SOUTH ASIA'S EXPORT STRUCTURE IN A COMPARATIVE PERSPECTIVE

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SUMMARY

World-wide cross-country regressions are used to examine South Asia's export structure through the lens of Heckscher-Ohlin trade theory. By comparison with other regions, South Asia's exports are unusually concentrated on labour-intensive manufactures. This distinctive export structure is shown to be the result mainly of South Asia's distinctive combination of resources: by comparison with other regions, it has a low level of education and few natural resources, relative to its supply of labour. This basic economic fact must be recognised in the design of trade and development strategy for South Asia over the next few decades.

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INTRODUCTION

Although South Asia's growth has accelerated in the past two decades, it remains one of the world's poorest regions, and has made far less economic progress than its neighbour, East Asia. The contrast between the rates of growth of these two regions of Asia has clearly been associated with differences between them in the degree and character of their integration into the world economy, with no counterpart in South Asia to the export-oriented industrialisation of East Asian countries. What is less clear is the nature and direction of the causal linkages between the differences in growth and in trade.

The objective of this paper is to contribute to improved understanding of these causal linkages, and to the design of trade and development strategy in South Asia, by examining and explaining one aspect of South Asia's exports, namely their structure or commodity composition, in a world-wide comparative context. The central hypothesis of the paper is that differences among regions and countries in the broad features of their export structure are the result mainly of differences in their supplies of human and natural resources – differences which, moreover, change over time only slowly.

Section 1 explains why and how the export structure of a country is influenced by its human and natural resources, both in theory and in practice. Section 2 compares South Asia as a whole with other regions of the world, asking how far the differences in export structure among them can be explained by differences in their resource supplies. Section 3 asks the same question about all the individual South Asian (and East Asian) countries, comparing what they actually export with what would be predicted from their resources. Section 4 discusses the implications of the results for South Asia's export prospects and policies.

1 INFLUENCE OF RESOURCES ON EXPORT STRUCTURE

That the composition of a country's exports is influenced by its resources is an old idea, and a simple one. The mixture of goods which people want to consume varies less among countries than the mixture of goods which their resources allow to be cheaply produced. Countries thus tend to export goods whose production makes intensive use of resources of which they have a relatively large supply, and conversely to import goods which require large inputs of resources that are locally scarce. This idea is the basis of Heckscher-Ohlin (H-O) trade theory (in which resources are called 'factors of production').

1.1 Theory

Some variants of H-O theory are based on implausibly strong assumptions, particularly that all countries are equally efficient, and that trade equalises wages and other factor prices among countries, so that all countries use exactly the same combination of resources to produce one unit of any good. However, the prediction of H-O theory that is relevant to the present paper, namely that the composition (or relative proportions) of a country's exports depends on the composition of its resources, requires only a much weaker and more plausible assumption, namely that in all countries the ranking of goods in terms of resource input combinations is similar – for example, that the land/labour input ratio in agriculture is always greater than in manufacturing. This is likely to be the case even when comparing countries with different levels of efficiency, and with different factor prices.

H-O theory cannot provide a complete explanation of the pattern of trade: other forces are also important (and will be considered in this paper). Some differences in efficiency among countries are uneven among goods, and a country which was particularly efficient in producing a good would tend to export that good, even if the mixture of resource inputs required gave it no special advantage. A common cause of sectorally uneven differences in efficiency is economies of scale, which are especially important in explaining the large volume of trade that occurs among countries with similar resources, and in explaining the fine details of the composition of trade. The pattern of trade is also affected by many sorts of government policies, including charges and restrictions on imports, and by transport costs and varying distances among countries.

Nonetheless, H-O theory provides a useful broad-brush explanation of some major features of the pattern of trade. In particular, recent research has found that it explains much of the variation among countries in the shares of manufactures, processed primary products and unprocessed primary products in their exports (Wood and Berge 1997, Owens and Wood 1997, Mayer 1997). H-O theory also explains North-South trade in manufactures, and in particular why developing countries export labour-intensive items to developed countries in exchange for imports of skill-intensive items (many studies are reviewed in Wood 1994, ch. 3). The resources whose varying supply among countries causes this variation in export composition are three broad ones: skill (or 'human capital', acquired through education and training), land (meaning natural resources of all sorts), and labour (the number of people in the workforce).

By contrast with most other H-O models, capital (physical or financial) is omitted from this list of resources. The reason is that capital, though of vital importance as an input to production, is now highly mobile among countries, so that it cannot plausibly be regarded as a resource of which a large fixed 'endowment' gives some countries a comparative advantage in the production and export of capital-intensive goods. If a country has a comparative advantage in a good because of the abundance of a resource such as copper ore or educated labour, then it can usually obtain the capital needed to develop this resource, either from domestic savings or from abroad. Moreover, because domestic capital markets are linked to international capital markets, the cost of capital is similar in most countries, so differences in capital intensity among sectors do not cause differences in comparative advantage among countries (Wood 1994: 32-40). There are exceptions to these generalisations, particularly in developing countries, but they appear to be a good first approximation to the truth.

Both labour and skill are also internationally mobile to some extent. Only a small fraction of the world's labour force is able to move among countries, but for some individual countries such mobility is important (and the remittances of their mobile workers are an important 'export'). There is also a high degree of mobility among some of the world's most skilled workers: those with the experience, know-how and contacts needed to produce and sell goods on world markets, which is what exporting is all about. As with capital, the international mobility of highly-skilled workers means that their services can usually be obtained to develop the production of goods in which a country's resources give it a comparative advantage, reinforcing the H-O pattern of trade. However, barriers to harnessing the skills of such workers – poor communications facilities or restrictions on direct foreign investment, for example – may impede the realisation of a resource-based comparative advantage in particular countries and particular sectors (Wood 1998).

1.2 Econometric specification

The simplest of our models explains variation among countries in the share of manufactures in their exports as a consequence of variation in their relative supplies of only two of the three resources: skill and land. Manufacturing is more compact than agriculture, and needs a more educated labour force: as a consequence, it requires a much higher ratio of skill to land. Given this basic difference in the resource mixtures needed to produce manufactures and primary products, a country's comparative advantage as between these two sorts of goods depends heavily on its relative supplies of skill and land. Countries with high ratios of skill to land tend to export manufactures, while those with low ratios of skill to land tend to export primary products. This relationship is measured using a cross-country regression:

$$(X_{nm}/X_{bp})_i = \alpha + \beta(h/n)_i + u_i \qquad (1)$$

where X_{nm} and X_{bp} are (gross) exports of manufactures and primary products, h/n is the ratio of skill to land supplies, u is the error term, and the subscript i identifies the country. The skill/land ratio is expressed as skill per worker, h, over land per worker, n (with the per-worker denominators cancelling out). Both the export ratio and the resource ratio are converted into logarithms.

This simple skill-and-land-only model is a good approximation, but its omission of labour implicitly assumes that manufacturing and primary production are equally labour-intensive. To relax this assumption, and to bring all three resources into the model, the form of the regression needs to be slightly expanded, to:

$$(X_{nm}/X_{bp})_i = \alpha + \gamma\, h_i - \delta\, n_i + u_i \qquad (2)$$

in which the two resource ratios h (skill/labour) and n (land/labour) are entered separately. This specification can be used with other pairs of goods. In particular, we shall apply it to the ratio of processed to unprocessed primary exports and the ratio of skill-intensive to labour-intensive manufactured exports. Neither of these last two export ratios, however, is much affected by cross-country variation in n: both processed and unprocessed primary products require large inputs of land, and both labour-intensive and skill-intensive manufactures small inputs of land. The main influence on both ratios is variation in h: countries with more skill per worker tend to export higher ratios of processed to unprocessed primary products and higher ratios of skill-intensive to labour-intensive manufactures. Simple models for these export ratios, again involving only two of the three resources (skill and labour), are thus:

$$(X_{pp}/X_{up})_i = \alpha + \gamma\, h_i + u_i \qquad (3a)$$

$$(X_{nmh}/X_{nml})_i = \alpha + \gamma\, h_i + u_i \qquad (3b)$$

where X_{pp}/X_{up} is the ratio of processed to unprocessed primary exports and X_{nmh}/X_{nml} the ratio of skill-intensive to labour-intensive manufactured exports. In all these models, to capture possible effects of economies of scale, we will also include a country size variable.

These models refer to (gross) exports, but similar models can be applied to net exports (exports minus imports), as in Owens and Wood (1997), a specification which would be more appropriate if the aim were to test

H-O theory (which focuses on net exports), rather than to analyse the export structure of a particular region. Both gross and net export specifications are at risk of 'contamination' by non-H-O influences: that is, the estimated coefficients on the resource variables may reflect not only pure resource-supply effects, but also other influences on trade whose variation among countries happens to be correlated with variation in resource supplies (for example, the composition of demand may vary with per capita income, which is correlated with skill per worker). Such contamination is more likely with gross than with net exports, because gross exports include all intra-industry trade, much of which is non-H-O in nature. However, the signs of the coefficients on the resource variables (which are usually the same for net exports as for gross exports) suggest that the dominant influence on them is the resource-supply effects described by H-O theory.

1.3 Resource measures

Skill per worker is measured by the average number of years of schooling of the adult (over-15) population, using data mainly from Barro and Lee (1996). The stock of skill in a country is thus its total number of person-years of schooling, obtained by multiplying average years of schooling by the number of adult inhabitants – the latter being our measure of the country's supply of labour (which we also use as our country size variable). We measure the supply of land – that is, the availability of natural resources in each country – by a country's total land area (with land per worker being total land area divided by adult population). Details of our data sources are provided in the appendix.

Total land area is clearly not an ideal measure of natural-resource availability, since it fails to allow for variation among countries in the quality of their land. But it is an unbiased measure, because what each country has, per square kilometre of its surface area, in terms of soil fertility, water resources, minerals, and so on, can be regarded as the outcome of a random draw. Nor is it easy to improve on this measure. In earlier work (e.g. Wood and Mayer 1998), we added information on specific natural resources, such as arable land and oil reserves. This was helpful in explaining the composition of primary exports (for example, the division between agricultural and mineral products), but was not helpful as a measure of the quality of natural resources and thus in explaining the division of exports between manufactures and primary products.

Average years of schooling is likewise not an ideal measure of skill. It takes no account of cross-country differences in the quality of schooling – how much (and what) the student learned in the years concerned. Moreover, it neglects sources of skill acquisition other than schooling – both formal classroom training and experience (or on-the-job training). These deficiencies cannot be remedied with currently available data. For our statistical purposes they are less serious than they might appear, because there is a strong cross-country correlation between years of schooling and these other aspects of skill: countries with longer schooling tend also to provide better quality schooling (Lee and Barro 1997) and more training. In interpreting the statistical results, however, it will be important to bear in mind that it is not just length of schooling which matters.

A refinement of the skill measure that *is* possible with currently available data is to look not simply at the average years of schooling of a country's labour force, but at the mix of different levels of schooling – for example, a four-year average could mean that everyone had four years of schooling or that one-third of the labour force had 12 years and the rest none. Following Wood (1994: 48-51) and Owens and Wood (1997: 1469-

70), we tried replacing average years of schooling with a pair of skill variables – the adult literacy rate and the division of literate workers between those with basic and those with higher education – but this did not improve our results (more details are available from the authors on request).

All our resource availability measures are of relative quantities rather than relative prices, even though it is fundamentally the relative cheapness of abundant factors that gives a country a comparative advantage in goods that use them intensively. One reason for using quantity data is that H-O theory predicts that trade reduces (or even eliminates) inter-country differences in factor prices by raising the demand for abundant resources and reducing the demand for scarce ones, making prices in principle a less reliable indicator of the relative abundance of resources. Another, more practical reason is that relevant and comparable data on the prices of skill, land and labour do not exist for most countries. There are data on the wages of production workers in manufacturing, which can be interpreted as the price of labour, but these shed no light on relative factor prices within each country, which are what affect comparative advantage.[1]

1.4 Export categories

We divide all (merchandise) exports into two broad categories – manufactured and primary – each of which is further divided in two, with manufactures being split between skill-intensive and labour-intensive items, and primary exports between processed and unprocessed items. The next few paragraphs explain the definitions of these categories: more information and the sources of the data are provided in the appendix.

Our definition of manufactures is the one used by trade statisticians, namely categories 5-8 less 68 (non-ferrous metals) of the Standard International Trade Classification (SITC).[2] This definition is narrower than that used by production and employment statisticians, as will be explained below, and so we label this category NM (for 'narrow manufactures'). Table 1 lists the goods which are included in NM. All other goods are classified by trade statisticians as primary products, and so we label our primary category BP (where B stands for 'broad').

To split BP between processed and unprocessed items, we apply the wider definition of manufacturing in the International Standard Industrial Classification (ISIC), which includes also goods produced in factories which use large inputs of (usually local) raw materials: food, beverage and tobacco products, non-ferrous metals, sawn timber, tanned leather, pulp and paper, and refined petroleum. It is these items – which the ISIC classifies as manufactures but the SITC as primary – that we define as processed primary products (PP), as is illustrated in figure 1.[3] Our unprocessed primary products are those which the ISIC classifies (more narrowly than the SITC) as agricultural and mineral, namely goods in the state in which they leave the farm or the mine, and we label them NP (where N again stands for 'narrow').

[1] Indeed, in the simple model of our equation (1) the price of labour has no effect on comparative advantage as between manufactures and primary products, which depends only on the relative prices of skill and land.

[2] A few items in SITC 5-8 (other than 68) are classified as BP rather than NM, and parts of SITC 9 are added to NM: for details, see table 1.

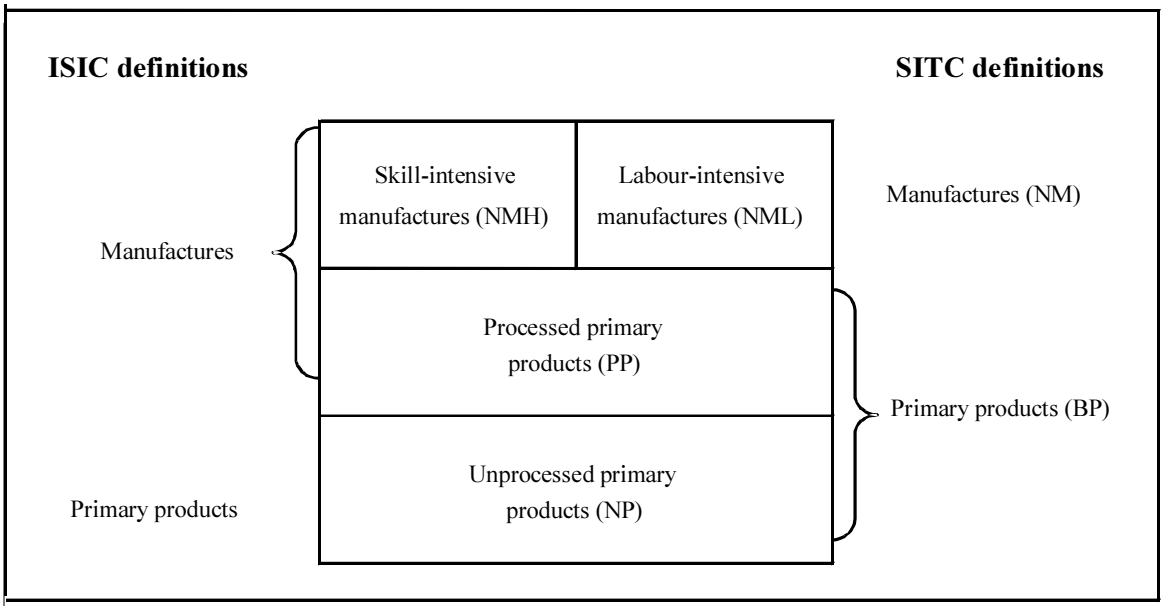
[3] Our division of BP between PP and NP is an approximation, using SITC categories, to the ISIC classification (the details are set out in Annex 1 of Wood and Mayer 1998). Owens and Wood (1997) use ISIC categories to separate PP from NP, but can therefore only approximate the SITC definition of NM.

