outside Asia to match the performance of the Asian Tigers. Note that Brazil, a much larger economy, loses rank over the period (from 4th to 8th position).

4. The sustained role of the mature Tigers (Singapore, Korea and Taiwan) in the top five in both years. These are the countries with the greatest technological depth, in particular the latter two, in the developing world, and have mounted the most systematic and comprehensive

[18] One interesting aberration in the annex table is that Niger appears as the 11th largest high technology exporter in 1985. This is probably due to a one-off sale of aircraft, illustrating the earlier point about such distortions.

industrial policies to upgrade their competitive structures (Lall, 1996). Singapore relies very heavily on MNCs, but uses a barrage of industrial policy instruments to target, attract and upgrade technology-intensive investors.[19] Korea and Taiwan rely primarily on domestic firms, many now large MNCs in their own right, and invest heavily in skill development, R&D and institutional support for enterprises.

We return to some of these explanations of export dynamism below. Annex Tables 3 and 4 show detailed figures on the export performance of the 13 countries that account for nearly 90 percent of total manufactured exports by the developing world in 1998. These are the four mature Asian Tigers, the four 'new Tigers', China, India, Mexico, Brazil and Turkey. The list differs from the previous one, which took leading exporters separately in each year and product category. While there is insufficient space to discuss them in any detail, we may how different their technological specialisation in 1998 is. Figure 2 shows the shares of MT and HT in their manufactured exports.



In MT, highest share is by Mexico, a mixture of its large automotive and engineering exports dominated by MNCs, followed by Korea (dominated by domestic firms, the *chaebol*) and Brazil (mainly MNCs). The highest technology structures are in Philippines, Singapore and Malaysia, all dominated by MNC export-oriented operations. Local technological content among these countries is highest in Singapore, followed by Malaysia and then Philippines (still mainly final assembly and

[19] Note that Singapore's export figures include re-exports (about 40% of the total). This is the reason it appears as a large LT exporter – most of these products are sold on behalf of neighbouring low-wage countries. Its own exports are highly concentrated in RB (petrochemicals), MT (machinery) and particularly HT (electronics) products.

testing operations). However, among the largest exporters of high-tech products, Korea and Taiwan have the greatest domestic technological inputs and competence. Their domestic firms undertake much of the manufacturing activity involved, and also provide very high levels of physical, design, R&D and engineering inputs (see Hobday, 1995 and Lall, 1996). Their role in marketing is less (though growing); because of strong product differentiation and branding, a large proportion of their sophisticated products has to be sold by foreign MNCs under their own brands (called OEM, or original equipment manufacture). Also note the very low technology structure of Hong Kong exports, the only Asian Tiger to suffer massive deindustrialisation in recent years, due in significant part to its *laissez faire* policies on industrial and technological deepening.

Table 7: Correlation of RCAs between 1985 and 1998

RB	0.781**
LT	0.814**
MT	0.881**
HT	0.805**

** significant at 1% (2 tailed)

Finally, how much has the distribution of RCAs changed over time? It was argued here that there is likely to be considerable *structural inertia*, caused by the path-dependent and cumulative nature of capability and institution building. We can test for this by correlating RCAs for each technological category between 1985 and 1998. A high correlation would indicate that country-level comparative advantages remain relatively unchanged (how fast or slow total exports grow over the period does not affect the RCAs). Table 7 shows the correlation matrix for 73 countries, both developed and developing, on which we have data. The indication is that RCAs by technology have stayed very stable.

5. Strategic determinants of export competitiveness

Let us now briefly consider the broad *strategies* pursued by leading exporters to build their competitiveness. Part of recent export growth was not based on any specific strategy but on the exploitation of existing advantages (natural resources and unskilled or semi-skilled labour) and the 'natural' development of productive capabilities and inflows of FDI. However, a large part – particularly in countries that enter complex technological functions in technologically advanced industries – did entail 'strategy', to deliberately create new advantages (skills, technological capabilities and institutions), attract high quality FDI and induce MNCs to upgrade activities. The basic choices were between the agents involved (local enterprises or MNCs), the technology-intensity of activities undertaken and the complexity of functions undertaken locally (design, engineering and R&D as compared to simple assembly). Countries tended to use combinations of different strategies, but with different balance and emphasis, varying by activity and over time.

The main strategic issues revolve around the building of the capabilities needed for export competitiveness. Exporting requires, even in simple activities, investments in capabilities of various kinds: procurement, production, engineering, design, marketing and so on. The building of advantages in resource-based or simple labour-intensive activities tends to involve less effort, risk and

externalities than in complex activities. However, even simple activities are demanding in the developing country context, and the data on 'outsiders' suggests that the effort needed has been out of reach of many countries. Sustained and rapid manufactured export growth, particularly if accompanied by fast-rising wages, needs a move from easy to complex products and processes within activities and from easy to complex technologies across activities. The choice between local and foreign firms to lead the capability building process depends on the existing base of skills and experience and the demands of exporting. It also depends upon the ability of governments and institutions to help enterprises to develop the necessary capabilities and tap externalities (say, to coordinate investments in vertically linked activities or undertake collective learning). MNCs and local firms face different factor markets and have to overcome different market failures in learning.

MNCs have several advantages over local firms in deploying new technologies ('new' to a particular location) in export activity. They may have created the technology in the first place; they have mastered and used the technologies elsewhere. They have large internal reserves of skill, technical support, experience and finance to design and implement the learning process. They have access to major export markets, established marketing channels and well-known brand names. They can transfer particular components or processes from a production chain to a developing country and integrate it into an international system (UNCTAD, 1999). This is much more difficult for local firms, not just because they lack the experience or technological competence – they also face higher transaction and coordination costs in integrating into MNC production systems.

