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Prospects for Skills-based Export Growth in a Labor-abundant, Resource-rich Developing Economy

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In an integrated global economy, specialisation in trade is an increasingly prominent strategy. A labor-abundant, resource-rich economy like Indonesia faces stiff competition in labor-intensive manufactures; meanwhile, rapid growth in demand for resources from China and India exposes it to the 'curse' of resource wealth. This diminishes prospects for more diversified growth based on renewable resources like human capital. Using an international panel data set we explore the influence of resource wealth, foreign direct investment and human capital on the share of skill-intensive products in exports. FDI and human capital increase this share; resource wealth diminishes it. We use the results to compare Indonesia with Thailand and Malaysia. Indonesia's reliance on skill-intensive exports would have been greater had it achieved higher levels of FDI and skills. Its performance in accumulating these endowments, and its relative resource abundance, impede diversification in production and trade. We present policy options flowing from these findings accommodated.

JEL codes: F16, F17, J24
Keywords: developing economy, skill-intensive export, factor endowments, human capital

1 Introduction

Indonesia is an important case study in economic development both by virtue of its size (it is the world's fourth most populous nation) and for the lessons it may offer to other countries. One of the world's poorest and least promising economies in the 1950s, it has had an impressive record of growth and structural transformation since the establishment of the New Order government (1966–98). Fifteen years ago, in a stunning vindication of the economic gains of the New Order era, Indonesia (along with Southeast Asian neighbours Singapore, Malaysia and Thailand) was included in the group of so-called high-performing Asian economies (HPAEs) whose growth successes defined the 'East Asian miracle' (WORLD BANK 1993). For the half-decade 1993–97, Indonesia's per capita income placed it among the lower-

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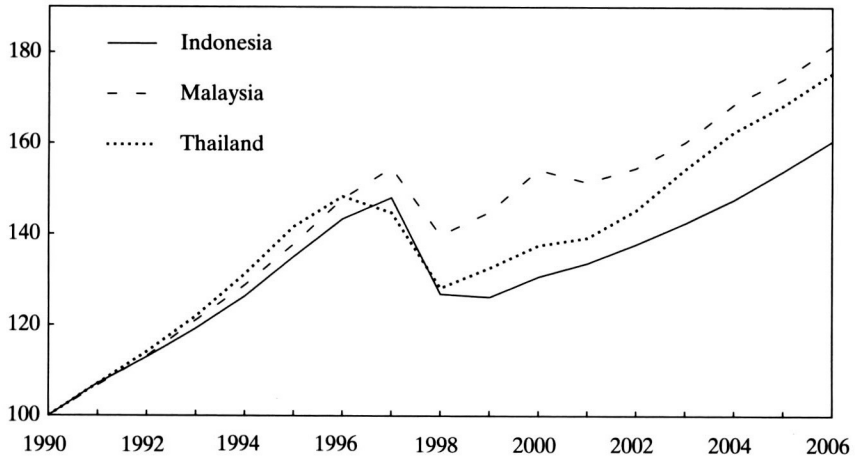
middle income economies – a position it relinquished during the Asian crisis but regained in 2003 (WORLD BANK 2008).

Figure 1: Growth of Per Capita GDP (PPP basis; 1990 = 100)[a]



[a] PPP = purchasing power parity.

Source: World Development Indicators Online.

Despite these gains, Indonesia's recent growth has been persistently slower than that of its closest HPAE comparators, Malaysia and Thailand. Taking 1990 as a base, Figure 1 shows that by 2006 Indonesia's per capita income, measured in PPP (purchasing power parity) adjusted dollars, had grown by 61%; Thailand's by 76%, and Malaysia's by 81%. The ratio of Indonesia's per capita income to that of Thailand had fallen from over 48% to 44%, and the ratio for Malaysia from 40% to 35%. While Indonesia's growth record is healthy by the standards of developing economies worldwide, a puzzle remains as to why its performance within the dynamic East and Southeast Asian region has lagged behind.

What explains this regional growth difference? Is there any evidence of a long term slowdown in Indonesia's growth rate, either now or in the future? What would it take for Indonesia to reach the 'next level' – upper-middle income status – or at least to consolidate its position in the lower-middle income group? Obviously, there are many ways in which these questions can be framed and answered. In this paper we focus only on Indonesia's growth challenges and opportunities as a trade-dependent economy, one that has abundant endowments of natural resources and labor

and is also a participant in the dynamically growing Asian regional trade in manufactures. In particular, we focus on the likely interactions between resource abundance and the prospects for growth through participation in the booming regional trade in skill-intensive parts and components. What can we learn about Indonesia from an examination of international and regional data? What policy lessons can be drawn, for Indonesia or for other developing nations?

We first explore the particular growth challenges faced by economies abundant in labor and natural resources within a global economy that is increasingly integrated, that rewards specialisation but that is increasingly dominated by some very large developing-country players, notably China. We continue with a quantitative international comparison based on a broad group of countries, and a more detailed examination of the Indonesian case within the Southeast Asian regional context. Our analysis is intended to shed light on whether a resource-rich economy like Indonesia might really face a 'middle income trap' and, if so, what policy steps may be needed to escape it. The final section of the paper identifies some preliminary policy implications.

2 Factor endowments and comparative advanatage in the short and long run

Could pursuit of comparative advantage within an ever-larger and more closely integrated global market impose a barrier to the growth of some developing economies? At first, the very question seems paradoxical; after all, economists believe that by following comparative advantage a small open economy gains from specialisation, which is associated with enhanced opportunities for economic growth. However, this view is subject to a number of challenges that seem relevant to the present-day Indonesian case.

2.1 The 'curse' of natural resource abundance

A price-taking country with comparative advantage in non-renewable or depletable natural resources will optimally exhaust its stocks, because domestic scarcity will not be reflected in prices derived from global markets. The phenomenon of weak property rights in natural resources – common in developing countries – generates even faster rates of depletion. Moreover, resource-based export growth may reduce the prospects for future

economic growth and diversification. The claim that natural resource abundance contributes to low growth rates among developing economies has been given empirical support in several prominent papers – notably, though not exclusively, by SACHS and WARNER (1999, 2001). Several explanations have been offered for this apparent paradox. First, the 'Dutch disease' effects of natural resource exports can inhibit growth in all other tradable sectors because of competition for labor and capital from resource sectors and secondary, demand-driven expansion in non-traded sectors (CORDEN and NEARY 1982).[1] The losers will typically include manufacturing, a sector whose expansion is commonly believed to generate positive productivity externalities giving rise to increasing returns. Slower growth in manufacturing then reduces the economy's potential for dynamic growth. Second, specialisation in natural resource sectors may reduce returns on human capital investment, and thus diminish incentives for educational attainment (GYLFASON 2001a). Resource- abundant countries in which this occurs will then find it more difficult to climb product variety or quality ladders in manufacturing, where human capital inputs are employed with increasing intensity on each successive rung. Third, lower growth rates have also been attributed to the destabilising macroeconomic consequences of 'Dutch disease'. Resource booms cause relative shrinkage in the output of non-resource tradable sectors, while resource and non-tradable sectors expand. Consequently, the shares of resources and non-tradables in GDP increase, as does the share of resources in total trade. This has the effect of heightening vulnerability to global market shocks. In world markets, commodity prices fluctuate much more than do the prices of other goods, so both relative prices and incomes in the domestic economy become less stable. It is in the nature of non-tradable sectors that adjustment to demand or supply shocks also takes place disproportionately through price fluctuations (HAUSMANN and RIGOBON 2002). Thus, both price and income instability and unpredictability of returns on investments are magnified in resource dependent developing economies.