Table 1: Manufactured exports (NM)

Labour-intensive (NML)	*SITC2 categories*
Leather and rubber products	61-62
Wood and paper products	63-64
Textiles, clothing, footwear and travel goods	65, 83-85
Non-metallic mineral products	66 (less 667)
Iron and steel and metal products	67, 69
Furniture and plumbing equipment	81-82
Ships, bicycles and trains	78 (less 781-4), 79 (less 792)
Miscellaneous	89, 9 (less 941, 971)
Skill-intensive (NMH)	
Chemicals	5 (less 522.24, 522.56, 524)
Cut diamonds	667.29
Non-electrical machinery	71-74
Computers and office equipment	75
Communication equipment	76
Electrical machinery	77
Motor vehicles and aircraft	781-784, 792
Scientific instruments, watches and cameras	87, 88

Note: the SITC 5-8 categories allocated to primary rather than manufactured exports are phosphorus pentoxide and phosphoric acids (522.24), aluminium hydroxide (522.56), radioactive material (524), pearls and precious stones, except cut diamonds (667 except 667.29), and non-ferrous metals (68).

Figure 1: Export categories



Manufactured exports are divided between skill-intensive items (NMH) and labour-intensive items (NML) using the classification in Wood and Mayer (1998), which was based on a review of earlier studies which ranked individual manufacturing industries by their skilled/unskilled labour ratios or other measures of skill intensity (particularly the studies reviewed in Wood 1994, ch. 3, and OECD 1992). Our allocation of SITC categories between NMH and NML is shown in table 1, and in most respects is familiar and uncontroversial, although the division into only two groups is of course arbitrary: textiles, clothing, footwear, leather and wood products are classified as labour-intensive, and chemicals, machinery, cars, aircraft and instruments as skill-intensive.

A limitation of any classification of manufactured exports by skill intensity is the internal heterogeneity of statistically defined industries. Each industry contains many goods (final and intermediate) and many activities (or stages of production), of widely varying skill intensity, which are increasingly divided among countries (e.g. Feenstra 1998). For example, in the electrical machinery sector skill-intensive components are made in developed countries and labour-intensive assembly is undertaken in developing countries. Thus the same 'good', in a statistical sense, may vary widely in skill intensity, depending on the country from which it is exported. There is no simple solution to this problem with existing export data, but it is vital to be aware of it in interpreting the results of statistical analysis.

We experimented also with the limited data available on exports of services. Different kinds of services vary in skill intensity no less widely than different kinds of manufactured goods, and there are differences also in land intensity (for example, between tourism and financial services). However, the only statistics that exist for large numbers of countries divide total service exports into just three categories – transport, travel and other – which bear no obvious resemblance to a classification by either skill intensity or land intensity. Moreover, these data on trade in services are in most cases probably less accurate than the data on merchandise trade.

1.5 Regression results

Table 2 reports the results of cross-country regressions describing the relationships between export structure and resources. They refer to 1990 (the latest year for which all the variables are currently available) and cover 111 countries – all those with populations over one million for which data are available.[4] The first six regressions in the table focus on three aspects of export structure – the ratios NM/BP, PP/NP and NMH/NML defined above – in each case using both a 'full' specification and a simplified specification.

The first regression shows that variation across countries in their manufactured/primary export (NM/BP) ratios is quite well explained simply by variation in their skill/land ratios, but the second regression improves the explanation by separating the skill/land ratio into two separate resource ratios (skill/labour and land/labour) and including a country size variable. The ratio of manufactured to primary exports tends to be higher in countries which have more skill per worker and less land per worker, and which are bigger. This last effect is probably the result of external economies in manufacturing: firms benefit from the presence of other firms, for example because a larger manufacturing sector makes it economic to develop more specialised support services, training and infrastructure.[5]

[4] The data set is the same as in Wood and Mayer (1998) except that four African countries with populations under one million are omitted. The countries included are listed in the appendix.

[5] This explanation is due to Keesing and Sherk (1971), who first discovered this effect of country size (which was masked in

Table 2: Regression results

Dependent variable	Constant	Coefficients on independent variables				R-squared	Number of countries
		h/n	h	n	p		
NM / BP	-5.01 (-13.3)	0.82 (11.2)				0.53	111
NM / BP	-7.43 (-9.0)		1.44 (7.1)	-0.57 (-6.3)	0.27 (2.9)	0.62	111
PP / NP	-3.70 (-12.1)		1.64 (8.2)			0.38	111
PP / NP	-4.89 (-5.5)		1.49 (6.9)	-0.13 (-1.4)	0.10 (1.0)	0.40	111
NMH / NML	-3.36 (-7.4)		1.61 (6.3)			0.38	69
NMH / NML	-3.70 (-4.1)		1.59 (6.2)	-0.07 (-0.8)	0.01 (0.1)	0.38	69
SVS / BP	-3.29 (-5.1)		0.37 (2.3)	-0.44 (-6.2)	0.05 (0.67)	0.39	103
SVS / NMH	5.88 (5.4)		-1.46 (-4.9)	0.16 (1.6)	-0.22 (-2.3)	0.35	64
SVS / NML	2.58 (3.3)		0.08 (0.4)	0.09 (1.1)	-0.24 (-3.5)	0.19	64

Notes: Dependent variables are export ratios. NM = narrow manufactures; BP = broad primary (= PP + NP); PP = processed primary products; NP = unprocessed primary products; NMH = skill-intensive manufactures; NML = labour-intensive manufactures; SVS = services; h = skill per worker (average adult years of schooling); n = land per worker (square kilometres per adult); p = total adult population (thousands). All variables are expressed in natural logarithms. t-statistics in brackets.

The second pair of regressions explains cross-country variation in the ratio of processed to unprocessed primary exports. In the full specification, the largest and statistically most significant coefficient, by far, is that on *h*: countries with higher levels of skill per worker tend to export more of their primary products in processed form. The coefficient on *n* is negative, because inputs of natural resources are a smaller share of the cost of processed than of unprocessed items, but is small and statistically insignificant. So is the positive coefficient on country size, suggesting that there are few sectoral economies of scale in primary processing. Thus the simplified specification, with *h* as the sole explanatory variable, fits the data almost as well as the full specification.

Wood and Mayer 1998 by the inclusion of the four small African countries mentioned in the previous note). Another possible explanation of the size effect is that larger countries trade less in primary products because they have more diversified natural resources: to test this, we tried land area as an alternative measure of country size, but it performed slightly worse than population. We also tried GDP as a measure of country size, and obtained results similar to those using population.

The third pair of regressions explains cross-country variation in the division of manufactured exports between skill-intensive and labour-intensive items. These regressions are estimated using a smaller set of 69 countries, namely those in which manufactures account for 10% or more of total exports: in countries which export few manufactures, the NMH/NML ratio varies widely and erratically, due to the vagaries of statistical classification. As in the previous pair of regressions, the largest and most significant coefficient in the full specification is that on *h*: countries with higher levels of skill per worker tend to export higher ratios of skill-intensive to labour-intensive manufactures. The coefficients on the other two variables, *n* and *p*, are both small and statistically insignificant, so that the simplified specification fits just as well as the full specification.

The final three rows of table 2 report results for exports of all services (separate regressions for transport, travel and other services yield similar results).[6] The first regression shows that the ratio of service exports to broad primary exports is greater in countries with higher *h*, smaller in those with higher *n*, and unrelated to country size. The other regressions refer to the ratios of service exports to skill-intensive and labour-intensive manufactured exports: both ratios decrease with country size, reflecting the positive effect of country size on manufactured exports noted above, and both are (insignificantly) greater in countries with higher *n*. However, the SVS/NMH export ratio is lower in countries with higher *h*, whereas the SVS/NML export ratio is unrelated to *h*. Together, these results suggest that traded services are on average much less land-intensive than primary products (though slightly more land-intensive than manufactures), and of about the same skill intensity as labour-intensive manufactures. Some service exports are of course far more skill-intensive, but the average is dominated by items of relatively low skill intensity.

All these regressions leave half or more of the cross-country variation in export structure unexplained. Measurement errors in our trade and resource data account for part of this shortfall, but part of it must be due to variation in systematic influences, including trade and other policies. Extensive experiments with trade policy measures as additional independent variables in these and similar regressions achieved little improvement in their explanatory power (Wood and Berge 1997: 49-53; Mayer and Wood 1998, annex 4). Nor have we been able to find any other variables whose inclusion substantially improves their explanatory power - tests of infrastructure variables are reported in Zappia (1995) and of foreign direct investment in Greenhill (1999). However, these failures are probably partly a result of the weaknesses of the few measures of relevant variables that are available for large numbers of countries: the export structures of individual countries and regions are bound to be affected by policies and other variables which are not included in our regressions, and this will be recognised in the application of our results below.

2 SOUTH ASIA COMPARED WITH OTHER REGIONS

The previous section discussed world-wide relationships between countries' export structures and their resources. The rest of the paper will use these relationships to analyse the export structure of South Asia. In

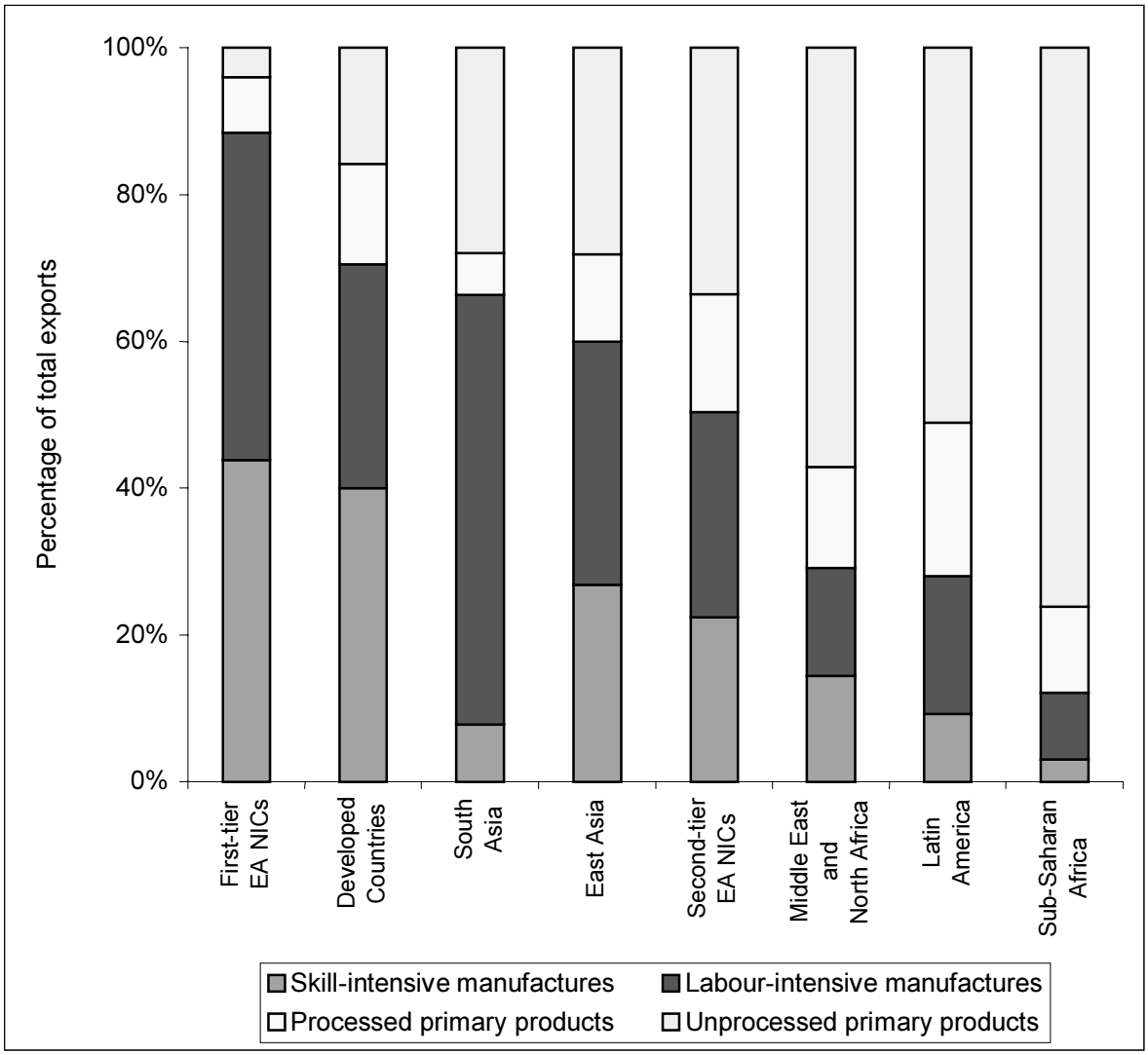
[6] In regressions of the ratios of these three components of service exports to broad primary exports, the coefficients on *n* are all of similar size. The coefficient on *p* is close to zero for transport and travel services, but is positive (0.13) and almost statistically significant for other services. The coefficient on *h* is highest for transport services (0.74), close to zero for other services, and in between for travel services (0.48). Transport thus appears to be the most skill-intensive component, and other services the least skill-intensive component.

section 3, we will study South Asian countries individually, and compare them with East Asian countries, but in this section we will look briefly at South Asia as a whole, and compare it with other regions.

We will distinguish seven other groups of countries, whose membership is listed in the appendix. One contains developed countries, and four are regional groupings of developing countries: East Asia, Africa (sub-Saharan), Latin America, and the Middle East and North Africa (MENA). The other two groups are subsets of what the World Bank (1993) labelled the 'high-performing' East Asian countries: we shall refer to Hong Kong, Korea, Singapore and Taiwan as the 'first-tier East Asian NICs', and to Indonesia, Malaysia and Thailand as the 'second-tier East Asian NICs'. Our averages for each group are unweighted: in South Asia, for example, Nepal has as much influence as India. An alternative would be to weight the averages by country size, but in South Asia this would make them into minor variants on the values for India, which contains three-quarters of the region's population.