While the MNC-led strategy has many benefits, and can be a highly effective and rapid means of exploiting existing advantages, a passive FDI strategy may not be the best way to dynamise competitiveness. MNCs may not invest in a particular country because of imperfect information or poor image. Thus, effective promotion and targeting of investors can allow a country to attract more and higher quality FDI. Where MNCs do invest, they initially transfer equipment and technologies suited to *existing* skills and capabilities. To move on to more advanced activities and functions, they have to upgrade local skills, technological capabilities and supply chains. This is economical only where the education and training base is growing, local suppliers are raising their capabilities, technology institutions are able to provide more advanced services, and so on. Such supply side upgrading needs government support. Moreover, a policy to induce MNCs to enter more advanced activities by offering such inducements as specialised infrastructure and skills can accelerate the upgrading process. With a completely passive policy, MNC exports can remain at low, technologically stagnant, levels. Thus, an MNC dependent export strategy needs a proactive element for dynamic competitiveness.

More important, an *FDI-dependent strategy cannot substitute fully for building domestic capabilities*. There are many activities in which MNCs have no competitive advantage over domestic

firms, particularly those served by SMEs. The development of national enterprises may also lead to broader, deeper and more flexible capabilities, since the learning process within foreign affiliates may be curtailed as compared to local firms. The very fact that an affiliate can draw upon its parent company for technical information, skills, technological advances and so on means that it needs to invest less in its own capabilities. This applies particularly to functions like advanced engineering, design or R&D, which MNCs tend to centralise in industrial countries. As they mature industrially, it is imperative for developing countries to undertake these functions locally to support their future comparative advantage. This is why some countries choose to promote technology development in indigenous firms.

The leading exporters made different strategic choices in these respects. Taking our sample of leading developing country exporters, we may distinguish four:

- '*Autonomous'*, based on the development of capabilities in domestic firms, starting in simple activities and deepening rapidly over time. This strategy used extensive industrial policy, reaching into trade, finance, education, training, technology and industrial structure. It involved selective restrictions on FDI, and actively encouraged technology imports in other forms. All these interventions were carried out in a strongly export-oriented trade regime, with favours granted in return for good export performance. The prime examples are Korea and Taiwan.

- '*Strategic FDI dependent'*, driven by FDI and exports to MNC global networks. There was strong effort to upgrade MNC activity according to strategic priorities, directing investments into higher value-added activities and inducing existing affiliates to upgrade their technologies and functions. This strategy involved extensive interventions in factor markets (skill creation, institution building, infrastructure development and supplier support), encouraging R&D and technology institutions, and in attracting, targeting and guiding investments. The best example is Singapore.

- '*Passive FDI dependent'*, also driven by FDI but relying largely on market forces to upgrade the structure (with rising wages and growing capabilities). The main tools were a welcoming FDI regime, strong incentives for exports, with good export infrastructure, and cheap, trainable labour. Skill upgrading and domestic technological activity were relatively neglected (though some countries had a relatively good base), and the domestic industrial sector tended to develop in isolation from the export sector. Malaysia, Thailand and Philippines are good examples, along with the Special Economic Zones of China (and the *maquilas* of Mexico).

- *'ISI restructuring'*, with exports growing from long-established import-substituting industries where competitive (or nearly competitive) capabilities had developed. The main policy tool was trade liberalization or strong export incentives (some, as in Latin America, within regional trade agreements). This led to considerable upgrading, restructuring and expansion of these industries along with their supplier networks. In some countries the main agents were domestic enterprises, in others they were MNCs. The main difference from the 'autonomous' strategy is the lack of clear and coordinated industrial policy to develop export competitiveness, with haphazard (and generally weak) support for skills, technology, institutions and infrastructure. China and India are examples within Asia, the large Latin American economies elsewhere; elements of this strategy are also present in many other economies.

These strategies are not, as noted, mutually exclusive. Countries combine them and vary the combinations over time. Nevertheless, this simple typology is useful as an analytical tool, if used carefully with appropriate caveats. The main tools in the armoury of upgrading are *trade policy, credit allocation and subsidies, infrastructure development, skill formation, technology promotion, and FDI attraction, targeting or restriction.* The way in which the Asian Tigers used these tools of industrial policy is well known (Lall, 1996, Stiglitz, 1996) and need not be discussed here.

It does not appear from the evidence at hand that any particular strategy is optimal for developing countries. On the contrary, since successful exporters used different approaches adapted to their initial conditions, political economy and strategic 'visions', *there is unlikely to be any such thing as an 'optimal' approach.* The vital strategic issue is to address the market failures that affect the main determinants of technological competitiveness: skills, technological effort, support institutions, information flows, agglomeration and FDI (apart from the usual factors like outward-oriented trade regimes, good physical infrastructure, well managed macro policies and the like). *How* this is done is difficult to prescribe in advance. Many of the industrial policy tools used by the larger Tigers are, of course, no longer available under the new rules of trade and finance, but many remain. It is beyond this paper to analyse them, but they are spelled out in Lall (1997).

6. Conclusions: Insights of the capability approach

This paper has mapped out recent trends in manufactured exports by the developing world and made a case for the technological approach to the analysis of comparative advantage. It concludes by returning to the issue raised at the start of the paper – much of received trade theory really does not explain emerging patterns of developing country exports. It does not, for instance, explain why export success is so concentrated in the developing world (across all types of manufactured products), why, in other words, generic export capabilities for industrial products are so unevenly distributed and

concentrated. It also does not explain how a few developing countries have built strong export positions in technology-intensive products, particularly those that have developed indigenous capabilities – received theory does not predict any comparative advantage for developing countries here. For countries that have relied on FDI to drive export growth, it does not explain how strategic interventions may be needed to sustain technological upgrading.

The underlying reason is the neglect of cumulativeness, externalities, agglomeration and technological learning in developing countries. Simple two-factor trade models assume away such phenomena by taking as a premise that enterprises operate on universally known and well-behaved production functions. The introduction of capital mobility and skills into the explanation (Wood, 1994) makes the theory more realistic, but does not go further in terms of incorporating other non-neoclassical factors. Yet these factors affect the evolution of comparative advantage, in two ways.

- Scale and agglomeration economies lead countries, *ceteris paribus*, to establish cumulative competitive leads by being first movers and adding to their advantages over time (Krugman, 1986, Venables, 1996). These are the insights of 'new' trade theory and economic geography.