Such effects are of course not automatic, but rather are conditional on particular configurations of policies and institutions (HUMPHREYS, SACHS and STIGLITZ 2007). A large literature attributes development failures in resource-abundant economies to institutional weaknesses, whether these are due to colonial legacies (ACEMOGLU, JOHNSON and ROBINSON 2002), ethnic

1 'Dutch disease' is '[t]he deindustrialisation of a nation's economy that occurs when the discovery of a natural resource raises the value of that nation's currency, making manufactured goods less competitive with other nations, increasing imports and decreasing exports. The term originated in Holland after the discovery of North Sea gas' (Internet: http://www.investorwords.com as of August 22, 2008).

divisions (EASTERLY and LEVINE 1997) or other causes. Some recent political economy papers argue that resource wealth itself contributes to the degradation of the rule of law and the institutions of governance and policy making, in effect by promoting the ascendance of the 'predatory state' over the 'developmental state' – either by actively encouraging the former through corruption related to resource rents, or by undermining the latter when revenue flows associated with resource extraction become the dominant source of income (AUTY 2001; MURPHY, SCHLEIFER and VISHNY 1993). Arguments of this type have been made with particular force in case studies of Latin America and sub-Saharan Africa (ACEMOGLU, JOHNSON and ROBINSON 2002, 2004). MAURO (1995) has uncovered a statistically significant negative relationship between corruption and investment.

The quality of development policy, including that intended to strengthen governance and the rule of law, may also be negatively affected by natural resource wealth. GYLFASON (2001a, 2001b) has argued that the sudden increase in income that follows a natural resource discovery may reduce the perceived need for sound economic management and institutional quality. The boom may also create a false sense of economic security and weaken the perceived need for investment and growth promoting strategies. In resource-abundant economies, politically powerful interest groups use rents to gain political and economic power, and this is usually against the public interest (MAURO 1995; SACHS and WARNER 1999; LEITE and WEIDMANN 1999; GYLFASON 2001b; TORVIK 2001). ISHAM et al. (2005) argue that because revenue from resources is unearned income, the diminished need to raise revenue from taxes on earned income means that the state in a resource-rich economy has less incentive to develop efficient and accountable institutions of public finance. There is also less incentive for citizens to demand mechanisms of accountability or to create the 'horizontal social associations that many feel are the "preconditions" of democracy ...'. With unearned revenues, moreover, the state 'can mollify dissent through a variety of mechanisms (buying off critics, providing the population with benefits, infrastructure projects, patronage or outright graft)', and also 'has resources to pursue direct repression and violence against dissenters'. In a recent econometric exercise, ATKINSON and HAMILTON (2003) found that resource abundance has a significant negative effect on economic growth only in countries where government revenues from resource rents are directed toward consumption rather than investment, leading to low rates of genuine (that is resource wealth adjusted) savings. They conclude that institutions that are sufficiently robust to prevent the dissipation of resource rents on current consumption might avert the 'resource curse'.

Table 1: Revealed Comparative Advantage (RCA) Measures for Labour-intensive Product Categories (2000–04 average)[a]

Product Category	SITC[b] Code	Revealed Comparative Advantage					
		Indonesia	China	Malaysia	Philip-pines	Thailand	Vietnam
Travel goods, handbags etc.	83	0.87	5.12	0.06	2.48	2.00	4.33
Clothing & accessories	84	2.28	4.12	0.68	2.15	1.61	3.88
Footwear	85	3.02	4.59	0.13	0.24	1.51	13.42

[a] RCA values greater than 1 indicate comparative advantage.

[b] Standard International Trade Classification

Source: Coxhead (2007).

2.2 Exogenous changes in comparative advantage

Indonesia is also a labor-abundant economy, and in the past has used this feature to good effect, building large export-oriented sectors in low-skill, labor-intensive activities such as garment and footwear manufacture. Even within East and Southeast Asia, however, Indonesia faces intense competition in the markets for these products, especially from emerging low-wage producers such as China and Vietnam. Countries that depend on exports of low-skill, labor-intensive products have been shown to be directly and negatively affected by competition from China – the largest exporter by far in these product categories – in trade (EICHENGREEN, RHEE and TONG 2004) and investment (EICHENGREEN and TONG 2005). Regional measures of revealed comparative advantage (RCA), which show the share of each product in a country's exports relative to the share of that product in world exports, indicate the degree to which Indonesia's comparative advantage is shared with its neighbours. Table 1 illustrates this with RCA data for 2000–2004.

Of course, the growth of large developing economies such as China also creates significant market opportunities, and in the past decade Indonesia, like many other countries, has seen its exports to China grow much faster than total exports. However, the composition of those exports reflects complementarities between the two countries. Indonesia's exports to China are

overwhelmingly dominated by agriculture, fisheries, minerals, timber and other natural resources, and by semi-processed manufactures based on these; labor-intensive manufactures hardly feature (COXHEAD 2007). On the basis of these data one author has suggested quite strong prescriptions:

> ... Indonesia, facing sharp competition in international markets from other, rapidly industrialising countries, notably China, can no longer continue to rely on its traditional sources of comparative advantage, including its large supplies of relatively cheap, but mostly low-skilled labor and its natural resources. In fact, in view of the large overlap of China's and Indonesia's labor-intensive exports ... Indonesia is highly vulnerable to China's strong export competitiveness ... particularly in labor-intensive manufactured exports. Indonesia will therefore have to develop a more sustainable source of comparative advantage in order to raise the international competitiveness of its manufacturing industries (THEE 2005, p. 218).

2.3 'Fragmentation trade' and endogenous growth

Endogenous growth theory is constructed around the idea that some forms of growth generate increasing returns or positive externalities, such that the economy can grow in sustained fashion rather than converging on a steady state in terms of per capita income. This idea is typically articulated in the single-sector context of aggregate growth models. Several contributions, however, locate endogenous growth in a two-sector or multi-sector context, and some of these provide reminders of the dynamic costs of 'Dutch disease' and related 'resource curse' phenomena (VAN WIJNBERGEN 1984; MATSUYAMA 1992; SACHS and WARNER 1999). In these models, the expansion of a resource-intensive sector such as oil or forestry has 'Dutch disease' effects that reduce productivity in activities that rely more heavily on capital, skills or technology, and whose expansion is associated with endogenous growth processes such as productivity spill-overs. When those sectors contract, there is a loss (or, rather, a failure to emerge) of productivity spill-overs or learning-by-doing effects, and of scale-related cost reductions associated with them. VAN WIJNBERGEN (1984), for example, advances the hypothesis that the level of activity in manufacturing raises future factor productivity through learning-by-doing effects. A resource boom reduces manufacturing sector output through the familiar 'Dutch disease' mechanisms, and this in turn lowers the potential for productivity growth in the future. The economy's capacity for diversification away from resource dependence toward

higher-productivity activities in more skill-intensive sectors is reduced. This will be important from a welfare point of view when natural resources are subject to increasing extraction costs or outright exhaustion, since the economy's level of specialisation in natural resource sectors cannot be sustained in the long run. The inter-temporal effects of 'Dutch disease' appear in VAN WIJNBERGEN's model in the form of 'unlearning by not doing', as it were, with consequences for future rates of economic growth.[2] Institutional weaknesses, although they are not elucidated in the models just cited, can also play a role, since they reduce the capacity to manage natural resource assets for the long term, to provide public goods and to overcome coordination failures in the supply of education and training. Thus weaker institutions create a higher premium on good development policies in the present.

The importance of skill and technology upgrading is most clearly demonstrated in Asia by the rapid growth of 'fragmentation trade'. When international trade is costly, it is efficient to develop production processes that are vertically integrated within the borders of a national economy. Recently, however, the lowering of transport costs and policy barriers to international trade has led to explosive growth in semi-finished manufactures. In the new global economy, components of manufactured products are produced in many locations, depending on cost, and assembly of final products takes place elsewhere. To middle income countries, the brightest feature of China's growth has been the expansion of its demand for knowledge-intensive and skill-intensive products, many of them unfinished goods ('parts and components'), which are then assembled into final products in Chinese factories. Countries (including Malaysia and Thailand) that have discovered comparative advantage niches within the parts and components market are finding their trade accounts flourishing along with the expansion of Chinese demand for imported intermediate goods.