Figure 2 shows the average (merchandise) export structure of each group in 1990, using our four product categories. South Asia stands out from the other groups in three respects. First, manufactures are a high proportion of its exports - exceeded only by the first-tier East Asian NICs and the developed countries,

Figure 2: Regional export composition, 1990



somewhat above East Asia as a whole, and far above the other three developing regions (MENA, Latin America and Africa). Second, labour-intensive items are a larger proportion (and skill-intensive items a smaller proportion) of manufactured exports in South Asia than in any other group, by a considerable margin. Third, the share of processed primary items in total exports is smaller in South Asia than in any other region. All three of these distinctive features of South Asia's export structure, as will be shown below, can be explained largely by the distinctive composition of its resources.

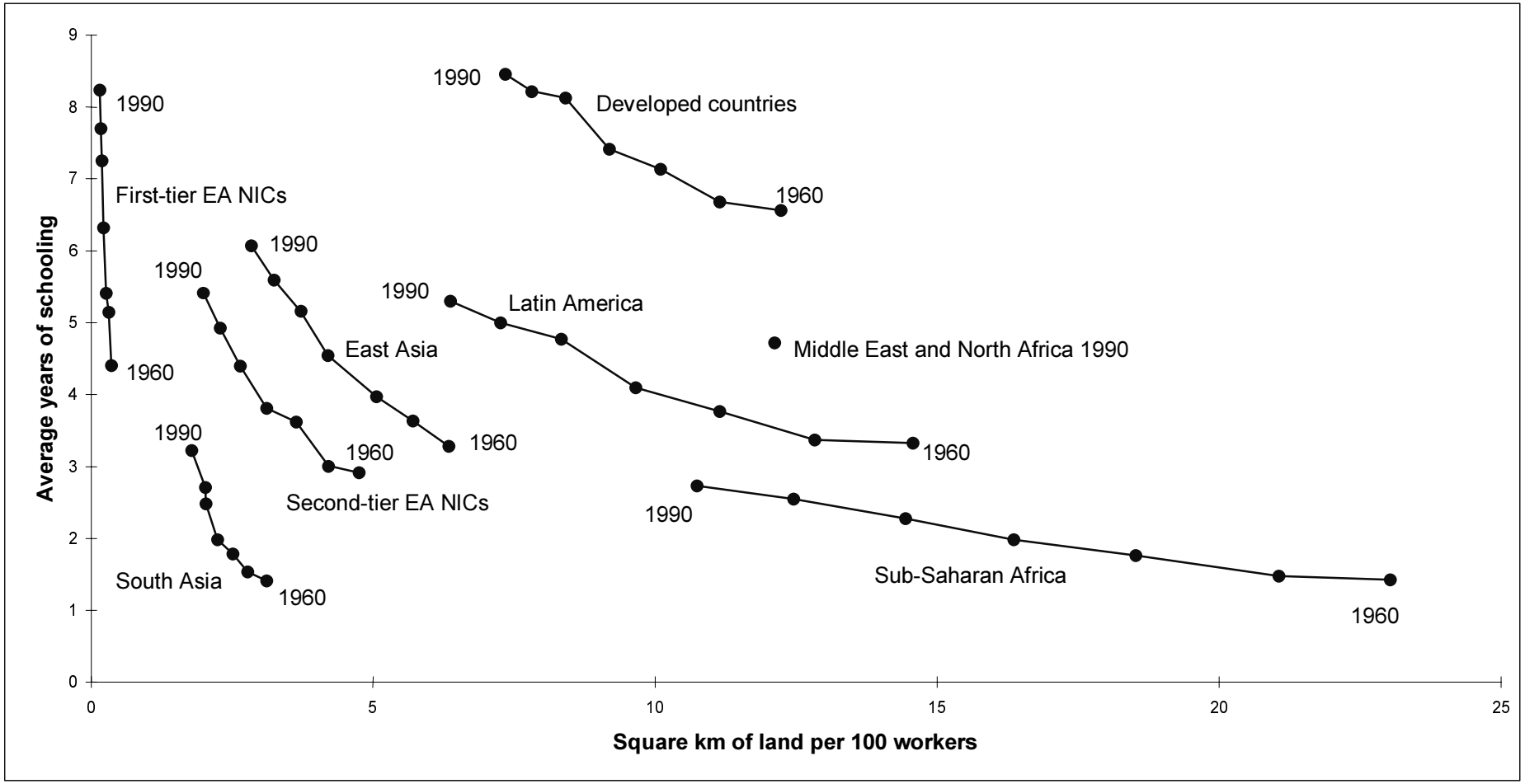
Figure 3 shows the average resource supplies of each country group in two dimensions - skill per worker and land per worker - in 1990 (the year to which the export data refer) and at five-year intervals since 1960. South Asia is in the bottom left-hand corner, with a unique combination of low skill per worker and low land per worker. Only Africa has fewer years of schooling than South Asia, and both regions lie well below all the other groups. Only the first-tier East Asian NICs have less land per worker than South Asia: the rest of East Asia has somewhat more, and all the other groups have far more. (All the Asian groups are thus at the left-hand side of the figure, with Latin America, developed countries, MENA and Africa to the right.) Over the thirty years covered by the figure, each of the groups moved upwards, reflecting an increase in average years of schooling; and each of them also moved to the left, as a result of population growth.[7] But there was little change in their positions relative to one another, and there is little reason to anticipate larger changes over the next thirty years.

The next three figures (4a, 4b and 4c) show the influence of regional differences in resource combinations on three aspects of export structure. Each figure contains the relationship between export structure and resource combinations estimated across all the individual countries in the world (a cross-country regression line, based on the simplified specification in table 2) and the actual average export structures and resource combinations of each of the country groups.

Figure 4a shows how countries' manufactured/primary export ratios tend to increase with their skill/land ratios. The country-group averages follow roughly the pattern suggested by the regression line: the first-tier East Asian NICs are up at the right-hand end of the line with high values of both the manufactured/primary export ratio and the skill/land ratio; while Africa, with low values for both ratios, is down at the left-hand end of the line. South Asia is roughly in the middle, with intermediate values of both the manufactured/primary export ratio and the skill/land ratio. South Asia lies well above the regression line, implying that it exports a higher proportion of manufactures than would be predicted from its skill/land ratio, but we shall show later that this is due entirely to the influence of two atypical countries - Afghanistan and Nepal.

[7] The impression of huge inter-regional differences in population growth rates is misleading: if the figure is replotted with the values on the x-axis in logarithms, proportional growth rates of population look much more similar across regions.

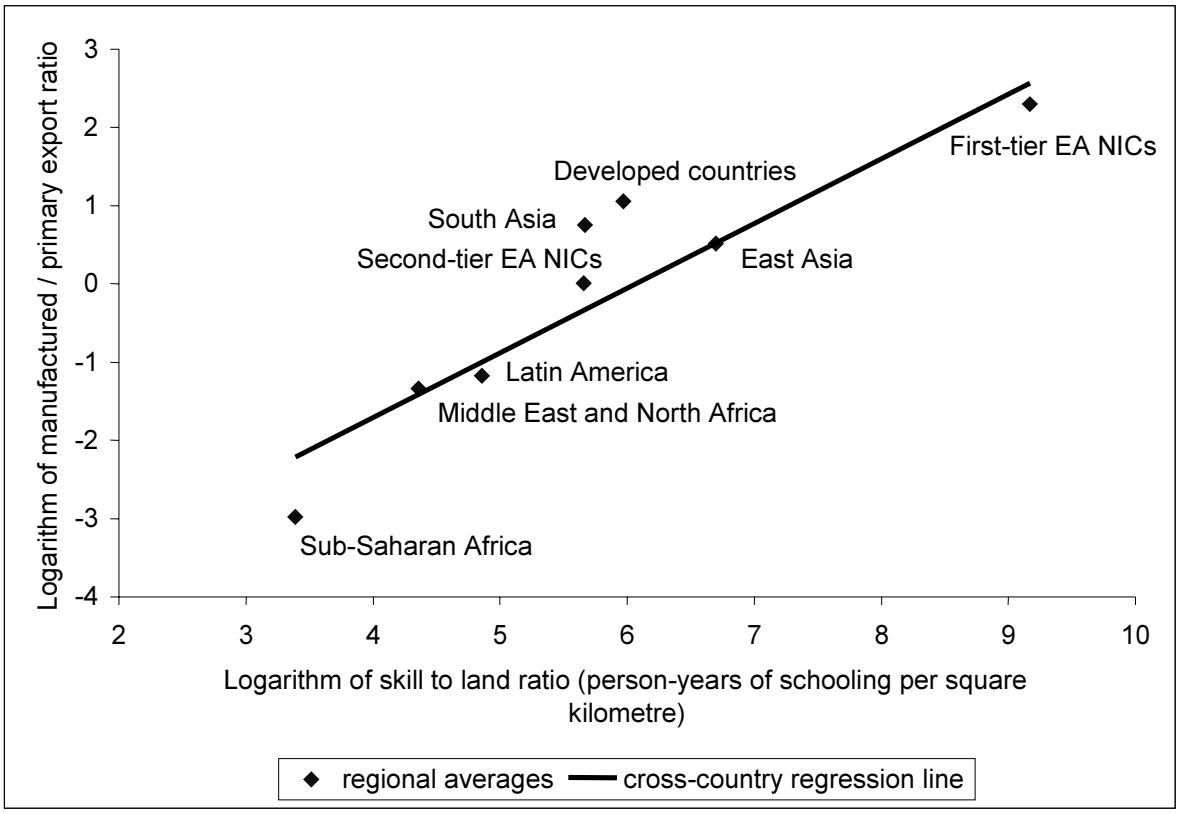
Figure 3: Regional resource combinations, 1960–1990 (at 5-year intervals)



Sources: Education and population data from Barro and Lee (1996), land data from World Bank.

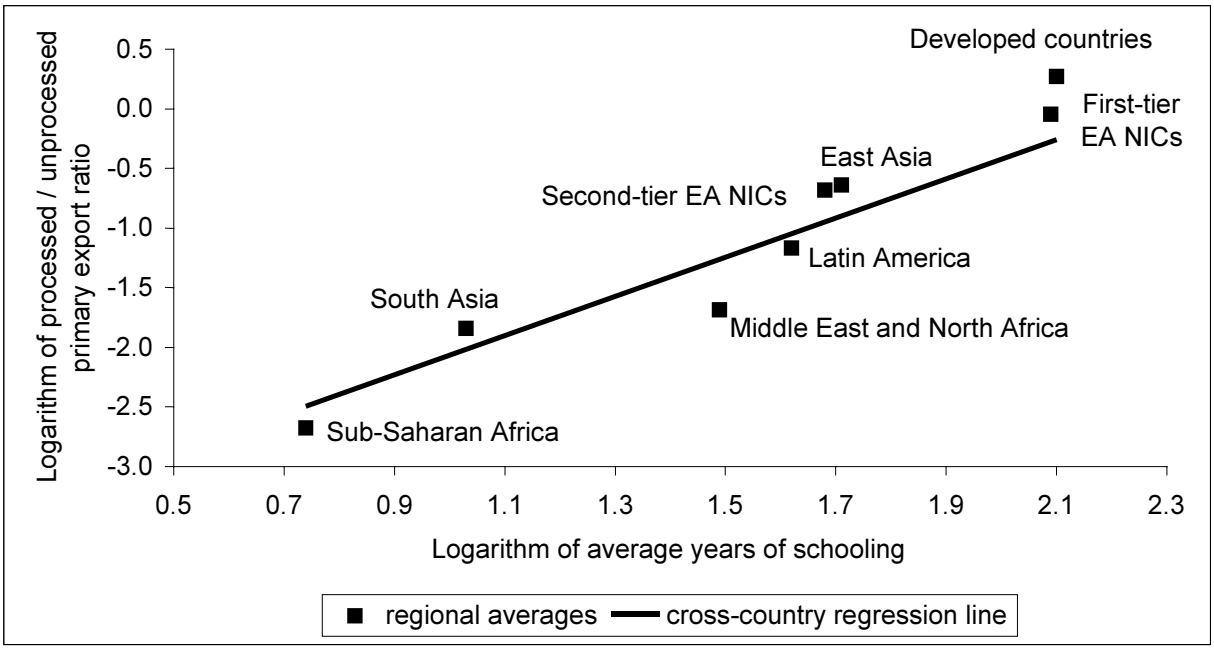
Note: Time series not available for several countries in Middle East and North Africa.

Figure 4a: Export structure (manufactured/primary) and resources, by region



Sources: Education data from Barro and Lee (1996) and UNDP (1992), land data from World Bank, export data from UNCTAD database.

Figure 4b: Export structure (processed / unprocessed primary) and resources, by region, 1990



Source: Education data from Barro and Lee (1996) and UNDP (1992), export data from UNCTAD database.

Figure 4c: Manufactured export structure (skill / labour-intensive) and resources, by region, 1990

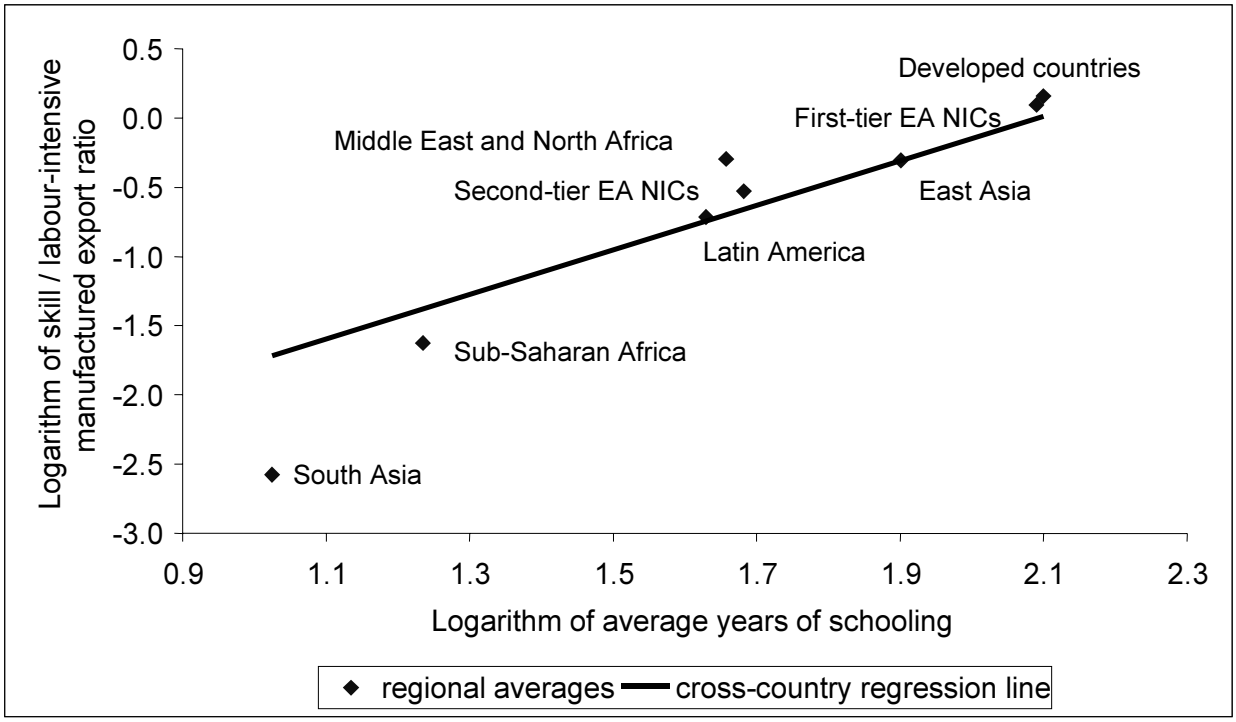


Figure 4b shows how the ratio of processed to unprocessed primary exports tends to rise across countries with the level of skill per worker, the reason being that processing is more skill-intensive than the production of unprocessed primary goods. All the country-group averages lie fairly close to the regression line. Thus the fact that South Asia exports only a small share of its primary exports in processed form appears to be well explained by its low level of skill per worker (with Africa below it in both respects, and all the other groups above it). Referring back to figure 2, the exceptionally small share of processed primary items in South Asia's total exports is explained by its unique combination of low levels of both skill per worker and land per worker. Large exports of processed primary products, as in Latin America, require both abundant natural resources and high levels of skill: South Asia meets neither of these requirements.