- Where there are unpredictable, prolonged, costly and inter-linked learning processes, with diffuse externalities and failures in information markets, comparative advantage depends (again cumulatively) on how well countries build their national 'learning systems'. The nature of the national learning system depends, among other things, on policies to overcome market failures affecting enterprise learning, to build skills and institutions and coordinate learning with factor market and institutional development, and to capture learning spillovers across activities (Lall, 2000). Since learning costs and risks rise with technological complexity, further interventions may be needed to promote deepening. These are the insights offered by the technological capability approach.

The systemic, path-dependent and policy-based nature of comparative advantage helps explain why export success is *so concentrated in the developing world across products*. The ability to absorb technologies efficiently and react competitively to changing technological conditions appears to be a generic and fungible resource. Once a 'learning system' is in place, it benefits all types of export activities and grows cumulatively. While the pattern of specialisation shifts with changing costs and technologies – this is the main benefit of a good 'system' – the best countries retain substantial competitive positions across the technological spectrum (by quality upgrading), even where they are losing their initial advantages. By contrast, countries with weak learning systems find it difficult to establish competitive positions even in simple or resource-based activities. Without addressing the development of learning systems, therefore, trade liberalization cannot lead to a uniform spread of manufacturing competitiveness across the developing world.

Similarly, the capability approach can explain better than other comparative advantage approaches the *growth of technology-intensive exports*, particularly where this is based on genuine domestic technological inputs (rather than final assembly by MNCs). Since the 'learning system' needs interventions to develop and deepen once the technological structure advances beyond simple activities or functions, countries that are able to design and mount such interventions effectively can develop advantages far in advance of what endowment based theories would predict. Moreover, many of these interventions have to be selective rather than functional, though the two also complement each other (see Lall, 1996, for a review of this debate). This contrasts with the 'market friendly' interpretation of the World Bank (1993), which argues that selective interventions, while used in East Asia, were largely ineffective in altering comparative advantage.

The policy conclusions of the alternative approaches consequently differ. The conventional wisdom is that developing countries liberalise and invest in human capital to realise and dynamise their comparative advantage.[20] The capability approach suggests that this would help countries to exploit existing advantages in simple activities where inefficient inward-oriented policies and biases, or the lack of basic education, held these back. Many countries have experienced significant manufactured export growth recently by implementing such reforms. However, once the easy stage of exporting is over, and significant technological upgrading and deepening are required to sustain export growth, there is a need for selective policies. For countries that have strong domestic enterprises (and technological ambitions), policies have to deal with the needs of costly learning and building specific skills. For those heavily reliant of FDI, policies have to deal with targeting and attracting technology intensive activities or functions – and also with building specific skills. In a world with free trade and minimal government intervention in resource allocation – the 'ideal' to which we now seem headed – the outsiders to dynamic export growth face the risk of remaining marginalised for a long time to come.

While theory and evidence provide a valid case for intervention, however, there remains a real and important danger of *government failure*. Governments face information constraints just as markets do (Stiglitz, 1994), and any policy, especially if it is selective, is susceptible to hijacking, corruption and agency problems. Development experience has so many instances of this that many argue that governments *cannot* improve upon deficient markets. This is probably too extreme. Government failure is not inevitable, and in cases where industrial policy has worked well, as in the Tigers, it has accelerated learning significantly. The real issues are the conditions under which governments can be more effective, the choice of the right set of interventions in those conditions,

[20] Physical infrastructure is also mentioned (in the more practical analyses). This is clearly so basic that all approaches would accept it.

ways of improving policy learning and flexibility and of reducing the scope of interventions as markets and institutions improve (Lall and Teubal, 1998).

The new international 'rules of the game', backed by aid donors and several multilateral institutions, rule out many interventions that worked well in the Tigers; the Asian crisis is accelerating the process in that region. This can be beneficial where it constrains governments from inefficient interventions and gives more scope for efficient markets to function. The rules are, however, based in part on strong, and questionable, assumptions of market efficiency. The economic rationale for selective interventions remains as long as markets fail and governments are capable of improving their capabilities. What has to be avoided is a return to the bad old days of rampant, unselective and irrational interventions that led neither to efficiency nor to dynamism.

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Annex Table 1: Technological classification of exports (SITC 3-digit, revision 2)