The usual reasoning from Ricardian comparative advantage theory indicates that global welfare is enhanced by fragmentation. As with conventional trade liberalisation, however, fragmentation can produce losers as well as gainers. Losses can occur when a country with comparative advantage in an integrated production process loses market share to others with

2 This analysis is a precursor to endogenous growth models in which expansion of high-skill industries has positive productivity spill-overs, which raise returns to skilled labor and induce additional investments in human capital. But human capital investments are financed by profits earned from production in lower-skill industries. So faster growth in lower-skill industries accelerates growth along with structural change (expansion of higher-skill output); conversely, lower world prices for lower-skill manufactures reduce profits, and thus reduce the rate of growth and structural change.

specialised capabilities, either in the production of parts and components or in the assembly of the final product (JONES and KIERZKOWSKI 2001; MARKUSEN and VENABLES 2007).[3] Parts and components production tends to be intensive in skills and technology, while assembly is labor-intensive; therefore, the countries most at risk of losing from growth of fragmentation trade are those with intermediate endowments of both unskilled labor and human capital. As parts and components trade expands, a lower middle income country like Indonesia could see its comparative advantage in manufacturing sectors eroded by the growth of trade between specialist countries like Malaysia (supplying high-tech intermediates) and China (providing assembly services), causing it to lose investments in the second industry and not to gain them in the first. This speculation is supported by recent empirical studies showing that China's expansion has had beneficial effects on trade and foreign direct investment (FDI) in upper-middle income economies, but has greatly intensified the competition for global market share and FDI among less advanced economies (EICHENGREEN, RHEE and TONG 2004; EICHENGREEN and TONG 2005).

2.4 A middle income trap?

To sum up, the developing countries whose long-term growth prospects are most at risk in the current global economy are those that compete at the labor-intensive end of their manufacturing spectrum with low-income economies; that have little or no complementarity with those economies as suppliers of more skill- intensive parts and components; and that either have a high dependence on imported energy and raw materials or have exhaustible natural resource wealth but lack robust institutions to manage its extraction and the disposition of the associated rents. These economies may be experiencing a variant of what the WORLD BANK (2007) has termed the 'middle income trap', albeit one with features more specific to lower-middle income economies than to those economies (mainly in Latin America and Eastern Europe) aspiring to make the transition from middle to high income. The key challenges, however, are generically the same:

> History shows that while many countries have been able to make it from low income to middle income, relatively few have carried on to high income ... A lot of complex challenges have to be met, from rais-

3 As JONES and KIERZKOWSKI (2001) put it, 'an Olympic gold winner in a mixed event, such as the decathlon ... might return with no medals if the event is broken down into separate components'.

> ing the skills and innovativeness of the labor force, to creating sophisticated financial systems, to maintaining social cohesion, to greatly reducing corruption. Without these sorts of tough policy and institutional changes, countries stay where they are, unable to bust out of middle income. (WORLD BANK 2007, web summary)

The foregoing discussion is a reminder that mere engagement with the global economy is not a sufficient condition for sustained economic growth. Natural resource exhaustion, 'Dutch disease' and the 'resource curse', and the emergence of competitor economies large enough to alter export prices in world markets all pose threats to growth strategies based on the pursuit of comparative advantage alone. To escape such a trap requires actions and policy decisions that dynamically 'build' comparative advantage in more skill-intensive (and more highly differentiated) activities. This is a well-trodden development path in East Asia, though of course the specific strategies by which changes in comparative advantage have been pursued vary widely.[4] The same World Bank study describes the challenge in general terms as follows:

> [C]ountries that are successfully making a transition towards high income status begin to specialize in selected areas where they are able to achieve economies of scale and technological leadership. Accompanying this change are a whole host of complex transitions, for example, substantial increases in the proportion of people with tertiary education and specialized skills, the transition from economies that largely absorb knowledge from abroad to ones that are also a source of innovation, the development of deep financial systems that provide a diverse range of services, the movement of much of the population into livable cities, among many others. At the socio-political level, successfully transitioning countries are able to maintain a certain level of social cohesion, avoiding the emergence of deep inequities of the kind that fuel social conflict and political instability and stall growth. Clean government and rule of law become the norm, while corruption becomes the exception. (WORLD BANK 2007, p. 26)

This list of conditions is clearly neither complete nor rigorous (for example, it is hard to imagine that urbanisation is anything but an endogenous response to other economic changes), but its characterisation of supply-side

4 COLLINS and BOSWORTH (1996) provide an excellent overview of the mid-1990s blossoming of scholarly studies on this subject.

requirements – skills, capacity to use knowledge in creative ways, and macroeconomic stability – is widely agreed. Asia provides several examples of countries that have achieved upper-middle income status despite high inequality and deep social divisions – Malaysia is one – but none has succeeded without overcoming these supply-side constraints. While the mix varies greatly, the combination of skilled domestic labor and new technologies (principally though not exclusively supplied through FDI) is common to all East Asian success stories. Motivated by this fact, the next section of this paper explores possible relationships between country characteristics and the relative importance of net exports of skill-intensive products in total exports.

3 Skill-intensive exports: international evidence

Is there any empirically observable relationship between an economy's endowments of productive factors and natural resources and its degree of specialisation in skill-intensive exports? There is no obvious answer to this question, and as with the empirical growth literature, there is little clear theoretical guidance beyond that presented in highly stylised models of the kind referred to in the previous paragraphs. In this section we present an econometric exercise aimed at explaining the skill intensity of exports in a panel of country data. The total value of world exports of high-technology goods, according to the World Bank's *World Development Indicators,* is somewhat more than one trillion dollars. In 1999, developing countries accounted for almost 16% of the total, a share that had risen steadily to 22% by 2003, the last year for which such data are available. Nearly all the developing country exports come from a small group of countries in East and Southeast Asia and Latin America. The United Nations Comtrade database provides usable export data for 106 countries (Appendix A); from these we can construct an unbalanced panel spanning 1980–2005. We are interested in *net* exports of high-tech goods; with the growth of the parts and components trade, a country may appear to be a significant exporter of skill-intensive goods when in fact it serves merely as an assembly-line for final products whose skill-intensive inputs are sourced elsewhere.

Therefore, in order to interpret the skill intensity of exports as a measure of the skills endowment of an economy, we must also take into account imports of skill-intensive parts and components. We construct a measure of the net skill intensity of exports as follows. We first obtain the value of all exports in the first category shown in Table 2 (high-skill-intensive products).

We then compute the value of imports of all *intermediate* goods from the first category, where intermediates are defined principally by the use of the terms 'parts' or 'components' in the product description.[5] We then deduct the value of imports from that of exports, and divide this value by total merchandise export value to obtain the desired metric.[6]

Table 2: Products Used in Calculating Skill Intensity of Exports

Product by Skill Intensity		SITC[a] code
High	Aircraft & spacecraft	95
	Pharmaceuticals	54
	Office, accounting & computing machinery	75, 87, 88
	Radio, TV & communications equipment	76, 77
	Medical, precision & optical instruments	87, 88
Medium-high	Other electrical machinery & apparatus	81
	Motor vehicles, trailers & semi-trailers	71
	Chemicals, excluding pharmaceuticals	51, 52, 53, 55–59
	Railroad equipment & other transport equipment	78, 79
	Other machinery & equipment	72, 73, 74
Medium-low	Coke, refined petroleum product & nuclear fuel	23, 32–35
	Rubber & plastics products	23, 62
	Other non-metallic mineral product	28
	Building & repairing of ships & boats	
	Basic metals	67, 68
	Fabricated metal products, excluding machinery	66, 69, 96, 97
Low	Other manufacturing & recyclin	82, 89
	Wood, pulp, paper & printed products	24, 25, 63, 64,
	Food products, beverages & tobacco	00–12, 22, 29, 41, 42
	Textiles, textile products, leather & footwear	21, 26, 61, 65, 83, 84, 85

[a] Standard International Trade Classification

Figure 2 shows the resulting data for some of the most prominent skill-intensive developing country exporters. For all countries in this group other

5 Intermediate goods in the 'High' category in Table 2 have the following 1992 Harmonised System (HS-1992) Codes: 8503, 850490, 850690, 850790, 850870, 850990, 851090, 851190, 851290, 851390, 851490, 851590, 851690, 851770, 851890, 8522, 8529, 853190, 853290, 853390, 8538, 853990, 854091, 854190, 854390, 8803, 880400, 9002, 900390, 900590, 900691, 900699, 900791,900792, 900890, 901090, 901190, 901290, 901390, 901490, 901590, 901790, 901811, 901819, 901819, 901820, 901831, 901890, 902290, 902490, 902590, 902690, 902790, 902890, 902990, 903090, 903190, 903290, 903300, 911190, 9114, 9209, 9305, 930690, 930700.