Figure 4c shows how the ratio of skill-intensive to labour-intensive manufactured exports tends to rise across countries with the level of skill per worker. This figure (like the NMH/NML regressions in table 2) refers to a smaller set of countries than the two previous figures, including only those where manufactures account for 10% or more of total exports. Thus the membership of some of the country groups is different, most notably for Africa, whose point lies further to the right than in figure 4b, but South Asia is unaffected. Once again, the country-group averages follow roughly the pattern suggested by the regression line. The developed countries and the first-tier East Asian NICs have both the highest shares of skill-intensive items and the highest levels of skill per worker. South Asia is at the other end of the spectrum, with both the lowest share of skill-intensive manufactures and the lowest level of skill per worker. However, South Asia lies well below the regression line, implying that it exports an even smaller share of skill-intensive items than would be predicted from its low level of education.

Table 3:
Service exports as share of all exports (services plus merchandise), 1990: percentages

	Total services	of which	Transport services	Travel services	Other services
Developed countries	23.7		5.8	8.4	9.6
South Asia (-1)	26.0		5.1	8.5	12.5
East Asia (-3)	16.0		3.0	5.7	7.3
Middle East and North Africa (-3)	22.7		6.8	8.1	7.7
Latin America	23.0		5.5	10.1	7.4
Sub-Saharan Africa (-5)	21.3		6.2	5.4	9.7
All countries (-12)	23.0		6.2	7.6	9.3
Standard deviation	14.4		6.9	7.3	6.7

Source: IMF *Balance of Payments Statistics Yearbook* 1997

Note: Includes only countries for which complete data are available; negative figures in brackets are the reductions in the number of countries as compared with the data on merchandise exports.

Table 3 reports the group averages for service exports - in total, and divided into transport, travel and other services - as a share of all exports. By contrast with merchandise exports, there is little variation among the groups. The averages for South Asia are distorted by high values for travel and other services in Nepal, excluding which reduces South Asia's total service export share from the highest of all the groups to 20%, the second lowest (ahead of East Asia). South Asia's transport services share is similar to that of most other groups (though again above East Asia). Its travel services share, which also looks similar to that of most other groups, drops to 4%, lower than any other group, if Nepal is excluded. Excluding Nepal also lowers South Asia's other services share, but it remains (at 10%) higher than any other group. All these differences between South Asia and the other groups, however, are small and statistically insignificant. Their economic significance is also hard to assess without a finer breakdown of service exports.

To summarise, the analysis of group averages in this section has shown that South Asia has an unusual merchandise export pattern, concentrated on labour-intensive manufactures, with few primary exports (particularly processed ones) and few skill-intensive manufactured exports, and that this pattern is quite well explained by South Asia's unusual combination of low levels of both skill per worker and land per worker. By comparison with the rest of the world, South Asia has a lot of labour, relative to its supplies of both skill and land, and so its exports are concentrated on a type of good which uses large inputs of labour and small inputs of both skill and land.

3 INDIVIDUAL SOUTH ASIAN COUNTRIES

The previous section examined the situation of South Asia as a whole, relative to other groups of countries. This section examines all the individual South Asian countries, asking essentially the same questions as in the previous section: about the composition of their exports, about their combinations of human and natural resources, and

about the connections between their export structures and their resources. This last question will be addressed by comparing each country's actual export structure with the structure predicted from its resources on the basis of the cross-country relationships discussed and estimated in the first section. It will be addressed also by including in the analysis, for purposes of comparison, the individual countries of East Asia.[8]

3.1 Variation in export structure and resources

The 1990 merchandise export structures of individual South Asian and East Asian countries are shown in columns 2 and 3 of table 4, and in figure 5, where countries are arranged in descending order of the share of manufactures in their exports. (More recent export data are in appendix table A5.) In South Asia, the share of manufactures is over 70% in four of the six countries, but is only one-half in Sri Lanka and one-third in Afghanistan. In East Asia, the share of manufactures varies even more widely, from over 90% in Hong Kong, Korea and Taiwan, and over 70% also in China and Singapore, to one-half in Malaysia, one-third in Indonesia, and under 10% in Myanmar and Papua New Guinea (PNG). The share of processed primary exports is low for all South Asian countries except Afghanistan, but varies more widely among the countries of East Asia.

The share of skill-intensive items in manufactured exports is low in five of the six countries of South Asia (as is reflected in the low regional average), ranging from near-zero in Nepal and Pakistan to around one-tenth in Afghanistan and Sri Lanka. However, in India, which is by far the largest of the six, this share is much higher - about two-fifths. In all the East Asian countries except Indonesia, the share of skill-intensive items is well above the South Asian average: about one-third in China and the Philippines, between 40% and 50% in Hong Kong, Korea, Taiwan and Thailand, and more than 70% in Malaysia and Singapore. (The shares of skill-intensive items in Myanmar and PNG have little meaning, because these countries export so few manufactures, and will not be considered further in our analysis.)

These skill-intensive shares must be interpreted with caution, because of the problems of classifying manufacturing sectors mentioned earlier. Half of India's high share (compared to the rest of South Asia) consists of cut diamonds, whose classification as skill-intensive is questionable.[9] There are problems of classification also for electrical and electronic goods (SITC 75-77), which, as shown in table 4, are a large proportion of the skill-intensive exports of most East Asian countries - China and Indonesia being important exceptions. In some countries, these exports are largely the product of labour-intensive assembly activities, so that our data may overstate the differences in skill-intensive shares between South Asia and East Asia and, within East Asia, between, say, China and Indonesia on the one hand and Malaysia and Thailand on the other hand (we shall return to this issue later).

[8] Our definition of East Asia is broad, based on the World Bank's 'East Asia and Pacific' grouping, but several of the countries concerned are omitted from our analysis, either because they are small (we include only countries with populations above one million) or for lack of data (most notably Cambodia, Laos and Vietnam).

[9] This sector was classified as skill-intensive by Wood and Mayer (1998). However, the skills involved are a manual craft which does not require a high level of education. Moreover, the degree of skill required is lower in India, where most of the stones are small, than in countries such as Israel and the Netherlands. It might thus be more appropriate, particularly in India, to classify this sector as labour-intensive.

Table 4: Export composition and resource combinations of Asian countries, 1990

	Country label	Share of manufactures in total exports %	Share of skill-intensive goods in manufactured exports (%) Total	of which SITC 75-77	Average years of schooling	Square km of land per 100 workers	Adult (over-15) population (millions)
	1	**2**	**3**		**4**	**5**	**6**
SOUTH ASIA							
Afghanistan	AF	36.9	11.4	0.9	1.3	6.8	9.6
Bangladesh	BA	77.2	5.2	0.2	2.2	0.2	64.9
India	INDI	71.7	41.3	3.3	4.1	0.6	541.8
Nepal	NE	83.0	1.1	0.0	1.6	1.3	11.1
Pakistan	PK	75.9	2.6	0.1	4.2	1.2	66.7
Sri Lanka	SL	53.3	11.6	1.3	6.0	0.6	11.6
Regional average		66.3	12.2	0.9	3.2	1.8	117.6
EAST ASIA							
China	CH	72.9	33.1	9.0	5.9	1.1	837.6
Hong Kong	HK	95.8	39.1	23.4	9.2	0.0	4.6
Indonesia	INDO	35.7	10.9	2.6	4.6	1.6	118.5
Korea	KO	92.8	41.7	27.8	9.9	0.3	31.8
Malaysia	ML	54.8	70.3	57.0	6.0	3.0	11.1
Myanmar	MY	5.7	36.8	2.0	2.5	2.6	26.2
Papua New Guinea	PNG	8.2	79.3	2.2	2.3	20.1	2.3
Philippines	PH	67.5	30.8	24.5	6.9	0.8	37.4
Singapore	SI	72.6	79.8	55.5	5.9	0.0	2.1
Taiwan	TW	92.7	44.4	29.1	8.0	0.2	14.8
Thailand	TH	60.5	41.3	29.0	5.6	1.4	37.5
Regional average		59.9	46.1	23.8	6.1	2.8	102.2

Note: SITC 75-77 includes computers and office equipment, communications equipment, and electrical machinery.

The service exports of individual Asian countries, as a share of total exports, are reported in appendix table A1. In four of the South Asian countries, the total service export share is about 20%, but in Afghanistan it is much lower and in Nepal much higher. There is wide variation also in the composition of service exports: the transport shares are lowest in Bangladesh and Nepal, and highest in Pakistan and Sri Lanka; the travel shares too are lowest in Bangladesh and Pakistan, and highest (by a long way) in Nepal; the other services shares are close to the world average in India, Pakistan and Sri Lanka, but much higher in both Bangladesh and Nepal. In East Asia, the total service export share, which ranges from 8% in Indonesia to 29% in the Philippines, is below the South Asian average in six of the nine countries for which data are available, mainly because of lower shares for transport services and other services.

Figure 5: Export composition of Asian countries, 1990, percentages

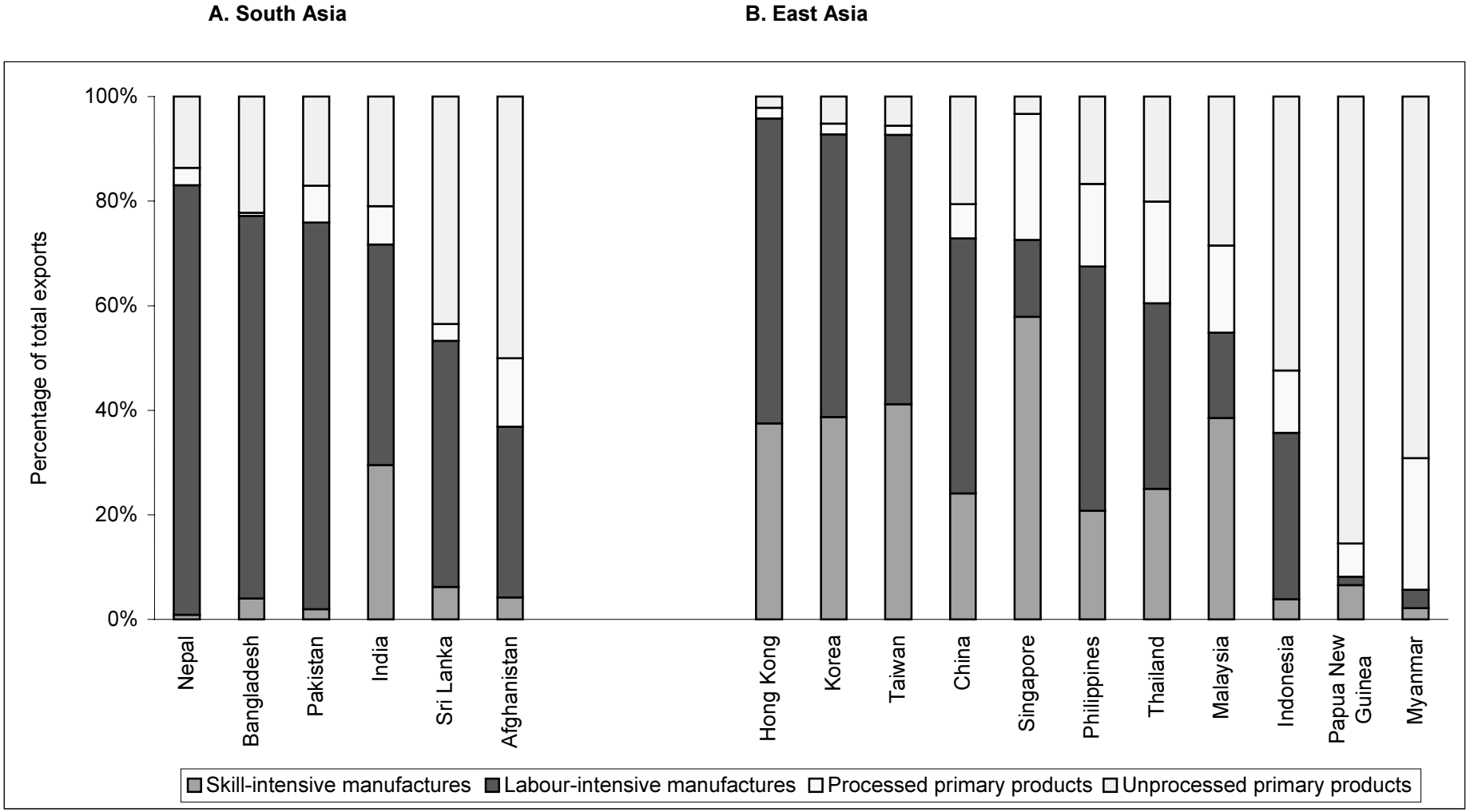
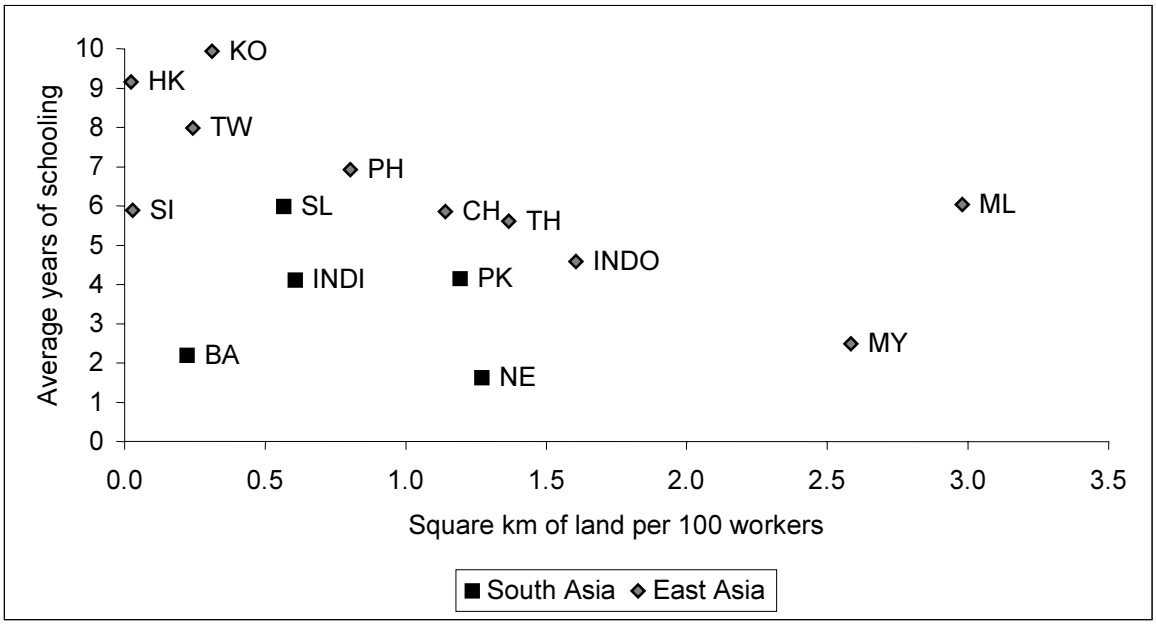


Figure 6: Resource combinations of Asian countries, 1990



Sources: Education and population data from Barro and Lee (1996), UNDP (1992) and UN (1994); land data from World Bank.