PRIMARY PRODUCTS (PP)	RESOURCE BASED MANUFACTURES	LOW TECHNOLOGY MANUFACTURES
001 LIVE ANIMALS FOR FOOD	**RB 1: AGRO-BASED**	**LT1: TEXTILE, GARMENT AND FOOTWEAR**
011 MEAT FRESH,CHILLD,FROZEN	012 MEAT DRIED,SALTED,SMOKED	
022 MILK AND CREAM	014 MEAT PREPD,PRSVD,NES ETC	
025 EGGS,BIRDS,FRESH,PRSRVD	023 BUTTER	611 LEATHER
034 FISH,FRESH,CHILLED,FROZN	024 CHEESE AND CURD	612 LEATHER ETC MANUFACTURES
036 SHELL FISH FRESH,FROZEN	035 FISH SALTED,DRIED,SMOKED	613 FUR SKINS TANNED,DRESSED
041 WHEAT ETC UNMILLED	037 FISH ETC PREPD,PRSVD NES	651 TEXTILE YARN
042 RICE	046 WHEAT ETC MEAL OR FLOUR	652 COTTON FABRICS,WOVEN
043 BARLEY UNMILLED	047 OTHER CEREAL MEALS,FLOUR	654 OTH WOVEN TEXTILE FABRIC
044 MAIZE UNMILLED	048 CEREAL ETC PREPARATIONS	655 KNITTED,ETC FABRICS
045 CEREALS NES UNMILLED	056 VEGTBLES ETC PRSVD,PREPD	656 LACE,RIBBONS,TULLE,ETC
054 VEG ETC FRSH,SMPLY PRSVD	058 FRUIT PRESERVED,PREPARED	657 SPECIAL TXTL FABRC,PRODS
057 FRUIT,NUTS,FRESH,DRIED	061 SUGAR AND HONEY	658 TEXTILE ARTICLES NES
071 COFFEE AND SUBSTITUTES	062 SUGAR CANDY NON-CHOCLATE	659 FLOOR COVERINGS,ETC
072 COCOA	073 CHOCOLATE AND PRODUCTS	831 TRAVEL GOODS,HANDBAGS
074 TEA AND MATE	098 EDIBLE PRODCTS,PREPS NES	842 MENS OUTERWEAR NOT KNIT
075 SPICES	111 NON-ALCOHL BEVERAGES NES	843 WOMENS OUTERWEAR NONKNIT
081 FEEDING STUFF FOR ANIMLS	112 ALCOHOLIC BEVERAGES	844 UNDER GARMENTS NOT KNIT
091 MARGARINE AND SHORTENING	122 TOBACCO,MANUFACTURED	845 OUTERWEAR KNIT NONELASTC
121 TOBACCO UNMNFCTRD,REFUSE	233 RUBBER,SYNTHTIC,RECLAIMD	846 UNDER GARMENTS KNITTED
211 HIDES,SKINS,EXC FURS,RAW	247 OTH WOOD ROUGH,SQUARED	847 TEXTILE CLTHNG ACCES NES
212 FURSKINS,RAW	248 WOOD SHAPED,SLEEPERS	848 HEADGEAR,NONTXTL CLOTHNG
222 SEEDS FOR'SOFT'FIXED OIL	251 PULP AND WASTE PAPER	851 FOOTWEAR
223 SEEDS FOR OTH FIXED OILS	264 JUTE,OTH TEX BAST FIBRES	
232 NATURAL RUBBER,GUMS	265 VEG FIBRE,EXCL COTN,JUTE	**LT2: OTHER PRODUCTS**
244 CORK,NATURAL,RAW,WASTE	269 WASTE OF TEXTILE FABRICS	
245 FUEL WOOD NES, CHARCOAL	423 FIXED VEG OILS,SOFT	642 PAPER,ETC,PRECUT,ARTS OF
246 PULPWOOD,CHIPS,WOODWASTE	424 FIXED VEG OIL NONSOFT	665 GLASSWARE
261 SILK	431 PROCESD ANML VEG OIL,ETC	666 POTTERY
263 COTTON	621 MATERIALS OF RUBBER	673 IRON,STEEL SHAPES ETC
268 WOOL(EXC TOPS),ANML HAIR	625 RUBBER TYRES, TUBES ETC	674 IRN,STL UNIV,PLATE,SHEET
271 FERTILIZERS,CRUDE	628 RUBBER ARTICLES NES	675 IRON,STEEL HOOP,STRIP
273 STONE,SAND AND GRAVEL	633 CORK MANUFACTURES	676 RAILWY RAILS ETC IRN,STL
274 SULPHUR,UNRSTD IRN PYRTE	634 VENEERS,PLYWOOD,ETC	677 IRN,STL WIRE(EXCL W ROD)
277 NATURAL ABRASIVES NES	635 WOOD MANUFACTURES NES	679 IRN,STL CASTINGS UNWORKD
278 OTHER CRUDE MINERALS	641 PAPER AND PAPERBOARD	691 STRUCTURES AND PARTS NES
291 CRUDE ANIMAL MTRIALS NES	**RB 2: OTHER**	692 METAL TANKS,BOXES,ETC
292 CRUDE VEG MATERIALS NES	281 IRON ORE,CONCENTRATES	693 WIRE PRODUCTS NON ELECTR
322 COAL,LIGNITE AND PEAT	282 IRON AND STEEL SCRAP	694 STL,COPPR NAILS,NUTS,ETC
333 CRUDE PETROLEUM	286 URANIUM,THORIUM ORE,CONC	695 TOOLS
341 GAS,NATURAL AND MANUFCTD	287 BASE METAL ORES,CONC NES	696 CUTLERY
681 SILVER,PLATINUM,ETC	288 NONFERR METAL SCRAP NES	697 BASE MTL HOUSEHOLD EQUIP
682 COPPER EXC CEMENT COPPER	289 PREC MTAL ORES,WASTE NES	699 BASE METAL MFRS NES
683 NICKEL	323 BRIQUETS,COKE,SEMI-COKE	821 FURNITURE,PARTS THEREOF
684 ALUMINIUM	334 PETROLEUM PRODUCTS,REFIN	893 ARTICLES OF PLASTIC NES
685 LEAD	335 RESIDUAL PETRLM PROD NES	894 TOYS,SPORTING GOODS,ETC
686 ZINC	411 ANIMAL OILS AND FATS	895 OFFICE SUPPLIES NES
687 TIN	511 HYDROCARBONS NES,DERIVS	897 GOLD,SILVER WARE,JEWELRY
	514 NITROGEN-FNCTN COMPOUNDS	898 MUSICAL INSTRUMENTS,PTS
	515 ORG-INORG COMPOUNDS ETC	899 OTHER MANUFACTURED GOODS
	516 OTHER ORGANIC CHEMICALS	
	522 INORG ELEMNTS,OXIDES,ETC	
	523 OTHR INORG CHEMICALS ETC	
	531 SYNT DYE,NAT INDGO,LAKES	
	532 DYES NES,TANNING PROD	
	551 ESSENTL OILS,PERFUME,ETC	
	592 STARCH,INULIN,GLUTEN,ETC	
	661 LIME,CEMENT,BLDG PRODS	
	662 CLAY,REFRACTORY BLDG PRD	
	663 MINERAL MANUFCTURES NES	
	664 GLASS	
	667 PEARL,PREC-,SEMI-P STONE	
	688 URANIUM,THORIUM,ALLOYS	
	689 NON-FER BASE METALS NES	

MEDUIM TECHNOLOGY MANUFACTURES

MT 1: AUTOMOTIVE

781 PASS MOTOR VEH EXC BUSES
782 LORRIES,SPCL MTR VEH NES
783 ROAD MOTOR VEHICLES NES
784 MOTOR VEH PRTS,ACCES NES
785 CYCLES,ETC MOTRZD OR NOT