6 Total merchandise export value is the sum of a country's total merchandise exports to the rest of the world, using SITC codes 00–97.

than China, the 1990s-era expansion in the export share of high-tech products has not been sustained in the new millennium. Some have seen pronounced falls in the contribution of high-tech products to total exports. In other countries such as Indonesia, net export shares have remained roughly steady since about 2000. In China, meanwhile, the net high-tech export share quadrupled between 1992 and 2005, from 9% to 36% of total merchandise exports.

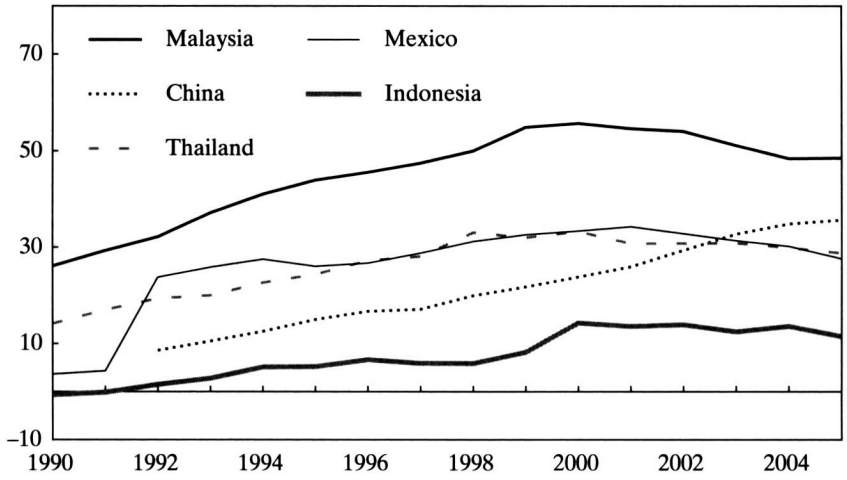
We hypothesise that the net skill intensity of exports should be higher in economies that have larger relative endowments of human capital, and in those that are hosts to relatively large FDI stocks. The role of FDI as a source of innovation and a stimulant of skills-based activity in tradables sectors is well established in empirical studies (for example HAUSMANN, HWANG and RODRIK 2007). The level of a country's FDI stock is also likely to reflect macroeconomic conditions that determine the general attractiveness of a country's investment climate (FRANKEMA and LINDBLAD 2006).

For human capital we use the BARRO and LEE (2001) measure, the percentage of the population aged 25 and over with post-secondary education.[7] Since FDI can be directed to many sectors, and in the absence of reliable data on the sectoral distribution of FDI by country and year, we make the assumption that sectoral FDI stocks in a given country are proportional to GDP shares. In the econometric analysis, therefore, we multiply initial FDI stocks in each period by the GDP share of manufacturing, in the hope that this adjustment better captures the amount of foreign capital going into this part of the economy rather than into property, mining, energy or services such as tourism.[8]

7 This measure does not discriminate by type of post-secondary qualifi cation or by quality. We were unable to obtain more detailed data with coverage adequate for a panel of countries.

8 Obviously this adjustment is very crude: it ignores sectoral capital intensity, bundling of investments with technology or training, and many other relevant phenomena including the allocation of FDI within manufacturing. Some diffi culties in constructing cross-country comparisons of FDI are raised in ANDERSON and RAND (2003). The validity of our results using this adjustment method depends on the adjusted figures being correlated with the true data.

Figure 2: Net High-tech Share of Total Merchandise Exports, Selected Countries (%)



Source: Authors' computations from Comtrade data.

Most contributions to the empirical 'resource curse' literature employ the standard aggregate growth model, testing hypotheses about the effects of resource wealth on the long-run average growth rate of GDP per capita in linear regression models (for example SACHS and WARNER 1999, 2001). Our variant on the 'resource curse' hypothesis is one step removed from growth models and, rather than examining the resource wealth–GDP growth relationship directly, predicts instead that the net skill intensity of exports will be lower, other things being equal, in economies with relatively abundant natural resource wealth.

Finally, we also surmise that, for the reasons given above, the relative strength of institutions may influence the net skill intensity of exports, particularly in resource-rich developing economies. We use the 'law and order' variable from the Political Risk Services International Country Risk Guide (ICRG) database to proxy for institutional robustness.

Table 3: Summary Statistics of Continuous Variables

Variable	Unit	Mean	Std Dev.	Min.	Max.	Obs. (N)	Coun-tries	Ave. Obs.
Net skill intensity of exports	% of exports	0.09	0.15	–0.35	0.63	269	103	2.61
FDI stock	% of GDP	0.03	0.06	–0.01	0.93	380	101	3.82
Arable land	Ha/person	0.30	0.38	0.00	3.00	401	105	3.82
Oil reserves[a]	% of GDP	1.54	3.96	0.00	28.84	241	90	2.68
Post-secondary education	% of population over 25	0.10	0.09	0.00	0.53	397	105	3.78
Law & order	Low = 0; high = 6	3.90	1.56	0.00	6.00	322	97	3.32
Population	Billion	0.05	0.16	0.00	1.26	406	106	3.83
Phone lines	No. per '000 population	160	190	0.2	760	526	106	4.96
GDP per capita	Year 2000 $	7,793	9,481	111	37,165	393	104	3.78

[a] Oil reserves data are not available for all countries and years. Missing values were computed as follows:

1 Obtain oil reserves data from World Resource Institute, oil export data from UN Comtrade.

2 Regress oil reserves data on oil exports by country and year.

3 Generate missing oil reserves data by prediction based on oil exports, where oil exports are calculated from category 2709 of HS-1992 (Petroleum oils and oils obtained from bituminous minerals, crude).

Full details of this computation are available from the authors on request.

Our options for econometric analysis are tightly constrained by data limitations that restrict us to using multi-year sub-periods of the data; with multiple observations on some countries we have a maximum of 191 observations, depending on which set of variables is used. Import data required to construct the net export measure are unavailable before 1985, so we have four usable six-year intervals from 1985 to 2005. The data set is highly heterogeneous, with countries ranging from low income to high income and spanning all regions of the world. We attempt to control for the most obvious sources of heterogeneity with dummy variables for developing economies, time period and world region.

We fit the data to the following linear model (in which italics denote scalars and bold denotes vectors):

$$Y_{it} = a + \mathbf{b}'\mathbf{X}_{it} + \mathbf{c}'\mathbf{Z}_{it} + \mathbf{d}'\mathbf{D} + e,$$

where Y_{it} is average net exports of skill-intensive goods as a share of total merchandise exports in country i and from year t to t + 5, and $\mathbf{X}_{it}$ is a vector of continuous independent variables consisting of adjusted FDI stocks, human capital stocks, arable land per capita, oil reserves relative to GDP, and law and order as defined by the ICRG. We include the product of oil reserves and the law and order measure to control for possible institutional interactions with oil wealth, as discussed in the previous section. The vector $\mathbf{Z}_{it}$ contains continuous variables intended to control for country-specific characteristics; it includes population (a proxy for domestic market size), and telephone mainlines per capita (CANNING and FAY 1993) and GDP per capita to capture relative sophistication in the economy not included in the measure of human capital. The vector **D** consists of dummy variables and inter actions among them; we include dummies for each time interval except 2000–05, an East Asia and Pacific regional dummy, and another for developing countries. We also use interactions of year and East Asia–Pacific dummies to account for the differential growth rate of intra-Asian trade, which has expanded far more quickly than has global trade since 1990, with skill-intensive trade occupying an ever-increasing share (ATHUKORALA and YAMASHITA 2006). Finally, the error term e_{it} is itself a compound that we re-define according to the specific panel data estimator used, and a, **b**, **c** and **d** are co efficients to be estimated. The variables used in the econometric analysis are defined and summarised in Table 3, and their sources are shown in Table 4. Table 5 provides data for some Asia Pacific economies.