Note: Papua New Guinea, with 20 square kilometres of land per 100 workers, and Afghanistan, with 7 square kilometres per 100 workers, are excluded from the figure. See table 4 for the list of country abbreviations.

The resources of individual South Asian and East Asian countries are shown in columns 4-6 of table 4 and in figure 6. As regards natural resource availability, there is a large overlap between the two regions. All but four countries have less than two square kilometres of land per hundred workers (and about half the countries in each region less than one). Within South Asia, Bangladesh has the lowest land-per-worker ratio, followed by India and Sri Lanka, and then by Nepal and Pakistan. Afghanistan has far more land per worker than any of the other South Asian countries. In East Asia, likewise, there is one country, PNG, whose land-per-worker ratio is far higher than in any other country, but Malaysia and Myanmar are also somewhat above two square kilometres per hundred workers.

There is far less overlap of skill availability between the two regions. Average years of schooling in every South Asian country except Sri Lanka are less than in every East Asian country except Myanmar and PNG. Within South Asia, the average in Afghanistan and Nepal is less than two years of schooling, and in Bangladesh slightly above two, while India and Pakistan both have slightly more than four, and Sri Lanka six. Within East Asia, apart from Myanmar and PNG, the range is from an average of 4.6 years of schooling in Indonesia to nearly ten years in Korea. A finer breakdown (in Appendix table A2) reveals that the differences in average years of schooling between South Asia and East Asia arise mainly from differences in literacy rates: in all South Asian countries except Sri Lanka, a larger fraction of the adult population has no schooling than in any East Asian country except PNG. By contrast, there is little systematic difference between South and East Asia in the proportion of literate people who have some college education, which averages about 10% in both regions

(although it varies widely among countries, from 2% in Sri Lanka, China and Indonesia to 15% in Korea and Taiwan and over 20% in the Philippines).

In the combined scatter of skill and land availability in figure 6, which includes all the Asian countries except the two most land-abundant ones (Afghanistan and PNG), the countries of South Asia all lie closer to the origin than the countries of East Asia (apart from Singapore). This is the same pattern as the regional averages in figure 3: relative to their supplies of labour, South Asian countries have less skill or less land (or both, most conspicuously in Bangladesh) than East Asian countries.

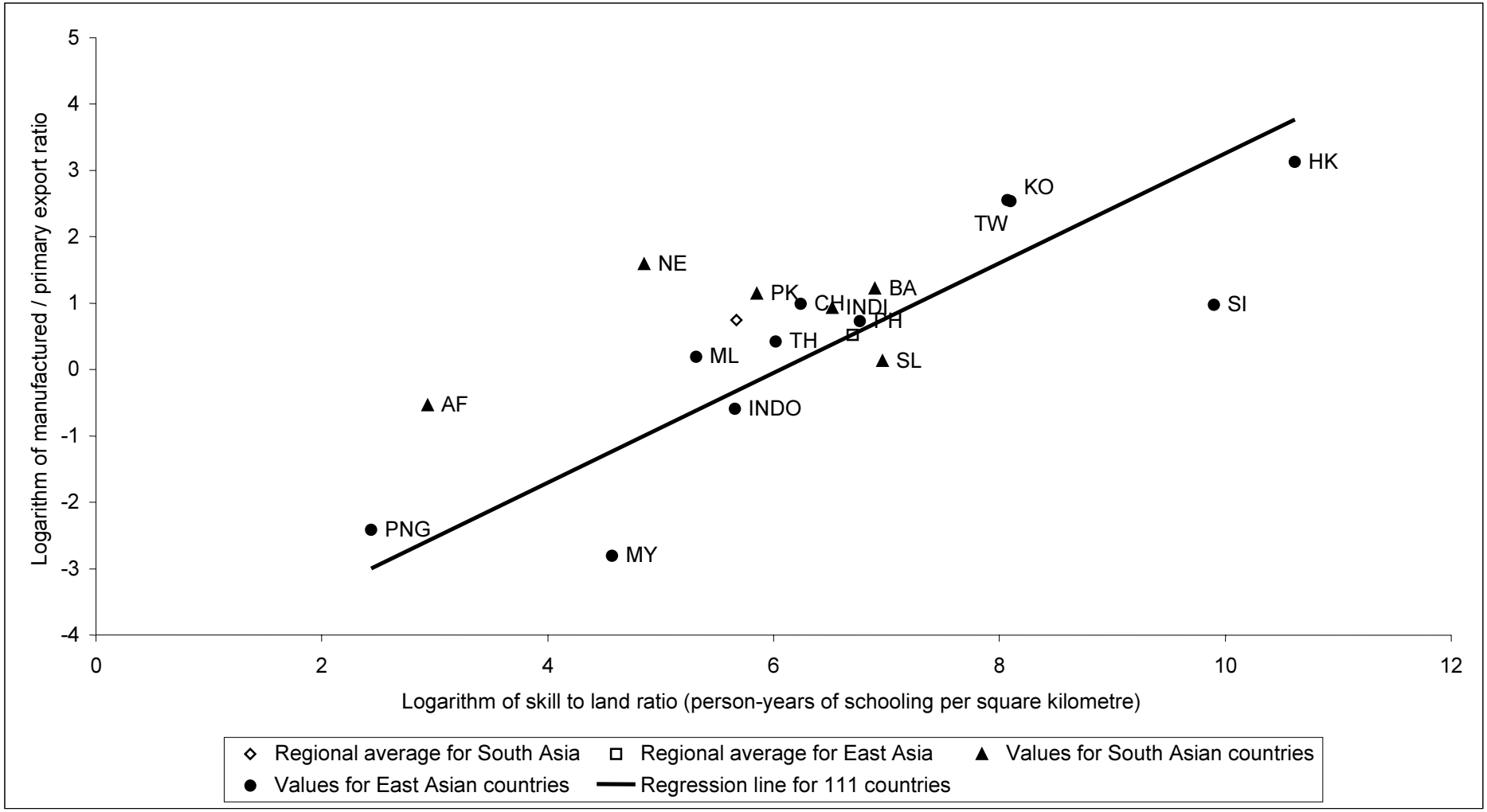
Figures 7a and 7b show the relationships between two aspects of these variations in export structure and in resource availabilities. They are identical in principle to the earlier figures 4a and 4c, and show the same regression lines, but the points are individual Asian countries rather than regions of the world (although the South Asian and East Asian regional averages are also shown).

Figure 7a relates variation in the manufactured/primary export ratio (a close relative of the share of manufactures in total exports) to variation in the skill/land ratio, which reflects the combined influence of variation in skill per worker and in land per worker. At the extremes are two East Asian countries: PNG, whose combination of low skill per worker and high land per worker gives it a very low skill/land ratio and a correspondingly low manufactured export share; and Hong Kong, whose combination of high skill per worker and little land per worker gives it a very high skill/land ratio and a correspondingly high manufactured export share. Four of the South Asian countries are bunched in the middle of the figure and lie relatively close to the regression line. Sri Lanka has the highest skill/land ratio, but is closely followed by Bangladesh (whose low level of land per worker offsets its low level of skill per worker), with India somewhat lower, and Pakistan lower still. The two other South Asian countries - Nepal and Afghanistan - both have even lower skill/land ratios (Afghanistan's being very low) and both lie far above the regression line, with unexpectedly high manufactured export shares.

Figure 7b relates variation in the ratio of skill-intensive to labour-intensive manufactured exports (a close relative of the share of skill-intensive items in manufactured exports) to variation in the level of skill per worker. Its appearance is different from that of the previous figure, with the South Asian countries on the left and the East Asian countries on the right, and with the points more widely scattered around the regression line (indicating that variation within Asia in this aspect of export structure is less well explained by variation in resources). Four of the South Asian countries are below the line (two of them a long way below), as is the South Asian regional average, but India and Afghanistan are above the line. Most of the East Asian countries are close to the regression line, and the East Asian regional average is on it, but one East Asian country - Indonesia - is far below the line, and two - Singapore and Malaysia - are far above it.[10]

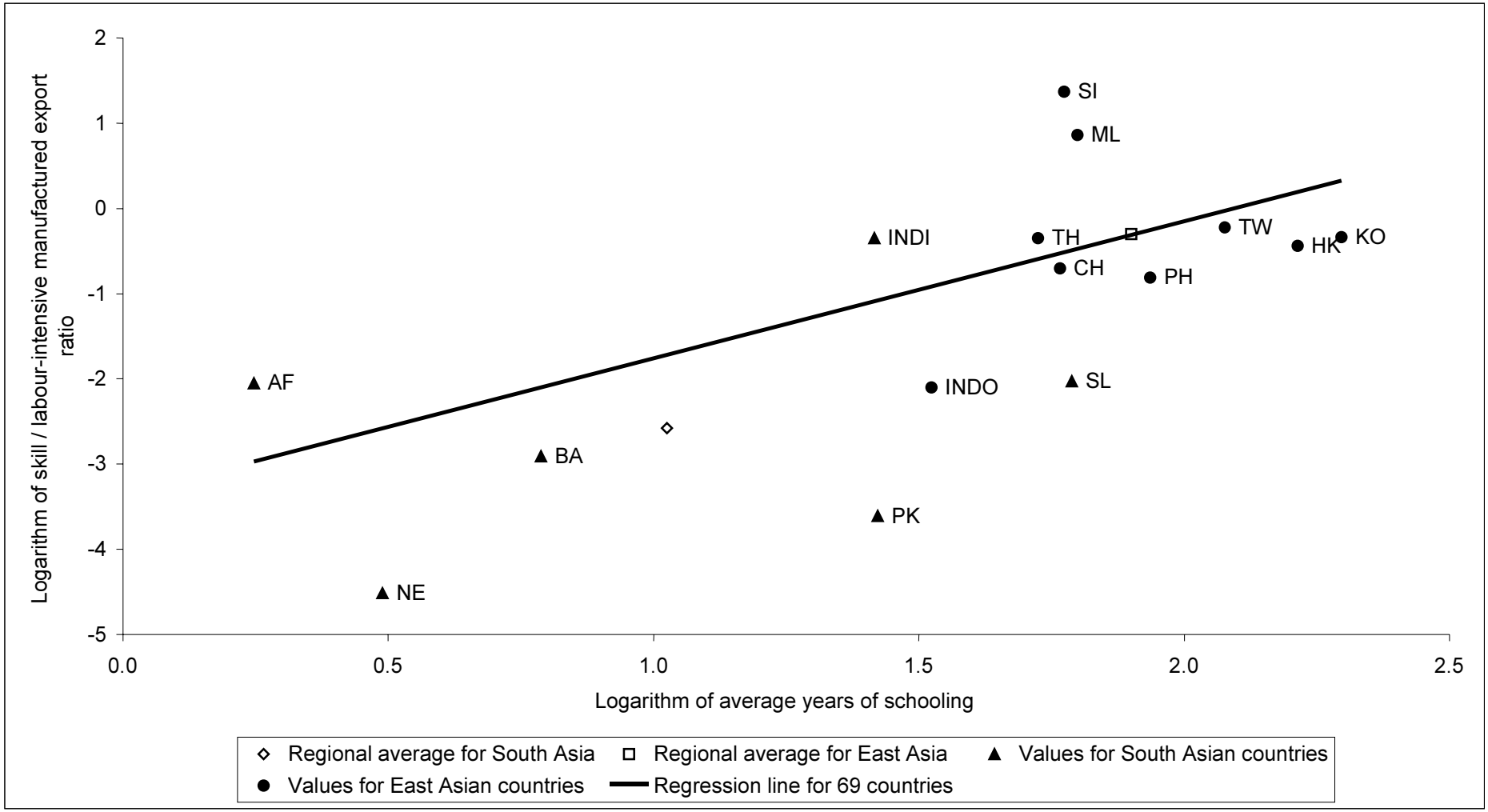
[10] Myanmar and PNG are omitted from the figure (and from the East Asian regional average in it), for reasons explained earlier.

Figure 7a: Export structure (manufactured / primary) and resources of Asian countries, 1990



Source: Skill data from Barro and Lee (1996) and UNDP (1992), land data from World Bank, export data from UNCTAD database.

Figure 7b: Manufactured export structure (skill / labour-intensive) and resources of Asian countries, 1990



Sources: Skill data from Barro and Lee (1996) and UNDP (1992), export data from UNCTAD database.

3.2 Actual and predicted export structures

Figures 7a and 7b are the simplest possible method of comparing the actual export structures of South and East Asian countries with the structures that would be predicted from their resources. However, this method is open to improvement in two respects. One is to base the predictions on the full rather than the simplified specifications of the regressions in table 2. The other is to exclude all the Asian countries from the data on which the regressions are estimated, so as to compare the exports of Asian countries with what would be predicted on the basis of the relationships between exports and resources in *non*-Asian countries.

In estimating our preferred predicting regression for the share of manufactures in exports, we also excluded from the data eight African countries which we had found in Wood and Mayer (1998) to have manufactured export shares far below what would be predicted from their human and natural resources, because of deficiencies in infrastructure and macroeconomic policies. As is shown in appendix table A3, the sizes of the regression coefficients vary quite substantially, depending on whether or not these African countries are included. Moreover, the predictions for South Asia are especially sensitive to their inclusion, because they have resources similar to South Asia - low skill per worker and (unusually for Africa) low land per worker. Thus if these African countries are included in the regression, predicted manufactured export shares in South Asia are appreciably lower, and actual shares appear higher relative to the predictions - misleadingly so, in our judgement (although we report these results as a sensitivity test in appendix table A4).

When we estimated the full specification of the regression for the share of skill-intensive items in manufactured exports with the Asian countries omitted from the data (regression 4 in table A3), the coefficient on land per worker became significantly negative and that on country size significantly positive, both having been near-zero with the Asian countries included (regression 6 in table 2).[11] As compared to the simplified specification, the full specification substantially increases the predicted skill-intensive shares of manufactured exports in both Asian regions, where most countries have low land per worker, and particularly in South Asia, where the typical country is also big. It thus makes actual shares seem lower, relative to the predictions. However, each of these coefficients is driven by a few countries. The coefficient on country size reverts to insignificance if we drop six large developed countries, as does that on land per worker if we drop 11 countries with high values of n, at the other end of the spectrum to the Asian countries. We therefore decided to retain the simplified specification (with skill per worker as the only independent variable) as our preferred predicting regression, and to report the results using the full specification as a sensitivity test (in table A4).