MT 2: PROCESS

266 SYNTHETIC FIBRES TO SPIN
267 OTHER MAN-MADE FIBRES
512 ALCOHOLS,PHENOLS ETC
513 CARBOXYLIC ACIDS ETC
533 PIGMENTS,PAINTS,ETC
553 PERFUMERY,COSMETICS,ETC
554 SOAP,CLEANSING ETC PREPS
562 FERTILIZERS,MANUFACTURED
572 EXPLOSIVES,PYROTECH PROD
582 PROD OF CONDENSATION ETC
583 POLYMERIZATION ETC PRODS
584 CELLULOSE DERIVATIVS ETC
585 PLASTIC MATERIAL NES
591 PESTICIDES,DISINFECTANTS
598 MISCEL CHEM PRODUCTS NES
653 WOVN MAN-MADE FIB FABRIC
671 PIG IRON ETC.
672 IRON,STEEL PRIMARY FORMS
678 IRON,STL TUBES,PIPES,ETC
786 TRAILERS,NONMOTR VEH,NES
791 RAILWAY VEHICLES
882 PHOTO,CINEMA SUPPLIES

MT 3: ENGINEERING

711 STEAM BOILERS & AUX PLNT
713 INTRNL COMBUS PSTN ENGIN
714 ENGINES AND MOTORS NES
721 AGRIC MACHY,EXC TRACTORS
722 TRACTORS NON-ROAD
723 CIVIL ENGNEERG EQUIP ETC
724 TEXTILE,LEATHER MACHNRY
725 PAPER ETC MILL MACHINERY
726 PRINTG,BKBINDG MACHY,PTS
727 FOOD MACHRY NON-DOMESTIC
728 OTH MACHY FOR SPCL INDUS
736 METALWORKING MACH-TOOLS
737 METALWORKING MACHNRY NES
741 HEATING,COOLING EQUIPMNT
742 PUMPS FOR LIQUIDS ETC
743 PUMPS NES,CENTRFUGES ETC
744 MECHANICAL HANDLING EQU
745 NONELEC MACHY,TOOLS NES
749 NONELEC MACH PTS,ACC NES
762 RADIO BROADCAST RECEIVRS
763 SOUND RECORDRS,PHONOGRPH
772 SWITCHGEAR ETC,PARTS NES
773 ELECTR DISTRIBUTNG EQUIP
775 HOUSEHOLD TYPE EQUIP NES
793 SHIPS AND BOATS ETC
812 PLUMBG,HEATNG,LGHTNG EQU
872 MEDICAL INSTRUMENTS NES
873 METERS AND COUNTERS NES
884 OPTICAL GOODS NES
885 WATCHES AND CLOCKS
951 WAR FIREARMS,AMMUNITION

HIGH TECHNOLOGY MANUFACTURES

HT 1: ELECTRONIC AND ELECTRICAL

716 ROTATING ELECTRIC PLANT
718 OTH POWER GENERATG MACHY
751 OFFICE MACHINES
752 AUTOMTIC DATA PROC EQUIP
759 OFFICE,ADP MCH PTS,ACCES
761 TELEVISION RECEIVERS
764 TELECOM EQPT,PTS,ACC NES
771 ELECTRIC POWER MACHY NES
774 ELECTRO-MEDCL,XRAY EQUIP
776 TRANSISTORS, VALVES, ETC.
778 ELECTRICAL MACHINERY NES

HT 2: OTHER

524 RADIOACTIVE ETC MATERIAL
541 MEDICINAL,PHARM PRODUCTS
712 STEAM ENGINES,TURBINES
792 AIRCRAFT ETC
871 OPTICAL INSTRUMENTS
874 MEASURNG,CONTROLNG INSTR
881 PHOTO APPARAT,EQUIPT NES

Note: Excludes 'special transactions' like electric current, cinema film, printed matter, special transactions, gold, works of art, coins, pets.

Source: Constructed by author based on Pavitt (1984) and OECD (1994).