Table 4: Data Sources

Variable	Source
FDI inflow	World Development Indicators Online
Public spending	World Development Indicators Online
Net skill intensity of exports	Calculated from UN Comtrade database
Post-secondary education share	Barro and Lee (2001)
Law & order	Political Risk Services: International Country Risk Guide (ICRG)
Arable land	World Development Indicators Online
Oil reserves	World Resources Institute, <http://earthtrends.wri.org/>

3.1 Estimation results

We estimate the model using OLS (ordinary least squares), fixed effects (FE) and random effects (RE) specifications, and in both static and first-order autoregressive (AR(1)) forms. It is always likely that the estimation model excludes some unobserved variable that contributes to an explanation of the variation in the dependent (or left-hand side) variable. For a panel of data on countries i over years t, an unobserved variable could vary across i but not t (for example, immutable country characteristics such as geography); across t but not i (for example, global economic shocks); or across both i and t. Which econometric strategy is used to deal with the unobserved variable problem depends, among other things, on our beliefs about the source of unobserved variation. Simply put, in the current context an FE estimator assumes time-invariant, country-specific variation only; an RE estimator makes no such assumption but posits instead that the unobserved variable is uncorrelated with other explanatory (right-hand side) variables in the model. Because our data consisted of repeated observations on countries over time, use of a first-order (that is one-period) autoregressive estimator (denoted (AR(1)) is a way of allowing for the possibility of dynamic or persistent effects, that is, that the current value of the dependent variable is determined both by current values of independent variables and by its own value (and thus those of the independent variables) in the previous period.[9] In Table 6, we report four sets of RE results, chosen on *ex ante* grounds to be the most plausible specifications (the criteria applied were relatively complete independent variable sets and a mix of static and AR(1) specifications).[10] In each regression model shown, the dependent variable is the average value of the net skill intensity of exports for a given interval.

9 There are in general no unambiguous ex ante reasons to prefer FE or RE estimators, but in the current context there is a case for using RE. The FE estimator uses only 'within' variation, that is variation in the dependent and explanatory variables after removing observation specific means. In the case where much of the variation in the data is 'between', that is information contained in the means (across individual observations or time), the FE estimator ignores a relatively large share of the information in the data set. Moreover, because FE attenuates the variance in the regressors, measurement error imposes a greater degradation in the signal to noise ratio; hence a variable measured with error will be more likely to be biased toward zero. On the other hand, RE assumes that the independent variables are uncorrelated with the error terms. The FE estimator will be ineffi cient under the null hypothesis that RE is correctly specifi ed, because it discards the information in the group means. If the error terms are correlated with the independent variables, then the RE estimator will be inconsistent. Another reason to prefer RE is that we want to include some timeinvariant dummy variables because we believe these are important sources of explanatory power and as such will help us to get a better prediction for Southeast Asian countries' net skilled-export intensity. Accordingly, we use the Hausmann test; for the fully specified static model the null is not rejected, so we prefer the more efficient RE estimator.

10 To save space, the full set of estimation results is available in an online archive at the following site Internet: www.aae.wisc.edu/coxhead/papers/CoxheadLiBIES/ as of August 22, 2008.

The values of the independent variables in vector $\mathbf{X}_{it}$ are those in the initial year of the same six-year period.[11]

11 Empirically, there are two ways to control for an Indonesia-specific effect. We can include a dummy variable for Indonesia in all of our regressions; doing so barely changes our estimation or counter-factual analysis results (for these results see the URL cited in footnote 10). Alternatively, in our counter-factual analysis in the next section of this paper, we take the difference between Indonesia's actual net skill-intensive export share and our prediction of that share as a country-specifi c effect that varies over time (see below).

Table 5: Economic Indicators for Selected Asia Pacifi c Economies

	Year	GDP per Capita (constant 2000 US$)	GDP per Capita (PPP current inter-national $)	Oil Reserves (billion tonnes/ GDP)	Arable Land (ha per capita)	Post-secondary Education (% pop. over 25)	High-tech Export Share (%)	FDI as % of GDP
China	1980	186	418	2.58	0.11	1.0	n.a.	0.03
	1990	392	1,326	1.02	0.09	2.0	10	0.98
	1995	658	2,514	0.37	0.09	2.2	19	4.92
	2000	949	3,939	0.40	0.08	2.7	29	3.20
India	1980	223	629	0.54	0.24	2.5	4	0.04
	1990	317	1,351	0.40	0.19	4.1	5	0.07
	1995	372	1,790	0.25	0.17	4.5	5	0.60
	2000	453	2,364	0.31	0.16	4.8	6	0.78
Indonesia	1980	397	777	5.42	0.12	0.8	1	0.38
	1990	612	1,814	1.07	0.11	2.3	1	0.96
	1995	827	2,764	0.40	0.09	3.6	7	2.15
	2000	800	2,904	0.83	0.10	5.0	15	2.72
South Korea	1980	3,221	2,581	n.a.	0.05	8.9	14	0.01
	1990	6,615	8,008	0.00	0.05	13.4	27	0.30
	1995	9,159	12,514	0.00	0.04	21.1	35	0.34
	2000	10,884	16,149	0.00	0.04	25.8	39	1.81
Malaysia	1980	1,848	2,178	2.63	0.07	1.4	10	3.75
	1990	2,547	4,536	1.83	0.10	2.8	32	5.30
	1995	3,510	7,054	0.95	0.09	6.8	50	4.70
	2000	3,927	8,570	1.34	0.08	7.5	61	4.19
Philippines	1980	983	2,149	n.a.	0.11	15.2	2	-0.33
	1990	914	3,021	n.a.	0.09	18.7	12	1.20
	1995	909	3,390	0.00	0.08	20.4	21	1.99
	2000	995	4,030	0.00	0.07	22.2	74	2.97
Singapore	1980	9,056	4,993	n.a.	0.00	3.4	19	10.53
	1990	14,674	12,227	0.00	0.00	4.7	44	15.13
	1995	19,370	18,214	0.00	0.00	7.6	60	13.72
	2000	23,077	23,563	0.00	0.00	10.6	64	17.77
Thailand	1980	804	1,374	0.00	0.36	2.9	6	0.59
	1990	1,452	3,749	0.07	0.32	7.8	20	2.86
	1995	2,057	5,993	0.03	0.29	9.4	29	1.23
	2000	1,998	6,319	0.11	0.26	11.3	36	2.74
Vietnam	1980	n.a.	n.a.	n.a.	0.11	n.a.	n.a.	n.a.
	1990	227	940	n.a.	0.08	n.a.	n.a.	2.78
	1995	305	1,428	1.77	0.07	n.a.	n.a.	8.59
	2000	397	2,016	6.11	0.08	2.6	7	4.16

n.a. = not available.

Sources: See table 4.

Table 6: Estimation Results[a]

Variable[b] / Method	RE[c]	RE[c]	RE/AR(1)[c]	RE/AR(1)[c]
Adjusted FDI stock	0.695***	0.506***	0.546***	0.550***
	(0.1356)	(0.1306)	(0.1155)	(0.1131)
Arable land per capita	–0.035	–0.037	–0.050**	–0.047**
	(0.0281)	(0.0262)	(0.0192)	(0.0188)
Oil reserves	–0.009	–0.010*	–0.010*	–0.013**
	(0.0069)	(0.0063)	(0.0058)	(0.0057)
Post-secondary education share	0.223*	0.146	0.329***	0.245**
	(0.1256)	(0.1226)	(0.1153)	(0.1145)
Law & order	–0.000	–0.005	–0.002	–0.007
	(0.0050)	(0.0046)	(0.0051)	(0.0057)
Law & order × oil reserves	0.001	0.002	0.002	0.002
	(0.0017)	(0.0046)	(0.0013)	(0.0013)
Population			–0.010	–0.025
			(0.0482)	(0.0479)
Phone lines per '000 population			0.003***	0.003***
			(0.0009)	(0.0010)
GDP per capita		0.002		0.002
		(0.0018)		(0.0018)
Developing country = 1	–0.084***	–0.069*	0.018	0.040
	(0.0285)	(0.0386)	(0.0367)	(0.0380)
East Asia & Pacific = 1	0.196***	0.218***	0.179***	0.194***
	(0.0310)	(0.0297)	(0.0233)	(0.0286)
1985–90 = 1	–0.057***	–0.005	–0.020	0.013
	(0.0184)	(0.0213)	(0.0199)	(0.0275)
1990–95 = 1	–0.013	–0.005	0.010	0.014
	(0.0108)	(0.0101)	(0.0113)	(0.0122)
1995–2000 = 1	0.003	0.000	0.021**	0.019**
	(0.0083)	(0.0076)	(0.0088)	(0.0088)
(1985–90) × East Asia & Pacific = 1		–0.132***		–0.063
		(0.0303)		(0.0423)
(1990–95) × East Asia & Pacific = 1		–0.072***		–0.017
		(0.0189)		(0.0265)
(1995–2000) × East Asia & Pacific = 1		0.009		0.043**
		(0.0172)		(0.0188)
Observations	160	160	160	160
Groups	76	76	76	76
R-square				
Within	0.4646	0.6716	0.4528	0.5643
Between	0.6322	0.6315	0.6810	0.6890
Overall	0.6087	0.6282	0.6338	0.6567

[a] Dependent variable = average value of the net skill intensity of exports for a given time interval; * significant at 10%; ** significant at 5%; *** significant at 1%; standard error in parentheses.