Table 5 and figures 8a and 8b show, for each of the countries of South and East Asia, the predictions made with our preferred regressions for the share of manufactures in exports and the share of skill-intensive items in manufactured exports, and compare these predictions with the actual shares. The units, it should be noted, differ from those in Figures 7a and 7b: the numbers are shares of totals, rather than ratios of parts, and they are unlogged.

[11] It should be recalled that the data used in estimating both these regressions exclude all countries whose share of manufactures in total exports is less than 10%, many of which are in sub-Saharan Africa, and most of which have low levels of skill per worker. The inclusion of these countries would reduce the slope of the regression line and would raise the predicted values for South Asia, thus making actual shares in South Asia appear lower, relative to the predictions. However, we do not think that this would be meaningful, since the skill-intensive manufactured export shares of the excluded countries are extremely widely dispersed, and the fit of the regression including them is poor.

Table 5: Actual and predicted export composition of Asian countries, 1990 percentages and percentage points

	Share of manufactures in total exports			Share of skill-intensive goods in manufactured exports		
	Actual	Predicted	Actual minus predicted	Actual	Predicted	Actual minus predicted
SOUTH ASIA						
Afghanistan	37	7	30	11	7	4
Bangladesh	77	72	5	5	14	-9
India	72	83	-11	41	29	13
Nepal	83	25	58	1	10	-9
Pakistan	76	62	14	3	29	-26
Sri Lanka	53	73	-19	12	40	-29
Regional average	66	54	13	12	21	-9
without AF and NE	70	72	-3			
EAST ASIA						
China	73	84	-11	33	40	-6
Hong Kong	96	97	-1	39	55	-16
Indonesia	36	64	-28	11	32	-21
Korea	93	91	2	42	58	-16
Malaysia	55	45	10	70	41	30
Myanmar	6	29	-23			
Papua New Guinea	8	4	4			
Philippines	68	77	-10	31	45	-14
Singapore	73	93	-20	80	40	40
Taiwan	93	88	5	44	50	-6
Thailand	61	64	-4	41	38	3
Regional average	60	67	-7	43	44	-1

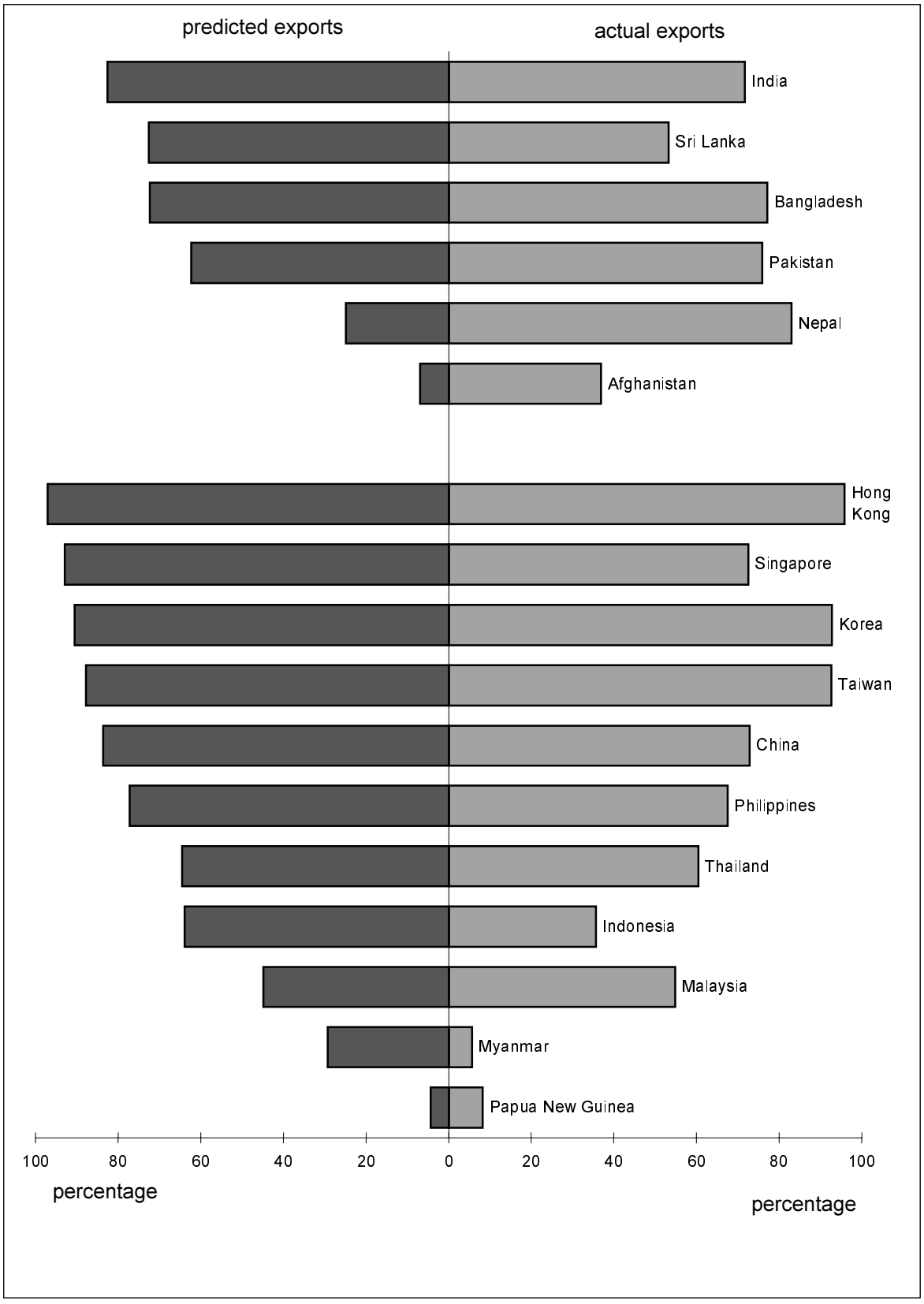
Notes: Predicted shares based on coefficients of regressions 2 and 3 in appendix table A3. Myanmar and Papua New Guinea are omitted from the last three columns because the shares of manufactures in their total exports are too small for the division between skill-intensive and labour-intensive goods to be meaningful. Discrepancies between 'actual minus predicted' and 'actual' minus 'predicted' are due to rounding.

Share of manufactures in total exports

Figure 8a and the first three columns of table 5 show that for most of the Asian countries the actual share of manufactures is quite close to the predicted share, meaning that differences in export structure among them are fairly well explained by differences in their resources and size.[12] The discrepancies for six of the 17 countries, including Bangladesh, are 5 percentage points or less, and are less than 15 percentage points for five more

[12] The sensitivity tests in appendix table A4, with the eight under-performing African countries included in the predicting regression, as anticipated lower the predicted values for all the Asian countries and thus make the positive discrepancies larger and the negative ones smaller. In South Asia, the difference is negligibly small for Afghanistan, largest for Bangladesh (a difference of 27 percentage points), and 10-13 percentage points for the other four countries. India's negative discrepancy is eliminated and Sri Lanka's halved, while the positive discrepancies of the other four countries are increased. The differences are generally smaller in East Asia than in South Asia, because levels of skill per worker are generally higher (the alternative predicting regression makes most difference for countries with both low *n* and low *h*, such as Bangladesh).

Figure 8a:
Actual and predicted manufactured export shares of Asian countries, 1990



countries, including the two other large South Asian ones. India exports a somewhat smaller share of manufactures than predicted, and in this regard is similar to China (with almost identical actual and predicted

shares - the latter is the result of China's higher *h* and larger size than India being almost exactly offset by its higher *n*). Pakistan, however, exports a somewhat larger share of manufactures than predicted, with its actual share being somewhat above that of India, and its predicted share being considerably lower because of its larger *n* and smaller size.

The discrepancies for the three smaller South Asian countries are bigger. Sri Lanka's actual export share of about one-half is 19 percentage points below its predicted share, which is pulled up by both its high *h* and its low *n*. By contrast, the manufactured export shares of Afghanistan and Nepal are much larger than predicted. Afghanistan has both the lowest actual and the lowest predicted values in South Asia, but the former is well above the latter. Nepal's combination of the highest actual share in South Asia and the second-lowest predicted share (mainly because of its low *h*) generates a discrepancy of nearly 60 percentage points. None of the discrepancies in East Asia is large and positive, as in Afghanistan and Nepal: only three are above 15 percentage points and all of these are negative, like that of Sri Lanka. Indonesia's actual share of about one-third is similar to that of Afghanistan, but its predicted share of nearly two-thirds is similar to that of Pakistan, which it resembles in terms of its *h*, *n* and size. The other two East Asian countries with substantial negative discrepancies are Myanmar and Singapore.

Although many of the discrepancies between actual and predicted shares are probably due simply to deficiencies of our trade or resource data, there are plausible explanations for the larger ones. The unusually high manufactured export shares of Afghanistan and Nepal are probably a result of the low quality of their natural resources - agriculture limited by mountainous terrain or lack of water, and few valuable minerals. The unusually low share in Sri Lanka has risen since the date to which our export data refer, and by 1994 was close to our predicted share (table A5). Sri Lanka's adoption of outward-oriented industrial trade policies in the late 1970s allowed it to realise its comparative advantage in manufacturing, but its export structure adjusted slowly, perhaps because of the country's long history as a primary exporter and consequent accumulation of primary-sector-specific skills and capital.[13] The lower-than-predicted share in Indonesia, which has risen substantially in the 1990s (table A5), partly reflects its late (1986) adoption of outward-oriented policies, but also reflects its large oil exports - our land area measure underestimates Indonesia's natural resources. The negative discrepancy in Singapore is also due to oil (but in this case to refining of imported crude), while the low share in Myanmar is a result of the country's autarkic policies.

The regional average of the discrepancies in table 5 suggests that South Asia has a higher-than-predicted share of manufactures in its exports, as is implied also by the South Asia point in figures 4a and 7a being well above the regression line. But this is due entirely to Afghanistan and Nepal: if these countries are omitted from the averages, South Asia's actual manufactured export share is close to its predicted share. (Their omission has little effect on the actual average, but it raises the predicted average substantially, because the skill/land ratios of both countries are low.) Even if, in addition, the actual share for Sri Lanka is raised to its 1994 level, the regional average discrepancy is small. The regional average of the East Asian discrepancies in table 5 suggests

[13] Bangladesh and Pakistan also have long histories as primary exporters, but their primary exports (fibres) were more suitable for conversion into manufactures, partly as a result of deliberate government policy, than were those of Sri Lanka (mainly tea).

Table 6: Educational structure of the labour force in selected manufacturing industries

	Share of sectoral employment (%)			Sector's share of country's total employment (%)
	Primary	Secondary	Tertiary	
Malaysia 1989				
Textiles (including clothing)	24	75	1	5
Machinery and metallurgy	10	83	7	11
Philippines 1993				
Textiles (including clothing)	25	53	22	6
Machinery and metallurgy	12	48	40	3

Source: tabulation of household survey data by Donald Robbins, aggregating males and females.

that the actual manufactured export share is somewhat lower than the predicted share, but this is due entirely to Indonesia, Singapore and Myanmar, whose omission would bring the actual average close to the predicted average.

Share of skill-intensive items in manufactured exports

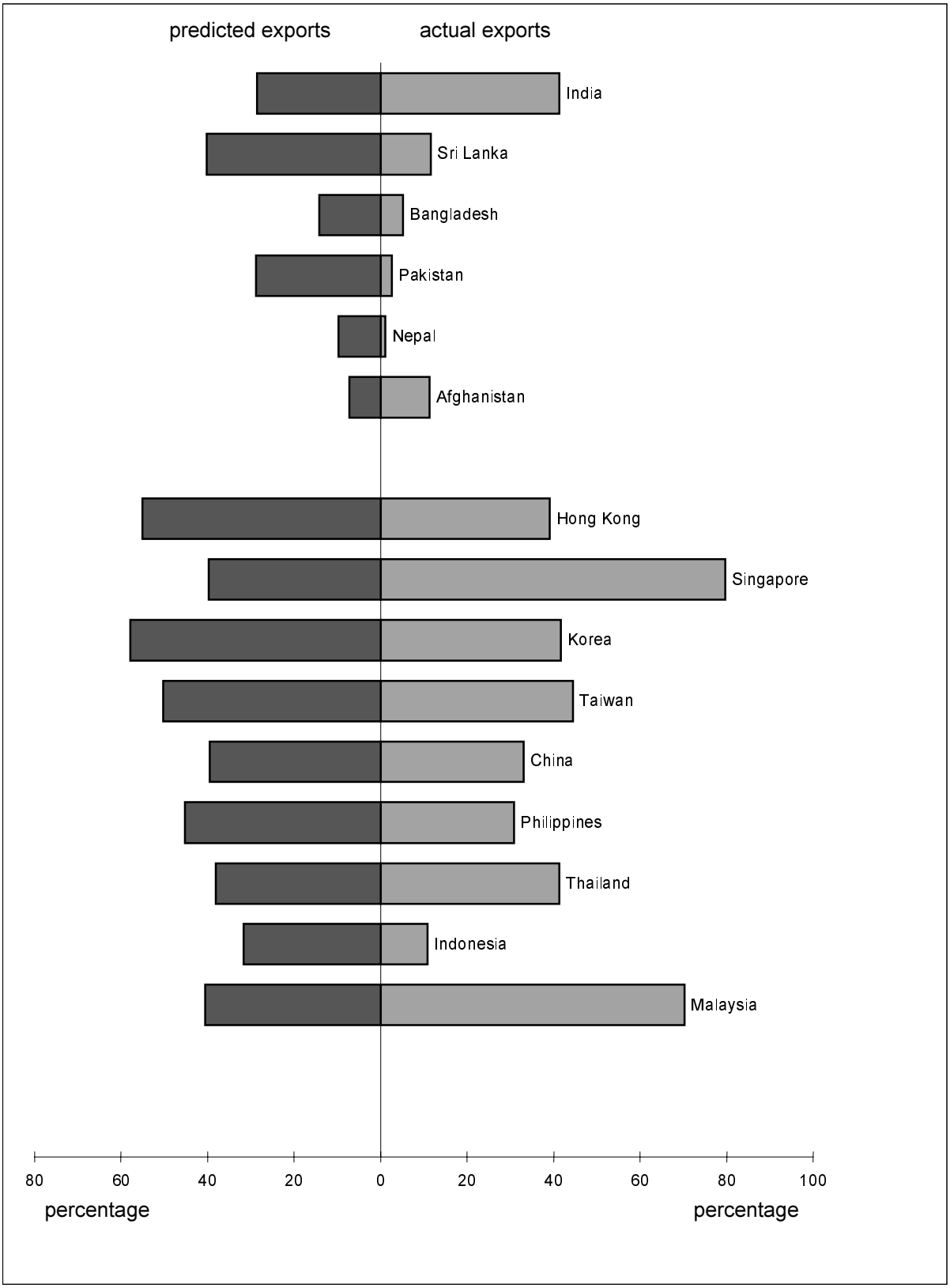
Figure 8b and the last three columns of table 5 show, for each Asian country, the actual and predicted shares of skill-intensive items in its manufactured exports.[14] The most striking feature of the figure is the general difference between the two regions, with most of the bars on both the actual and the predicted sides of the central line being shorter in South Asia than in East Asia. This impression is confirmed by the regional averages in the last three columns of table 5: the difference between South Asia and East Asia is large and statistically highly significant for both the actual average (31 percentage points) and the predicted average (23 points).[15] Thus, as the analysis in section 2 showed, not only are East Asia's manufactured exports more heavily concentrated than those of South Asia on skill-intensive items, but also most of the difference can be explained by the regional difference in education levels.