Annex Table 2: Leading 13 exporters of manufactured products in the developing world, 1985 and 1998 ($ million and %)															
1985	Total manufactures			Resource based			Low technology			Medium technology			High technology		
	Country	Exports	Share	Country	Exports	Share	Country	Exports	Share	Country	Exports	Share	Country	Exports	Share
1	Taiwan	29,092.5		Singapore	8,266.6		Taiwan	15,381.6		Korea	10,807.1		Taiwan	4,703.6	
2	Korea	29,025.0		Brazil	7,744.6		Korea	12,017.6		Taiwan	6,124.1		Singapore	4,662.1	
3	Singapore	19,014.0	36.6%	Venezuela	5,873.9	27.4%	Hong Kong	10,063.3	58.7%	Brazil	5,249.6	51.1%	Korea	3,706.7	56.7%
4	Brazil	17,616.8		Malaysia	4,632.1		Brazil	3,757.2		Singapore	4,445.2		Hong Kong	2,361.8	
5	Hong Kong	15,979.5	52.5%	Algeria	3,985.5	38.1%	Turkey	3,075.5	69.4%	Mexico	3,600.7	69.7%	Malaysia	2,319.9	77.0%
6	Malaysia	8,626.5		Kuwait	3,785.1		India	2,813.2		Hong Kong	3,050.2		Mexico	1,877.0	
7	Mexico	8,336.3		Saudi Arabia	3,689.4		China	2,645.2		Turkey	1,359.6		Brazil	865.4	
8	Venezuela	7,023.2		Indonesia	2,899.3		Singapore	1,640.2		Malaysia	982.1		China	315.4	
9	India	6,208.9		Taiwan	2,883.2		Pakistan	1,449.0		Thailand	803.8		Philippines	266.1	
10	China	6,049.2	69.7%	India	2,518.8	57.9%	Thailand	1,295.1	84.8%	China	738.9	85.7%	India	252.1	92.5%
11	Turkey	5,790.4		Korea	2,493.6		Mexico	1,097.2		Argentina	704.6		Niger	185.9	
12	Saudi Arabia	4,209.0		China	2,349.7		Macao	785.8		India	624.7		Thailand	172.2	
13	Algeria	4,045.0		Argentina	2,230.4		Malaysia	692.4		Venezuela	557.4		Argentina	163.5	
	Total above	161,016.1	76.6%		53,352.3	66.7%		56,713.3	88.8%		39,047.8	90.0%		21,851.7	94.8%
	Developing world	210,244.6			79,986.4			63,839.8			43,369.6			23,048.7	
1998	Total manufactures			Resource based			Low technology			Medium technology			High technology		
	Country	Exports	Share	Country	Exports	Share	Country	Exports	Share	Country	Exports	Share	Country	Exports	Share
1	China	167,681		China	16,551.3		China	83,803.2		Korea	46,443.7		Singapore	62,319.7	
2	Korea	120,700		Brazil	15,424.7		Taiwan	32,100.7		Mexico	45,598.6		Taiwan	38,597.2	
3	Taiwan	105,554	39.5%	Singapore	14,588.6	26.6%	Korea	25,325.3	50.9%	China	33,853.9	49.5%	Korea	36,016.7	47.2%
4	Mexico	103,681		Korea	12,914.5		Mexico	19,848.6		Taiwan	29,044.5		Malaysia	34,329.6	
5	Singapore	103,489	60.3%	Malaysia	11,004.8	40.2%	Turkey	13,236.9	62.8%	Singapore	19,326.2	68.5%	China	33,472.8	70.6%
6	Malaysia	65,941		Saudi Arabia	10,598.2		Hong Kong	13,034.7		Brazil	14,363.8		Mexico	31,257.0	
7	Thailand	44,760		Indonesia	10,447.6		India	12,583.4		Malaysia	13,360.2		Philippines	18,963.3	
8	Brazil	38,882		Thailand	8,657.7		Thailand	11,345.3		Thailand	9,165.0		Thailand	15,591.5	
9	Philippines	28,119		India	7,801.8		Indonesia	8,868.8		Argentina	5,265.9		Hong Kong	6,015.8	
10	Indonesia	26,895	80.8%	Mexico	6,977.1	65.6%	Singapore	7,254.0	82.0%	Indonesia	4,972.1	87.1%	Brazil	3,192.5	96.4%
11	India	25,855		Argentina	6,169.8		Malaysia	7,245.9		Turkey	4,870.8		Indonesia	2,606.3	
12	Hong Kong	23,137		South Africa	5,866.0		Pakistan	6,276.4		South Africa	4,144.5		India	1,706.3	
13	Turkey	22,885		Taiwan	5,811.3		Brazil	5,900.6		India	3,763.5		Turkey	1,437.7	
	Total above	877,577.3	88.0%		132,813.6	75.8%		246,823.9	89.0%		234,172.8	92.1%		285,506.2	98.4%
	Developing world	996,967.5			175,130.4			277,435.3			254,289.1			290,112.8	

Annex Table 3: Leading exporters of manufactures in 1998, values of exports in 1985 and 1998 ($ million)