[b] See table 3 and the text for a more detailed explanation of the variables.

[c] RE: random effects estimator; AR(1): first-order autoregressive error structure.

Table 7: Elasticities of the Estimates at Sample Means[a]

Variable[b]/Method	RE[c]	RE[c]	RE/AR(1)[c]	RE/AR(1)[c]
Adjusted FDI stock	0.2315***	0.1688***	0.1819***	0.1834***
Arable land per capita	–0.1144	–0.1200	–0.1617**	–0.1529**
Oil reserves	–0.1498	–0.1686*	–0.1709*	–0.2092**
Post-secondary education share	0.2461*	0.1616	0.3634***	0.2712**
Law & order	–0.0132	–0.2236	–0.1015	–0.3076
Law & order × oil reserves	0.0860	0.1024	0.1151	0.1478
Population			–0.0060	–0.0145
Phone lines per '000 population			0.4540***	0.4658***
GDP per capita		0.1708		0.1725

[a] Dependent variable = average value of the net skill intensity of exports for a given time interval; * significant at 10%; ** significant at 5%; *** significant at 1%.
[b] See table 3 and the text for a more detailed explanation of the variables.
[c] RE: random effects estimator; AR(1): first-order autoregressive error structure.

The results vary somewhat according to model specification, but in most instances the major hypotheses find statistically significant support (Table 6).[12] Larger relative endowments of adjusted FDI are strongly and significantly associated with higher shares of skill-intensive exports. Similarly, the relationship between human capital stocks and skill-intensive exports is robust and positive. The results indicate that countries with richer endowments of skills and complementary resources, such as the technologies, market networks and managerial inputs that are typically associated with FDI, perform more strongly in the skill-intensity race.

Natural resource wealth has a negative association with skill intensity of exports. Larger relative endowments of arable land are associated with lower skill intensity, though not signifi cantly so in the two static models. Similarly, oil reserves relative to GDP have a negative and (in three out of four regressions) significant association with the dependent variable. These results are consistent with the 'Dutch disease' component of the 'natural resource curse' argument, that resource wealth undermines an economy's capacity to specialise in more skill-intensive products. However, the law and order variable itself, and its interaction with oil reserves, are statistically insignificant in all models.

12 We are grateful to an anonymous referee for suggested improvements in the model specification.

Among the conditioning variables in vector **Z**, population and GDP per capita contribute nothing significant to the observed variation in skill-intensive export shares. The size of the domestic economy seems not to be an important factor once other characteristics have been taken into account. The intensity of telephone mainlines, included in the third and fourth estimation models, does carry explanatory power, serving (it seems) as a substitute for the basic differences between developing and high income economies. The coefficient estimates on the developing country dummy lose significance when telephone line density is added to the set of independent variables. The East Asia and Pacific dummy is strongly and significantly positive in all models, underlining the well-known special characteristics of regional production structure and intra-regional trade.

Table 7 shows the principal estimates in elasticity form. A 10% increase in FDI stocks is associated with a 17–23% higher skill-intensive export share, depending on the estimation model. A 10% greater accumulation of skilled labor would raise the same share by one-quarter to one-third. Finally, 10% more arable land is associated with a level of skill-based exports 11–15% lower. The share of these exports is 17–21% lower for each 10% higher level of oil reserves. These results are suggestive of three distinct policy-relevant stories relating to the expansion of skill-intensive exports. First, investments in human capital pay dividends in the acquisition of skills-based comparative advantage for all economies. To the extent that expected returns on human capital investments are subject to policy influences (for example, through macroeconomic stability or the provision of complementary infrastructure), there is a role for government in helping to ensure that private investment decisions are sufficient to match the socially optimal growth in demand.

Second, there is a strong positive association between playing host to tradable sector FDI and the expansion of skill-intensive industries (SJÖHOLM 1999; BLALOCK and GERTLER 2004; TAKII 2005). As with human capital, there are clear policy linkages to the rate of FDI accumulation, and these are likely to operate through both macroeconomic policy and microeconomic (sectoral) policies, as well as through the design, implementation and enforcement of the regulatory regime.[13] Third, our results thus support a spe-

13 Several recent studies of Indonesian growth also identify important supply-side constraints, including labor market regulations, infrastructural inadequacies and an unstable legal and political setting (for example ATHUKORALA 2006; TAKII and RAMSTETTER 2007). Such considerations undoubtedly apply widely in the developing world. Our econometric analysis cannot capture such effects for a panel of countries without the addition of much more (and more detailed) data. It is likely that the FDI measure in our data set reflects at least part of the effect of this set of constraints, as all must serve to discourage inward FDI flows in manufacturing sectors.

cialised version of the theoretical 'Dutch disease' prediction: after controlling for more industry-specific endowments of productive assets, we find that resource-abundant countries occupy smaller niches of comparative advantage where skill-intensive products are concerned. An implication is that increased export demand for agricultural and natural resource exports may stimulate aggregate economic growth, but this growth will not necessarily lead to the expansion of skills-based manufacturing output.

4 Indonesia in international and regional context

In the second section of this paper we identified some sources of apparent vulnerability to a middle income trap: the 'resource curse' and associated loss of capacity in tradable manufacturing sectors; a loss of comparative advantage by labor-intensive manufacturing industries facing intensified global competition; and forgone opportunities for growth-enhancing spill-overs from skill-intensive industries. Middle income countries in Southeast Asia are relatively resource rich but – thanks to the post-Plaza Accord (1985) boom in outward FDI from Japan and East Asia and the global FDI boom of the early 1990s – they have evolved manufacturing sectors that are advanced by the standards of the developing world.

Among these developing economies, Indonesia has lagged behind in terms of investments associated with productivity growth and progress up the technological ladder (THEE 2005; FRANKEMA and LINDBLAD 2006). Its policies toward FDI have reflected considerable ambivalence. Early New Order era policies offered limited encouragement to FDI in energy and mining, as well as tariff-jumping moves into import-substituting manufacturing sectors. Liberalisation of trade and investment policies in the 1980s and early 1990s was significant but shortlived. From around 1993 it was subject to both 'mixed signals' and the onset of 'deregulation fatigue' (AZIS 1998); in the late New Order era the criteria for investment policy reform seemed to be derived as much from a domestic political agenda as from the search for economic efficiency and growth – at least prior to major reforms adopted in 1994 (THEE 2006). Perhaps as a result, Indonesia's record of total factor productivity (TFP) growth in the critical early development decades (1975–95) was respectable in an absolute sense, but not relative to Asian trade partners and potential competitors (TIMMER 1999; COLLINS and BOSWORTH 1996).[14]

14 'Indonesian manufacturing is steadily climbing the technology ladder. However, global levels of TFP have also improved over the past decades. Hence, when viewed from an international perspective, Indonesia's ascent resembles a standstill on the global escalator' (TIMMER 1999).