It is unlikely that this basic conclusion is vulnerable to errors in the division of actual exports between skill-intensive and labour-intensive items due to the classification problems mentioned earlier, even though the risk of misclassification is particularly high for electrical and electronic exports, which are large in East Asia and all of which are categorised as skill-intensive, including the products of labour-intensive assembly activities. Anecdotal evidence suggests that the levels of education required of workers in electrical and electronic assembly are usually higher than in the production of textiles, clothing, footwear, leather goods and so on. This impression is reinforced by table 6, which refers to Malaysia and the Philippines, countries where electrical assembly exports

[14] The sensitivity tests in table A4 use a predicting regression which includes *n* and country size as well as *h*. As expected, this raises the predicted share of skill-intensive items for all Asian countries (except PNG, which is land-abundant and small). The predicted shares rise most in India and China (in both cases by about 25 percentage points), because of their size, but increase substantially in most countries, making the discrepancies much less positive or more negative (in six cases –30 percentage points or below).

[15] A two-tailed t-test of difference of means, assuming unequal variances within the two regions, yields P-values of 0.005 for the actual shares and 0.006 for the predicted shares.

Figure 8b: Actual and predicted shares of skill-intensive goods in manufactured exports of Asian countries, 1990 (ranked by predicted manufactured export share, as in figure 8a)



are important, but which also have large exports of textiles and clothing, so that the skill intensity of the two sectors can be compared. In both countries, the educational qualifications of the workforce are clearly higher in machinery production than in textiles and clothing. (The machinery sector also covers metallurgy and non-electrical machinery, but most of its workforce in these countries is producing electrical and electronic goods for export, particularly in Malaysia, where it accounted for no less than 11% of economy-wide employment in 1989.)

The manufactured exports of East Asia are thus almost certainly on average more skill-intensive than those of South Asia, as our numbers imply, despite the classification problem. However, there is probably substantial variation among countries in the true skill intensity of the goods in both the skill-intensive and the labour-intensive export categories. This may well be why our models explain less of the variation in this aspect of export structure (both worldwide and within Asia) than in the share of manufactures in total exports. It also calls for caution in interpreting the sizes of the discrepancies between actual and predicted shares in Asia, both for individual countries and the regional averages.

The discrepancies in the last column of table 5 vary widely in size and sign. Only in two of the 15 countries are they under 5 percentage points, although in five more countries, three of which are in South Asia, they are under 15 percentage points. The discrepancies for Afghanistan, Bangladesh and Nepal appear much smaller here than in figure 7b, because they are expressed in absolute rather than proportional terms.[16] But the negative discrepancies for Pakistan and Sri Lanka are both large. In East Asia, the discrepancies are small in China, Taiwan and Thailand, but larger in the other six countries. Four of these larger discrepancies are negative - in Hong Kong, Indonesia, Korea and the Philippines - but Malaysia and Singapore have large positive discrepancies, unlike any country in South Asia.

The average discrepancy between the actual and predicted shares is close to zero in East Asia, but -9 percentage points in South Asia (or -12 points if India's cut-diamond exports are reclassified), which is consistent with the impression obtained earlier from figures 4c and 7b that skill-intensive manufactured export shares in South Asia are even lower than predicted from its low level of education. However, this difference is statistically insignificant,[17] because of the wide variation of discrepancies within each region, and it would vanish if either Pakistan and Sri Lanka or Malaysia and Singapore were omitted from the calculation. Nor is there any difference in the pattern of signs of the discrepancies, two-thirds of which are negative in both regions (reclassification of India's diamond exports would make the proportion only slightly higher in South Asia). These numbers thus provide little evidence of a general difference between South and East Asia in the size or direction of the discrepancies, although such a difference may have emerged during the 1990s.[18]

[16] For example, Nepal's actual share of 1% is proportionally far lower than its predicted share of 10% (only one tenth of it), but absolutely not much lower (only 9 percentage points). The discrepancies in table 5 and figure 8b differ somewhat for all the countries from those in figure 7b, because the coefficients of the regression used for the predictions (in table A3) are not the same as those of the regression line shown in figure 7b (which is based on table 2), as a result of the omission of Asian countries from the predicting regression.

[17] The P-value for a two-tailed t-test of difference of means, assuming unequal variances within the two regions, is 0.399. If India's cut-diamond exports are reclassified as labour-intensive, the average discrepancy rises to 12 points, and the P-value of the test on the discrepancies falls to 0.195.

[18] If the 1990 actual values are replaced by those of the most recent available year (from table A5), the regional average discrepancy for South Asia is more or less unaltered at –10 percentage points (with virtually no change in the discrepancies for any of the individual countries), while the average for East Asia rises from –1 to +9 percentage points (with substantial increases particularly in Indonesia, Korea, Taiwan and Thailand), increasing the gap between the regions from 8 to 19 percentage points. However, part of this widening reflects continued growth of labour-intensive electronic assembly

Part of the variation in discrepancies among countries in table 5, however, must have real economic causes, rather than arising from errors of classification. We considered three possible reasons why a country might fail to achieve its potential in skill-intensive exports. (i) Restrictive trade policies or deficient infrastructure, which increase the costs of (or delay) imports and exports, and which may have a more adverse effect on skill-intensive than on labour-intensive exports because they depend more heavily on imported intermediate inputs in international production chains.[19] (ii) Obstacles or lack of inducements to direct foreign investment, which may have a more adverse effect on skill-intensive than on labour-intensive exports because their production more often requires proprietary technology or information. (iii) High levels of perceived risk (of disruption of output or markets, or of changes in taxes or regulations), which may have a more adverse effect on skill-intensive than on labour-intensive exports, because skill-intensive production requires more and longer investment in training by firms to develop the potential of an educated workforce.[20]

None of these causes appears to provide a single, simple explanation for the pattern of discrepancies between actual and predicted skill-intensive export shares in table 5. Extension of our worldwide regressions to include proxies for these three influences did not yield clear results.[21] Within Asia, too, there are anomalies: for example, Taiwan, which appears to do well on all three counts, has a negative discrepancy, and Korea an even larger one. However, these causes probably help to explain some of the discrepancies. Good infrastructure and low risk attracted multinational electronics firms to Singapore and Malaysia, which have the largest positive discrepancies, while the two largest negative discrepancies, in Pakistan and Sri Lanka, are in countries with almost the worst risk ratings in Asia in the late 1980s.[22]

The case of Sri Lanka is of particular importance to the analysis of this paper. It is the only country in South Asia with education levels matching those of East Asia, and yet the structure of its exports is similar to other South Asian countries. The smallness of its skill-intensive share - which, unlike the share of manufactures in its total exports, had not risen by 1994 (table A5) - could thus be seen as contradicting the principal conclusion of this section, which is that South Asia's manufactured exports are more concentrated on labour-intensive items than those of East Asia mainly because of its lower level of education. To defend this conclusion, it is necessary to provide some supplementary explanation of the large negative discrepancy in Sri Lanka. The single most plausible one is perceptions of risk arising from the country's prolonged civil strife, which may well have discouraged investors - particularly multinational electronics firms - from committing themselves on a large scale to developing skill-intensive export capacity.

Another apparent exception to the principal conclusion of this section, in the opposite direction, is India's rapidly growing exports of software and related services, which are much more skill-intensive than most of its

operations in East Asia, and part of it is explained by faster expansion of education in East Asia than in South Asia.

[19] Higher policy barriers to imports of intermediate goods in South than in East Asia are noted by Radelet *et al.* (1997).

[20] Many studies have shown that more educated workers have greater potential for learning during employment (e.g. Bartel and Sicherman 1995). Case studies of US electronics firms in Malaysia document their long-term investment in building up the skills of the local workforce (Hobday 1995).

[21] Our proxies were: (i) the trade policy measures described in Wood and Mayer (1998); (ii) the stock of direct foreign investment (tried also by Greenhill 1999); and (iii) various indicators of risk, including the International Country Risk Guide (ICRG) and the Euromoney country risk ranking. More details are available on request.

[22] In 1988-89, the ICRG overall risk rating for Sri Lanka was similar to Bangladesh, and worse than all countries in East Asia other than Myanmar. Pakistan was perceived as slightly less risky than Sri Lanka, but similar to the second and third most risky countries in East Asia, namely the Philippines and Indonesia, which also have large negative discrepancies in table 5.

other exports (Financial Times 1998). One reason for these exports is often suggested to be that India, despite its low literacy rate, has an unusually large supply of university graduates. However, this is not the case, at least in relative terms: the proportion of literate adults with tertiary education in India in 1990 was similar to the averages for both South and East Asia (table A2). It is more likely that the software sector in India has specific advantages over other sectors which more than offset the disadvantage of low levels of education, particularly widespread command of English, convenient location in terms of time zone, low cost of transport (by telecommunication) and minimal regulation.[23]

4 PROSPECTS AND POLICIES

What emerges from the analysis of the previous two sections is that the composition of South Asia's exports can be explained largely and simply by the composition of its resources. In comparison to other regions of the world, and relative to its supply of labour, South Asia has small supplies of skill (low levels of education) and of land (few natural resources). It thus tends to have a comparative advantage in labour-intensive manufactures, which use little of either skill or land per unit of labour, and it is indeed on this category of goods that South Asia's exports are concentrated. By contrast, the exports of East Asia, which has just as little land as South Asia but a higher level of education, also consist mainly of manufactures, but a larger share of them are skill-intensive.

Looking to the future, the implication of our analysis is that the composition of South Asia's exports is unlikely to change substantially unless or until its general level of education rises, relative to that of the rest of the world. The final clause of the preceding sentence is crucial: over the past forty years, levels of education in South Asia have risen absolutely, but as figure 3 showed, its position has not changed much by comparison with the rest of the world (rising more than Africa but less than East Asia), and it is on relative position that the composition of exports depends. So although the absolute level of education in South Asia will surely continue to rise in the future, the region's comparative advantage will shift from labour-intensive to skill-intensive manufactures only if its increase in education is faster than in the rest of the world - and, correspondingly, faster than in the past. This basic fact must be at the centre of any assessment of South Asia's long-term export prospects.[24]

Although most of our analysis has been limited to merchandise exports, the same basic fact is relevant to South Asia's prospects for exports of services. Like goods, services vary widely in skill-intensity, and within this broad spectrum, South Asia's comparative advantage tends to lie in labour-intensive activities, just as in manufacturing. An important difference, however, is that labour-intensive and skill-intensive manufactures are more or less equally tradable (involving similar transport costs and facing similar policy barriers), whereas labour-intensive services are less tradable than skill-intensive services. More precisely, the export of most labour-intensive services would require long-term physical presence in the importing country, which is severely

[23] Low transport costs and minimal regulation also assist another of India's successful export sectors, namely diamond cutting. The success of the software sector did not raise the share of services in India's total exports during the 1990s: its rapid export growth started from a small base, while merchandise exports also grew, more slowly but from a much larger base.

[24] The export projections in Pigato *et al.* (1997) are congruent with our analysis for most South Asian countries, in that they predict expansion to be concentrated on labour-intensive manufactures, but surprisingly, for India they predict substantial growth of more skill-intensive machinery exports, while for better-educated Sri Lanka they do not predict a shift towards more skill-intensive items.

restricted by immigration laws, while many skill-intensive services can now be exported through telecommunication and/or brief visits. As a result, South Asia's exports of services may be more skill-intensive on average than its exports of goods.[25]

This paper has focused on only one aspect of South Asia's exports - their commodity composition - and has neglected another important aspect, namely the overall size of these exports, relative to South Asia's total production (its openness) and to the exports of other regions. There is a striking conflict of evidence on the issue of South Asia's openness. Most studies of barriers to trade - transport costs as well as tariffs and quotas - have concluded that South Asia is an unusually closed region (e.g. Radelet *et al.* 1997; Pigato *et al.* 1997). This impression is shared by foreign businessmen: for example, buyers of footwear are deterred from sourcing in India by poor infrastructure and cumbersome customs clearance, which make it harder and slower to import components and to export the final product than in other countries (Schmitz and Knorringa 1999). In contrast, most econometric studies have found that trade/GDP ratios in South Asia are more or less what would be expected, given the large size, low income and location of the countries concerned - although these studies also find that trade/GDP ratios in East Asia are unusually high.[26]

But whether or not South Asia's exports are abnormally low relative to its GDP, they are certainly low relative to the exports of other countries. In 1996, the total merchandise exports of this region of 1.3 billion people were about $50 billion, which was less than the exports of Thailand, a country of 60 million people, one-third of the exports of China, with a similar-sized population, and 1% of the world's exports, as compared with South Asia's 22% of its population (World Bank 1998/99, Indicators Tables 1 and 20). In the global context, the smallness of South Asia's exports is a reflection overwhelmingly not of the smallness of its export/GDP ratio but of the smallness of its GDP (total and per capita). The key objective for the future must thus be to raise greatly the absolute levels of both exports and GDP.

For the next two or three decades at least, our analysis suggests that such an expansion of exports would and should be concentrated on labour-intensive manufactures. The world market for such goods is not attractive: competition is fierce, prices are low, and hence so are wages. But for most people in South Asia, these low wages would be well above what they now earn in subsistence agriculture, and for the region as a whole, there seems to be no other way of achieving, over the medium term, a really large increase in exports (although more skill-intensive sectors such as software can make a useful contribution to raising both exports and the earnings of the small minority of highly educated people in the region). Moreover, growth of South Asia's

[25] This conclusion is tentative, because there are, and will continue to be, exports of labour-intensive services through shipping, tourism, overseas construction and other temporary overseas employment (for example in the Middle East), while many skill-intensive services will remain difficult or costly to trade. The overall level of South Asia's service exports, relative to its merchandise exports, will depend also on the height of barriers to trade in services, relative to the height of barriers to merchandise trade.

[26] Radelet *et al.* (1997, tables 5a and 5b) obtain statistically insignificant coefficients on a South Asia regional dummy variable in cross-country regressions of export/GDP and import/GDP ratios on income, population and other variables, both in 1969-71 and in 1989-91, but obtain significant positive coefficients on dummy variables for the Four Tigers and Southeast Asia. Pigato *et al.* (1997, annex I.II) find that the actual values of trade/GDP ratios in South Asian countries are not generally or substantially lower than those predicted from cross-country regressions, whether calculated on the basis of official exchange rates or of PPPs. Similar calculations in Wood (1996), controlling only for country size, find export/GDP ratios in South Asia to be on average 5 percentage points lower than predicted, and in East Asia to be on average 27 points higher than predicted. In the trade/GDP regressions in UNCTAD (1998, table 48), the coefficient on a dummy for the East Asian NIEs is large (25-30 percentage points) and statistically significant (and we found a South Asia dummy to be insignificant).

labour-intensive manufactured exports will be assisted by the phase-out of the Multi-Fibre Arrangement, which could allow the region to capture a large share of global garment exports.