1985	Total mfrs.	RB Total	RB1	RB2	LT Total	LT1	LT2	MT Total	MT1	MT2	MT3	HT Total	HT1	HT2
China	6,049.2	2,349.7	677.7	1,672.0	2,645.2	2,217.4	427.8	738.9	28.6	589.5	120.8	315.4	38.6	276.8
Korea	29,025.0	2,493.6	1,016.7	1,477.0	12,017.6	7,892.5	4,125.1	10,807.1	678.6	3,020.4	7,108.1	3,706.7	3,287.7	419.0
Taiwan	29,092.5	2,883.2	1,690.3	1,192.9	15,381.6	8,597.1	6,784.5	6,124.1	865.3	1,668.5	3,590.4	4,703.6	4,430.0	273.6
Mexico	8,336.3	1,761.4	401.4	1,360.0	1,097.2	429.3	667.8	3,600.7	766.1	415.6	2,419.0	1,877.0	1,736.4	140.5
Singapore	19,014.0	8,266.6	1,527.8	6,738.7	1,640.2	764.7	875.5	4,445.2	146.4	1,066.3	3,232.4	4,662.1	3,916.9	745.3
Malaysia	8,626.5	4,632.1	3,998.9	633.3	692.4	466.6	225.8	982.1	20.5	262.9	698.7	2,319.9	2,167.4	152.5
Thailand	3,657.6	1,386.5	1,029.8	356.6	1,295.1	981.8	313.3	803.8	13.9	289.0	501.0	172.2	147.7	24.5
Brazil	17,616.8	7,744.6	3,563.2	4,181.4	3,757.2	2,042.9	1,714.4	5,249.6	1,287.2	2,079.7	1,882.7	865.4	578.4	287.1
Philippines	2,428.7	1,359.1	1,047.0	312.0	585.7	352.3	233.4	217.8	21.1	163.5	33.3	266.1	256.5	9.6
Indonesia	3,856.4	2,899.3	1,690.4	1,208.9	596.2	505.1	91.1	246.1	0.9	222.2	23.0	114.8	80.9	33.9
India	6,208.9	2,518.8	255.1	2,263.8	2,813.2	2,542.2	270.9	624.7	118.9	171.5	334.3	252.1	97.4	154.8
Hong Kong	15,979.5	504.2	278.1	226.1	10,063.3	7,045.7	3,017.6	3,050.2	1.9	196.4	2,851.8	2,361.8	2,163.1	198.7
Turkey	5,790.4	1,263.4	590.3	673.1	3,075.5	2,138.6	936.9	1,359.6	102.8	752.4	504.3	91.9	64.7	27.2
Total above	155,681.5	37,568.9	17,766.8	22,295.8	43,642.7	35,976.2	19,684.1	27,442.7	4,052.2	10,897.8	23,299.8	18,002.2	18,965.5	2,743.4
Developing world	210,244.6	79,986.4	24,308.2	55,678.2	63,839.8	42,194.1	21,645.7	43,369.6	4,380.5	14,040.5	24,948.6	23,048.7	19,490.7	3,558.0
%	74.0%	47.0%	73.1%	40.0%	68.4%	85.3%	90.9%	63.3%	92.5%	77.6%	93.4%	78.1%	97.3%	77.1%
1998	Total mfrs.	RB Total	RB1	RB2	LT Total	LT1	LT2	MT Total	MT1	MT2	MT3	HT Total	HT1	HT2
China	167,681.1	16,551.3	7,155.4	9,395.8	83,803.2	52,814.7	30,988.5	33,853.9	1,864.0	10,556.4	21,433.4	33,472.8	28,605.5	4,867.3
Korea	120,700.3	12,914.5	4,739.6	8,175.0	25,325.3	13,673.1	11,652.2	46,443.7	11,354.5	14,998.0	20,091.3	36,016.7	32,800.6	3,216.2
Taiwan	105,553.7	5,811.3	2,761.3	3,050.1	32,100.7	14,291.0	17,809.7	29,044.5	4,256.5	9,644.3	15,143.6	38,597.2	37,259.0	1,338.2
Mexico	103,681.3	6,977.1	3,743.6	3,233.5	19,848.6	9,358.2	10,490.4	45,598.6	19,200.6	5,264.1	21,133.9	31,257.0	28,055.0	3,202.0
Singapore	103,488.5	14,588.6	3,471.0	11,117.6	7,254.0	2,226.8	5,027.2	19,326.2	861.8	5,091.3	13,373.0	62,319.7	59,674.4	2,645.2
Malaysia	65,940.5	11,004.8	9,543.2	1,461.7	7,245.9	3,301.7	3,944.3	13,360.2	455.2	3,107.9	9,797.0	34,329.6	32,276.3	2,053.3
Thailand	44,759.5	8,657.7	5,532.4	3,125.3	11,345.3	6,798.2	4,547.1	9,165.0	1,014.8	2,438.8	5,711.5	15,591.5	14,593.9	997.5
Brazil	38,881.6	15,424.7	9,319.0	6,105.7	5,900.6	3,158.6	2,742.0	14,363.8	4,770.0	4,563.9	5,029.9	3,192.5	1,476.4	1,716.0
Philippines	28,118.8	2,022.3	1,548.6	473.7	4,074.3	2,988.2	1,086.1	3,058.9	382.2	346.8	2,329.9	18,963.3	18,673.5	289.8
Indonesia	26,894.8	10,447.6	7,154.9	3,292.7	8,868.8	5,511.1	3,357.7	4,972.1	310.0	2,647.5	2,014.6	2,606.3	2,381.3	225.0
India	25,855.1	7,801.8	847.5	6,954.3	12,583.4	9,977.4	2,606.0	3,763.5	735.2	1,820.4	1,208.0	1,706.3	708.5	997.8
Hong Kong	23,136.7	1,041.7	661.4	380.3	13,034.7	11,049.2	1,985.5	3,044.5	0.7	717.9	2,325.9	6,015.8	4,920.1	1,095.7
Turkey	22,885.2	3,339.9	2,204.1	1,135.8	13,236.9	10,276.1	2,960.8	4,870.8	761.5	1,992.9	2,116.4	1,437.7	1,156.3	281.3
Total above	877,577.3	116,583.5	58,681.9	57,901.6	244,621.8	145,424.2	99,197.6	230,865.8	45,967.0	63,190.3	121,708.5	285,506.2	262,580.8	22,925.4
Developing world	996,967.5	175,130.4	77,385.7	97,744.7	277,435.3	169,990.4	107,444.9	254,289.1	51,537.3	75,515.3	127,236.4	290,112.8	265,114.5	24,998.3
%	88.0%	66.6%	75.8%	59.2%	88.2%	85.5%	92.3%	90.8%	89.2%	83.7%	95.7%	98.4%	99.0%	91.7%

Annex Table 4: Leading developing exporters in 1998, distribution by technological category and growth rates (1985-98)

Shares of total manufactured exports by technological categories 1985

	Total mfrs.	RB Total	RB1	RB2	LT Total	LT1	LT2	MT Total	MT1	MT2	MT3	HT Total	HT1	HT2
China	100	38.8%	11.2%	27.6%	43.7%	36.7%	7.1%	12.2%	0.5%	9.7%	2.0%	5.2%	0.6%	4.6%
Korea	100	8.6%	3.5%	5.1%	41.4%	27.2%	14.2%	37.2%	2.3%	10.4%	24.5%	12.8%	11.3%	1.4%
Taiwan	100	9.9%	5.8%	4.1%	52.9%	29.6%	23.3%	21.1%	3.0%	5.7%	12.3%	16.2%	15.2%	0.9%
Mexico	100	21.1%	4.8%	16.3%	13.2%	5.2%	8.0%	43.2%	9.2%	5.0%	29.0%	22.5%	20.8%	1.7%
Singapore	100	43.5%	8.0%	35.4%	8.6%	4.0%	4.6%	23.4%	0.8%	5.6%	17.0%	24.5%	20.6%	3.9%
Malaysia	100	53.7%	46.4%	7.3%	8.0%	5.4%	2.6%	11.4%	0.2%	3.0%	8.1%	26.9%	25.1%	1.8%
Thailand	100	37.9%	28.2%	9.8%	35.4%	26.8%	8.6%	22.0%	0.4%	7.9%	13.7%	4.7%	4.0%	0.7%
Brazil	100	44.0%	20.2%	23.7%	21.3%	11.6%	9.7%	29.8%	7.3%	11.8%	10.7%	4.9%	3.3%	1.6%
Philippines	100	56.0%	43.1%	12.8%	24.1%	14.5%	9.6%	9.0%	0.9%	6.7%	1.4%	11.0%	10.6%	0.4%
Indonesia	100	75.2%	43.8%	31.3%	15.5%	13.1%	2.4%	6.4%	0.0%	5.8%	0.6%	3.0%	2.1%	0.9%
India	100	40.6%	4.1%	36.5%	45.3%	40.9%	4.4%	10.1%	1.9%	2.8%	5.4%	4.1%	1.6%	2.5%
Hong Kong	100	3.2%	1.7%	1.4%	63.0%	44.1%	18.9%	19.1%	0.0%	1.2%	17.8%	14.8%	13.5%	1.2%
Turkey	100	21.8%	10.2%	11.6%	53.1%	36.9%	16.2%	23.5%	1.8%	13.0%	8.7%	1.6%	1.1%	0.5%