Relatively low TFP growth can also be understood in the context of Indonesia's transformation, during this period, from an extremely poor, rural and agrarian economy into the ranks of the lower-middle income countries. This was a tremendous (and tremendously rapid) transformation, based initially on exploitation of its abundant endowments of natural resources and, increasingly after the mid-1980s, on unskilled labor in export-oriented manufacturing. In the postcrisis era – which coincides with the rise of China both as a global exporter of many of the same labor-intensive products that Indonesia exports and as a market for skill-intensive inputs to their production – the principal reasons for Indonesia's low performance in skills-based industries are different. These have been identified and discussed in the specific contexts of Indonesian history, politics and economics by BIRD and HILL (2006), who offer three explanations: a relatively low policy weight applied to skills upgrading relative to the need to re-establish macroeconomic stability and an investment-friendly business climate; lack of an adequate educational and training infrastructure for the production of skilled workers; and the 'fundamental discontinuity' of the crisis itself and of the subsequent political upheavals and transition to democracy. To these three reasons we may speculatively add two more. The first of these is the intersectoral effect of global commodity market booms that have driven the prices of some of Indonesia's key natural resource, agricultural and horticultural exports to all-time highs (WORLD BANK 2007, p. 15). While the impact of these sustained price shocks has yet to be formally tested, they are likely to have had substantial effects on the real exchange rate, and perhaps even on domestic factor prices – the two principal channels through which such booms are likely to lower profitability in skillsbased manufacturing. Second, it is impossible to ignore the potential impact of China's expansion on Indonesia's tradable manufacturing sectors in general, and on labor-intensive and skill-intensive industries in particular. Competition with China has become intense at the labor-intensive end (COXHEAD 2007; EICHENGREEN, RHEE and TONG 2004); whether Indonesia has the capacity or cost advantages to exploit complementarities in parts and components trade at the skill-intensive end remains in doubt (THEE 2005; MULAPRUK and COXHEAD 2005; PORTER et al. 2006).

Table 8: Manufacturing Value Added per Worker, Selected Asia Pacifi c Economies ($'000 per worker)

	Indo-nesia	Viet-nam	India	Thai-land	China	Philip-pines	Malay-sia	Singa-pore	South Korea
All manufacturing	**5**	**3**	**7**	**8**	**8**	**14**	**18**	**68**	**69**
Medical, measuring, testing appliances, etc.	**5**	3	7	6	7	5	12	99	44
Office, accounting & computing machinery	**17**	12	19	17	7	19	34	126	104
TV & radio receivers & associated goods	**8**	18	15	6	12	9	13	58	45
TV/radio transmitters; line communications apparatus	**4**	4	7	28	12	0	33	124	125
Footwear	**3**	1	2	3	4	0	5	17	27
Wearing apparel except fur	**2**	2	2	4	4	4	6	17	24
Spinning, weaving & finishing of textiles	**4**	2	3	8	5	6	12	43	45
Furniture	**2**	2	5	4	5	4	8	26	36
Paper & paper products	**8**	2	5	13	7	13	17	51	72

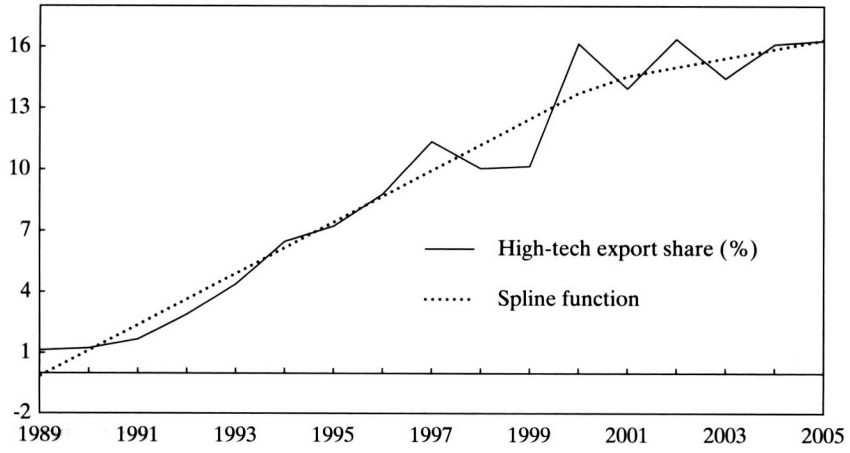
Source: United Nations International Development Organization (UNIDO).

Among the major Asian economies, value added per worker in Indonesian manufacturing industries is not high (Table 8). Indonesia's labor productivity, by this measure, is lower than that of China both in the aggregate and in almost every product division except the major parts and components category of 'office, accounting and computing machinery'. In this category, however, productivity per worker in Indonesia is roughly matched in several other lower-middle income economies in the region (Thailand, the Philippines and India) and its level is much lower than that in neighbouring Malaysia. At this level of aggregation at least, there is no evidence of a niche market advantage.

As already seen in Figure 2, Indonesia also shares with other middle income economies a declining growth rate of skill-intensive exports relative to total exports (China is the exception). In the 1990s, Indonesia's exports of goods classified as 'high-tech' in the *World Development Indicators* rose from a negligible component of manufacturing exports to a share just above 16% – and most of this was in reality the labor-intensive assembly of consumer electronics. Since 2000, moreover, that share has not grown (Figure 3), in spite of a near linear rate of expansion in the *dollar value* of this export ca-

tegory. In fact, as the Figure shows, the Indonesian data fit very well to a piecewise linear spline function in which the rate of expansion of the share of exports classed as high-tech in 2001–05 is only about one-third that of the years 1989–2000.[15]

Figure 3: Indonesia: Skill-intensive Export Share, 1989–2005



Source of basic data: World Development Indicators Online.

These data are consistent with direct (though subjective) measures of high-tech capacity collected by the Georgia Institute of Technology High-Tech Indicators Project (PORTER et al. 2006). On measures of socio-economic and technological infrastructure, national policy orientation, and productive capacity in high-tech industries, Indonesia is ranked at or near the bottom of the group of 33 nations surveyed. It was ranked 32nd of 33 in expert opinions of current high-tech production capacity (2005) and 28th of 33 in opinions of future capability. Interestingly, four of the countries ranked below Indonesia in the latter assessment are also major resource exporters (Mexico, Venezuela, Argentina and Russia); the remaining low rank was occupied by the Philippines. It is safe to assert from these comparisons that Indonesia is at best a marginal player in the global high-tech export market.

How different would Indonesia's skill-intensive export record look if its past policies had resulted in its attaining human capital and FDI endowments comparable with those of its regional neighbors? As of 2000, only

15 For details of estimation, see the URL cited in footnote 10.

5% of Indonesians over the age of 25 were recorded as having completed *any* kind of post- secondary education, compared with 7.5% in Malaysia and 11.3% in Thailand (Table 5). Indonesia's educational attainment figures are only slightly higher than those for China and Vietnam, regional economies normally considered to have progressed much less far along the development path. On FDI, too, Indonesia at best matches most of its regional neighbors. Its FDI was 2.7% of GDP in 2000, equivalent to that of Thailand and the Philippines, but far behind Malaysia and even Vietnam. In order to locate the Indonesian experience in a regional context we now conduct two counter-factual exercises based on the estimates in Table 6. Such procedures are of course risky; every country is unique. Nonetheless there is value in drawing comparisons, if only for the purpose of sharpening debate over what it is that makes each country different, and what might be done, where desired, to alter specific country features in ways that could lead to more promising development outcomes.

Table 9: Actual and Predicted Net Skill-intensive Export Shares, Developing Southeast Asia

	Period	Actual Share [a]	Average Prediction [b]
Indonesia	1985–90	–0.007	0.112
	1990–95	0.023	0.179
	1995–2000	0.077	0.244
	2000–05	0.132	0.258
Malaysia	1985–90	0.240	0.219
	1990–95	0.349	0.312
	1995–2000	0.496	0.482
	2000–05	0.521	0.573
Thailand	1985–90	0.131	0.141
	1990–95	0.196	0.215
	1995–2000	0.297	0.311
	2000–05	0.307	0.363

[a] Authors' computations from Comtrade data.

[b] Average computed from the results of the four regression models shown in Table 6.

As already discussed, the estimates reported in Table 6 are based on a heterogeneous group of countries, and our regressions explain only about 63% of the observed variation in that data set. There is no especially strong rea-

son to expect that the model will yield a good prediction of the dependent variable for any given country in the data set. It is instructive, therefore, to consider the data in Table 9. For each country and time interval, the first data column in this Table shows the value of the net skill-intensive export share in total merchandise exports. For Indonesia, for example, gross skill-intensive exports were worth slightly less than corresponding imports in 1985–90; thereafter, the domestic industry expanded to the point where, by 2000–05, it accounted in net terms for 13% of merchandise exports.

This was a huge expansion, particularly given rapid growth in Indonesia's total exports by value over the same period; but the figure is still very much lower than those for the two most directly comparable Southeast Asian countries, data for which are also shown in the Table.