The policies needed to realise this potential are those which are now being pursued to some degree in all South Asian countries: lowering barriers to economic interaction with the rest of the world - which include not only tariffs, quotas and restrictions on foreign investment, but also inadequate infrastructure, particularly in transport. Bureaucratic regulation of economic activity is also a barrier, but perhaps a less serious one than is usually supposed, since bureaucracy did not prevent massive expansion of exports in China. Labour market regulations and institutions also require consideration, since the wage level needed to be competitive in world markets for labour-intensive manufactures, though above the earnings of most South Asian peasants, may be below the current earnings of many workers in the organised manufacturing sector.

A vital and widely-agreed long-term objective for South Asia is to raise its general level of education, without which it will not be possible to achieve a much higher level of income, nor to move on a large scale into more skill-intensive exports. The analysis in this paper has shown the importance of education as a determinant of export composition, but causation flows also in the opposite direction, from exports to skills, and it is essential to consider how policies on trade might contribute to, or conflict with, the aim of raising levels of education. This reverse causation operates through the effects of trade on the demand for educated labour. Whether and for how long parents choose to send their children to school, or to exert political pressure for the provision of more and better schools, depends partly on the wages and employment opportunities available to more-educated, as compared with less-educated, workers, which in turn depends partly on the level and pattern of foreign trade.

Most assessments of the causes of (and remedies for) the low level of literacy in South Asia focus on the supply side - the small number, poor quality and deficient management of the region's schools - taking for granted that the demand for education would be sufficient to ensure full use of improved schools. This assumption is questionable. The evidence on rates of return to education in South Asia is extremely limited, and gives little support to the conventional view that returns to basic schooling are generally high (Bennell 1998). Returns to education in agriculture were increased by the Green Revolution, but only in places whose climate and terrain were suitable for the new technology - and in those places the supply of education responded to the increased demand (Foster and Rosenzweig 1996). Moreover, the parts of South Asia which through supply-side effort have achieved high levels of literacy, notably Kerala and Sri Lanka, have not attained higher levels of output than the rest of the region. All this is consistent with a broader set of evidence that the economic returns to education are greater in changing and modernising environments, and all of it suggests that South Asia's low level of education must be due at least partly to lack of demand.

Reduction of barriers to economic interaction with the rest of the world would increase the demand for literate workers. Although the growth of exports would be mainly in labour-intensive (rather than skill-intensive) manufactures, firms which produce goods of this sort for world markets employ workers with basic schooling - primary or lower secondary - as is illustrated by the data on textiles in table 6 (see also Wood 1994: 95). Thus the sectors which would expand as a result of increased openness, though of low skill intensity by world standards and by comparison with other manufacturing sectors in South Asia, would require higher levels of education than in peasant agriculture, and so would raise the economy-wide demand for literate labour, encouraging more

parents to send their children to school and creating incentives for government at all levels to provide more and better schools. The magnitude of this effect would be limited in the three large South Asian countries by their size, which means that they will never be as open to trade as smaller countries, and hence that only a small proportion of their labour forces will ever be producing for export. But it would shift demand in the right direction, reinforcing other much-needed efforts to improve the supply of basic education.

In contrast to its likely impact on literacy, increased openness might reduce the demand for higher education. This is because expansion of labour-intensive manufactured exports would increase the demand for literate labour relative to both illiterate labour and more-than-literate labour (particularly workers with upper secondary and tertiary education). In absolute terms, the demand for more-educated workers might still rise: the growth of labour-intensive manufacturing, drawing labour mainly from subsistence agriculture and the informal sector, would probably create more jobs for highly-educated workers than would disappear through contraction of skill-intensive manufacturing as a result of more competition from imports.[27] However, the reduced relative demand for more educated workers would make parents less willing than they otherwise would be to keep their children in higher levels of schooling, and thus the supply of highly educated labour would tend to rise more slowly.

This is a basic problem for all countries which develop through exporting manufactures: the initial gains from labour-intensive exports are large, but affect the skill structure of the labour supply in ways which reinforce comparative advantage in goods of low skill intensity, and thus inhibit further progress (Wood and Ridao-Cano 1999). To overcome this problem requires government intervention to increase both the supply of and the demand for more skilled workers: on the supply side, support for expansion of higher education; and on the demand side, selective support for industries and activities which require highly educated workers. It was through a strategy of this sort that Japan, Korea and Taiwan succeeded in moving their manufactured exports up the ladder of skill intensity. Such a strategy requires a subtle mixture of openness and protection and of market forces and government intervention, and is thus far from easy to implement, but it deserves consideration also in South Asia.

[27] This concern about the effects of trade liberalisation on India is analysed and assessed more pessimistically by Nambiar and Tadas (1994).

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APPENDIX: COVERAGE AND SOURCES OF DATA

Our data set, containing 111 countries, consists of all countries with populations of over 1 million for which a complete set of trade and resource data is available. In section 2, the countries are grouped as follows:

South Asia (6 countries): Afghanistan, Bangladesh, India, Nepal, Pakistan, Sri Lanka.

East Asia (11 countries): Hong Kong, Singapore, South Korea, Taiwan (*first-tier East Asian NICs*); Indonesia, Malaysia, Thailand (*second-tier East Asian NICs*); plus China, Myanmar, Papua New Guinea, Philippines.

Africa (37 countries): Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zaire, Zambia, Zimbabwe.

Latin America (21 countries): Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

Middle East and North Africa (MENA: 14 countries): Algeria, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Libya, Morocco, Oman, Saudi Arabia, Syria, Tunisia, United Arab Emirates.

Developed countries (22 countries): Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, New Zealand, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

The following 41 countries are excluded from the NMH/NML regressions because the share of manufactures in their exports is under 10 per cent: Algeria, Angola, Benin, Bolivia, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Cote d'Ivoire, Ecuador, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Honduras, Iran, Iraq, Libya, Malawi, Mali, Mauritania, Myanmar, Niger, Nigeria, Oman, Paraguay, Papua New Guinea, Rwanda, Saudi Arabia, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Zaire, Zambia. In addition, we excluded Mozambique, whose high manufactured export share appears to be the result of errors in the data (Wood and Mayer 1998)

Data on service exports are unavailable or incomplete for the following 12 countries: Afghanistan, Guinea-Bissau, Hong Kong, Iraq, Liberia, Myanmar, Saudi Arabia, Somalia, South Africa, Taiwan, Uganda and United Arab Emirates.

Sources of export data

Data on manufactured exports were taken from the United Nations COMTRADE data tape, and data on primary exports from the UNCTAD ETS data tape (except for gold, on which data were taken from the UNCTAD *Handbook of World Mineral Trade Statistics, 1990-1995*, United Nations: New York and Geneva, 1997).

To combine these two sources of data, we used the share of manufactures in total merchandise exports from the COMTRADE database, and divided the (residual) primary export share into more detailed categories using the proportions in the ETS database. The COMTRADE database provides a subdivision of manufactures. We use manufactured exports from the South African Customs Union (SACU) as a proxy for manufactured exports from South Africa, and are obliged to omit the other member countries of SACU. For a detailed discussion of the classification of exports by product categories, see Wood and Mayer (1998, annex 1).

The most recent year for which a complete set of merchandise export and resource data is available is 1990. The export data were averaged over the three years 1989-91, except for Germany (1988-1990) and the following countries (two-year averages over 1988-1989): Afghanistan, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Congo, Côte d'Ivoire, Dominican Republic, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Haiti, Iran, Iraq, Liberia, Mauritania, Mozambique, Niger, Rwanda, Sierra Leone, Somalia, Sudan, Uganda, Tanzania, Zaire, and Zambia.

Definition and sources of resource variables

Skill per worker (h) is average years of schooling per adult (15 and over) in 1990. For most countries, the source is Barro and Lee (1996). However, for 5 MENA countries (Libya, Morocco, Oman, Saudi Arabia and United Arab Emirates) and 12 African countries (Angola, Burkina Faso, Burundi, Chad, Côte d'Ivoire, Ethiopia, Gabon, Guinea, Madagascar, Mauritania, Nigeria, and Somalia), the values of this variable were estimated from data in UNDP (1992) on the average years of schooling of the over-25 population in 1990 (for details, see the appendix of Wood and Mayer 1998).

Land per worker (n) is the ratio of land area to population aged 15 and over (square kilometres per adult), calculated from land area data on the World Bank Stars data tape and population data from Barro and Lee (1996) and United Nations (1994).

Country size, or total labour force, (p) is adult population (in thousands, from Barro and Lee (1996) and United Nations (1994)).

The units of the resource variables given above are those which were used in our regressions. In some of the tables and figures, the units are changed, to make the numbers easier to grasp.

Table A1:
Service exports as share of all exports (services plus merchandise), 1990: percentages

	Total services	of which	Transport services	Travel services	Other services
SOUTH ASIA					
Afghanistan	3.1				
Bangladesh	19.9		1.9	1.0	17.1
India	20.7		4.2	7.3	9.1
Nepal	49.8		2.3	26.3	21.2
Pakistan	20.0		9.7	2.3	8.0
Sri Lanka	19.9		7.5	5.4	7.0
Regional average	22.2		5.1	8.5	12.5
excluding AF	26.0		5.1	8.5	12.5
excluding AF and NE	20.1		5.8	4.0	10.3
EAST ASIA					
China	10.1		3.8	3.3	3.1
Hong Kong					
Indonesia	8.3		0.2	7.3	0.8
Korea	14.8		5.1	4.1	5.7
Malaysia	11.3		3.8	4.6	2.9
Myanmar	23.0				
Papua New Guinea	14.6		1.4	1.5	11.7
Philippines	28.9		2.1	4.3	22.6
Singapore	18.3		3.3	6.4	8.7
Taiwan					
Thailand	21.3		4.3	14.0	2.9
Regional average	16.7		3.0	5.7	7.3
excluding MY	16.0		3.0	5.7	7.3

Source: IMF *Balance of Payments Statistics Yearbook* 1997

Table A2:
Educational attainment of adult (over-15) populations of Asian countries, 1990

	Percentage with some education (literacy rate)	Percentage of literate population (with some education) who have:	
		Tertiary education (some or complete)	Tertiary or complete secondary education
SOUTH ASIA			
Afghanistan	18.5	15.1	20.5
Bangladesh	40.5	4.9	15.1
India	44.2	8.1	20.6
Nepal	27.8	7.9	15.5
Pakistan	48.1	4.0	38.3
Sri Lanka	87.0	2.1	17.8
Regional average	44.3	7.0	21.3
EAST ASIA			
China	77.8	2.4	19.8
Hong Kong	87.2	12.9	49.1
Indonesia	80.3	2.1	7.8
Korea	92.0	15.1	63.8
Malaysia	80.6	4.1	18.9
Myanmar	57.4	4.2	13.4
Papua New Guinea	41.1	1.7	6.3
Philippines	92.3	21.8	31.3
Singapore	76.5	5.6	18.7
Taiwan	87.6	16.2	37.6
Thailand	84.0	8.7	11.9
Regional average	77.9	8.6	25.3

Source: Barro and Lee (1996). The percentage with some education is calculated as 100 minus the percentage stated to have 'no education' (who are assumed to be illiterate).

Table A3:
Results of the predicting regressions

	Dependent variable	Constant	Coefficients on independent variables			R-squared	No. of countries
			h	n	p		
(1)	NM / BP	-7.32 (-7.3)	1.60 (7.3)	-0.52 (-4.7)	0.24 (2.1)	0.59	94
(2)	NM / BP	-7.33 (-8.0)	1.15 (5.5)	-0.71 (-6.9)	0.28 (2.6)	0.66	86
(3)	NMH / NML	-2.90 (-5.5)	1.40 (4.8)			0.31	54
(4)	NMH / NML	-5.06 (-5.3)	1.27 (4.5)	-0.20 (-2.1)	0.19 (2.0)	0.41	54

Notes: Dependent variables are export ratios. NM = narrow manufactures; BP = broad primary (= PP + NP); PP = processed primary products; NP = unprocessed primary products; NMH = skill-intensive manufactures; NML = labour-intensive manufactures; h = skill per worker (average adult years of schooling); n = land per worker (square kilometres per adult); p = total adult population (thousands). All variables are expressed in natural logarithms. t-statistics in brackets. Regressions (1), (3) and (4) are the same as those in table 2 except that all Asian countries are omitted from the data. Regression (2) omits, in addition, eight African countries (Burundi, Gambia, Ghana, Malawi, Nigeria, Rwanda, Sierra Leone and Uganda) for reasons explained in the text.

Table A4:
Actual and predicted export composition (alternative estimates) of Asian countries, 1990
percentages and percentage points

	Share of manufactures in total exports			Share of skill-intensive goods in manufactured exports		
	Actual	Predicted	Actual minus predicted	Actual	Predicted	Actual minus predicted
SOUTH ASIA						
Afghanistan	37	4	33	11	8	4
Bangladesh	77	46	32	5	32	-26
India	72	70	2	41	55	-14
Nepal	83	12	71	1	14	-13
Pakistan	76	49	27	3	43	-40
Sri Lanka	53	63	-9	12	50	-38
EAST ASIA						
China	73	76	-3	33	65	-32
Hong Kong	96	93	2	39	73	-34
Indonesia	36	53	-17	11	47	-36
Korea	93	87	6	42	72	-30
Malaysia	55	42	13	70	42	29
Myanmar	6	19	-13			
Papua New Guinea	8	4	5			
Philippines	68	70	-3	31	58	-27
Singapore	73	83	-11	80	56	24
Taiwan	93	81	11	44	64	-19
Thailand	61	56	4	41	49	-7

Notes: Predicted shares based on coefficients of regressions 1 and 4 in appendix table A3. Discrepancies between 'actual minus predicted' and 'actual' minus 'predicted' are due to rounding.

Table A5:
Export composition of Asian countries, most recent available year

	Year	Share of manufactures in total exports %	Share of skill-intensive goods in manufactured exports (%)	
			Total	of which SITC 75-77
	1	**2**	**3**	
SOUTH ASIA				
Afghanistan	1988-89	36.9	11.4	0.9
Bangladesh	1996	87.5	4.0	0.1
India	1996	74.0	38.7	3.9
Nepal	1997	89.4	2.4	0.0
Pakistan	1997	86.1	2.9	0.1
Sri Lanka	1994	70.2	9.2	2.8
Regional average		74.0	11.4	0.9
EAST ASIA				
China	1997	86.7	34.4	20.6
Hong Kong	1997	95.6	41.8	26.1
Indonesia	1997	55.4	22.3	12.7
Korea	1997	88.1	61.2	33.3
Malaysia	1997	78.5	77.3	64.8
Myanmar	1992	5.8	5.6	3.3
Papua New Guinea	1993	3.4	59.9	2.3
Philippines	1997	87.6	35.5	31.6
Singapore	1998	86.9	86.1	67.0
Taiwan	1996	94.3	58.3	39.5
Thailand	1997	73.3	60.7	41.5
Regional average		68.7	49.4	31.2

Source: COMTRADE. More recent data for Afghanistan unavailable.