Shares of total manufactured exports by technological categories 1998

	Total mfrs.	RB Total	RB1	RB2	LT Total	LT1	LT2	MT Total	MT1	MT2	MT3	HT Total	HT1	HT2
China	100	9.9%	4.3%	5.6%	50.0%	31.5%	18.5%	20.2%	1.1%	6.3%	12.8%	20.0%	17.1%	2.9%
Korea	100	10.7%	3.9%	6.8%	21.0%	11.3%	9.7%	38.5%	9.4%	12.4%	16.6%	29.8%	27.2%	2.7%
Taiwan	100	5.5%	2.6%	2.9%	30.4%	13.5%	16.9%	27.5%	4.0%	9.1%	14.3%	36.6%	35.3%	1.3%
Mexico	100	6.7%	3.6%	3.1%	19.1%	9.0%	10.1%	44.0%	18.5%	5.1%	20.4%	30.1%	27.1%	3.1%
Singapore	100	14.1%	3.4%	10.7%	7.0%	2.2%	4.9%	18.7%	0.8%	4.9%	12.9%	60.2%	57.7%	2.6%
Malaysia	100	16.7%	14.5%	2.2%	11.0%	5.0%	6.0%	20.3%	0.7%	4.7%	14.9%	52.1%	48.9%	3.1%
Thailand	100	19.3%	12.4%	7.0%	25.3%	15.2%	10.2%	20.5%	2.3%	5.4%	12.8%	34.8%	32.6%	2.2%
Brazil	100	39.7%	24.0%	15.7%	15.2%	8.1%	7.1%	36.9%	12.3%	11.7%	12.9%	8.2%	3.8%	4.4%
Philippines	100	7.2%	5.5%	1.7%	14.5%	10.6%	3.9%	10.9%	1.4%	1.2%	8.3%	67.4%	66.4%	1.0%
Indonesia	100	38.8%	26.6%	12.2%	33.0%	20.5%	12.5%	18.5%	1.2%	9.8%	7.5%	9.7%	8.9%	0.8%
India	100	30.2%	3.3%	26.9%	48.7%	38.6%	10.1%	14.6%	2.8%	7.0%	4.7%	6.6%	2.7%	3.9%
Hong Kong	100	4.5%	2.9%	1.6%	56.3%	47.8%	8.6%	13.2%	0.0%	3.1%	10.1%	26.0%	21.3%	4.7%
Turkey	100	14.6%	9.6%	5.0%	57.8%	44.9%	12.9%	21.3%	3.3%	8.7%	9.2%	6.3%	5.1%	1.2%

Rates of annual export growth 1985-98

	Total mfrs.	RB Total	RB1	RB2	LT Total	LT1	LT2	MT Total	MT1	MT2	MT3	HT Total	HT1	HT2
China	29.1%	16.2%	19.9%	14.2%	30.5%	27.6%	39.0%	34.2%	37.9%	24.8%	48.9%	43.2%	66.2%	24.7%
Korea	11.6%	13.5%	12.6%	14.1%	5.9%	4.3%	8.3%	11.9%	24.2%	13.1%	8.3%	19.1%	19.4%	17.0%

Taiwan	10.4%	5.5%	3.8%	7.5%	5.8%	4.0%	7.7%	12.7%	13.0%	14.4%	11.7%	17.6%	17.8%	13.0%
Mexico	21.4%	11.2%	18.7%	6.9%	24.9%	26.8%	23.6%	21.6%	28.1%	21.6%	18.1%	24.2%	23.9%	27.2%
Singapore	13.9%	4.5%	6.5%	3.9%	12.1%	8.6%	14.4%	12.0%	14.6%	12.8%	11.5%	22.1%	23.3%	10.2%
Malaysia	16.9%	6.9%	6.9%	6.6%	19.8%	16.2%	24.6%	22.2%	26.9%	20.9%	22.5%	23.0%	23.1%	22.1%
Thailand	21.2%	15.1%	13.8%	18.2%	18.2%	16.0%	22.8%	20.6%	39.1%	17.8%	20.6%	41.4%	42.4%	33.0%
Brazil	6.3%	5.4%	7.7%	3.0%	3.5%	3.4%	3.7%	8.1%	10.6%	6.2%	7.9%	10.6%	7.5%	14.7%
Philippines	20.7%	3.1%	3.1%	3.3%	16.1%	17.9%	12.6%	22.5%	25.0%	6.0%	38.7%	38.8%	39.1%	30.0%
Indonesia	16.1%	10.4%	11.7%	8.0%	23.1%	20.2%	32.0%	26.0%	56.7%	21.0%	41.1%	27.2%	29.7%	15.7%
India	11.6%	9.1%	9.7%	9.0%	12.2%	11.1%	19.0%	14.8%	15.0%	19.9%	10.4%	15.8%	16.5%	15.4%
Hong Kong	2.9%	5.7%	6.9%	4.1%	2.0%	3.5%	-3.2%	0.0%	-7.5%	10.5%	-1.6%	7.5%	6.5%	14.0%
Turkey	11.2%	7.8%	10.7%	4.1%	11.9%	12.8%	9.3%	10.3%	16.6%	7.8%	11.7%	23.6%	24.8%	19.7%
Total above	14.2%	9.1%	9.6%	7.6%	14.2%	11.3%	13.2%	17.8%	20.5%	14.5%	13.6%	23.7%	22.4%	17.7%
All developing	12.7%	6.2%	9.3%	4.4%	12.0%	11.3%	13.1%	14.6%	20.9%	13.8%	13.4%	21.5%	22.2%	16.2%