The second column in the Table shows country-specific predictions of the dependent variable, obtained by fitting country FDI and human capital data to the coefficient estimates in Table 6 and then averaging the results over the four models. For Malaysia and Thailand, these average predictions fit the actual data surprisingly well, considering the heterogeneity of the underlying data from which the coefficient estimates were obtained. The model under-predicts Malaysia's skill-intensive export share until 1995, matches it almost exactly in the late 1990s, then over-predicts it in the post-crisis years after 2000. For Thailand, the model matches actual export data until 1995, but over-predicts it in the post-crisis era.

For Indonesia, the model *consistently* over-predicts skilled exports by a very large margin, even after controlling for differences in GDP per capita and natural resource wealth and allowing for geographical location in the dynamic Asia Pacific grouping. Based on our panel data estimates, Indonesia's skill-intensive export share by the mid-1990s should have been about 25%: three times the observed share in 1995–2000, and twice the observed share in 2000–05. Put another way, the model predicts that in 2000–05 Indonesia should have had a skill-intensive export share roughly comparable with that enjoyed by Malaysia in 1985–90 or Thailand in 1995–2000. Its actual share, however, corresponds to that of Thailand in 1985–90, and is half that of Malaysia in 1985–90. These comparisons are based on within-country predictions from the econometric model, but they also suggest an alternative approach. What if Indonesia, owing to different policies and conditions in earlier years, had achieved levels of FDI and human capital corresponding more closely to those of its regional neighbors?

Table 10 provides indicative answers by generating predicted values of Indonesia's skill-intensive export share using Indonesian data for all but FDI and human capital, values of which are then supplied from the neighboring countries. Suppose, for example, that Indonesia in 1985–90 had Thailand's levels of FDI and human capital; how different would its skill-intensive export share have been? From our computations, the answer for this period is 'not much': net skill-intensive exports were very low in both countries (and negative in Indonesia) during this period. But by the final decade of the data, the difference between Thai and Indonesian performance is revealed in a predicted gap of 23–29%; by 2000–05, if Indonesia had had Thai levels of FDI and human capital, its skill-intensive export share would have been four percentage points higher (a 29% difference).

This counter-factual is consistent with data on the structure of industrial production and trade, factor productivity, R&D expenditures, and the technology content of FDI, which suggest that Indonesia 'lags behind Thailand by about ten years, or slightly more' (FRANKEMA and LINDBLAD 2006). Malaysia provides a more stark contrast. Malaysian levels of FDI and human capital investments, if replicated in Indonesia in 1995–2005, could have helped that country increase the contribution of its skill-intensive exports to total merchandise exports by half to two-thirds. If Indonesia had had Malaysian levels of FDI and human capital in 2000–05, the counter-factual indicates that skill-intensive manufactures would have accounted for 22% of exports rather than the 13% actually recorded.

Table 10 also shows a breakdown of the contributions of human capital and FDI differences to the total difference in each comparison. This reveals that Thailand and Malaysia differ from Indonesia in different ways. In Malaysia, most of the difference comes from FDI; in Thailand, it comes mainly from human capital, at least until 2000. This suggests that although improvements in both FDI and human capital accumulation are necessary, there is likely to be more than one path leading to the growth of a more skill-intensive manufacturing sector.

The foregoing are static predictions obtained simply by replacing the Indonesian values of FDI and human capital with those from the other two countries within any given period of the data. As such, they ignore the dynamic effects of investment decisions on the skill-intensive export share in subsequent periods. Yet growth dynamics derived from learning by doing and other phenomena with inherent inter-temporal spill-overs are at the heart of the models by VAN WIJNBERGEN and others discussed in the second

section of this paper. In those models, a resource boom that undercuts profitability in manufacturing sectors can halt growth; the goal of long-run welfare maximisation motivates interventions aimed at maintaining manufacturing sector profitability for the duration of the boom.

The analogue, in our analysis, is that the goal of sustaining and increasing output in skill-intensive sectors, as a means to avoid the middle income trap, creates a mandate for interventions that promote FDI and human capital accumulation. To reiterate, the comparisons presented in this section are 'all else equal' exercises based on parameter estimates from international panel data. It would be erroneous to dwell too much on the exact numbers generated by these counter-factuals. Their real value lies in the questions they inspire. What does Indonesia's relative under-performance in this area imply for recent, current and future growth? What policies should have been, or should now be, adopted to help ensure sustained economic growth? More ambitiously, what challenges does Indonesia's apparent standstill on the *regional* escalator (to paraphrase TIMMER 1999) of technology and productivity growth pose for its ambitions to climb out from lower-middle income status to a level of living at which poverty alleviation and other fundamental development challenges are no longer the paramount development policy concerns?

Table 10: Net Skill-intensive Export Share Predictions for Indonesia Using Regional FDI and Human Capital Data

		Actual	Counter-factual with Data from	
		Indonesia	Thailand	Malaysia
1985–90				
Total	Net skill-intensive export share	–0.007	0.004	0.016
	Difference from Indonesia (%)		161.27	345.80
Due to human capital	Net skill-intensive export share		0.004	–0.003
	Contribution to total difference (%)		92.42	14.41
Due to FDI	Net skill-intensive export share		–0.006	0.013
	Contribution to total difference (%)		7.58	85.59
1990–95				
Total	Net skill-intensive export share	0.023	0.042	0.048
	Difference from Indonesia (%)		81.95	106.88
Due to human capital	Net skill-intensive export share		0.036	0.024
	Contribution to total difference (%)		68.81	4.80
Due to FDI	Net skill-intensive export share		0.029	0.046
	Contribution to total difference (%)		31.19	95.20
1995–2000				
Total	Net skill-intensive export share	0.077	0.094	0.119
	Difference from Indonesia (%)		22.99	55.31
Due to human capital	Net skill-intensive export share		0.090	0.084
	Contribution to total difference (%)		77.54	17.78
Due to FDI	Net skill-intensive export share		0.081	0.112
	Contribution to total difference (%)		22.46	82.22
2000–05				
Total	Net skill-intensive export share	0.132	0.170	0.223
	Difference from Indonesia (%)		28.68	69.21
Due to human capital	Net skill-intensive export share		0.147	0.138
	Contribution to total difference (%)		39.26	6.46
Due to FDI	Net skill-intensive export share		0.155	0.217
	Contribution to total difference (%)		60.74	93.54

Source: See Table 9, notes a and b.

5 Discussion and conclusions

5.1 Lessons of the past

Indonesia in 1970–96 was one of only a few resource-rich developing economies clearly to escape the 'curse' of natural resource wealth, because some of the oil revenue windfall was used for productivity-enhancing investments in other tradable sectors, notably agriculture and manufacturing (PINTO 1987; COXHEAD 2007). Part of this achievement may have been merely good fortune due to exogenous events, for example the post-Plaza Accord outflow of FDI from Japan and North Asia, and the search by East Asian garment and textile producers for production bases with unfulfilled MFA (Multi-fibre Arrangement) export quotas (HILL 1991). But equally clearly, part of the growth boom was due to timely policy reforms during and after the oil boom years. Current development policy, both in Indonesia and elsewhere in the developing world, can still derive lessons from that experience – especially in the current energy and resource price surge. Given this experience, it seems ironic that Indonesia now faces the possibility of a long-run downturn in growth, based on diminished prospects for labor-intensive manufacturing exports (TAKII and RAMSTETTER 2007), lack of progress in developing skill-intensive exports relative to total exports, and the perils of excessive concentration on natural resource sectors. As in earlier years, the reasons for a possible downturn once again derive from a mix of external and domestic factors.

For manufacturing sectors, external factors now include competition from China and other labor-abundant low income countries, plus the macroeconomic and trade policy decisions of large economies like the US and the EU. But as in the earlier oil boom era, Indonesia can and should be acting now to ensure that its capacity for manufacturing sector growth is not diminished by 'Dutch disease'. Given the country's continuing abundance of low-skill labor, this certainly applies to labor-intensive manufacturing sectors such as garments and footwear. But to ensure the maximum gains, it is vital that policy also facilitate and accelerate the transformation of industry from its current low skill intensity to a higher and more dynamic configuration (THEE 2005). Though Indonesia is currently a marginal player in global high-tech markets (PORTER et al. 2006), these markets are expanding rapidly. There is scope to develop comparative advantage in niche markets in this area, if steps are taken to ensure that the economic and institutional conditions for productive investments are in place.

One very important reason to intervene in favor of a more skills-intensive pattern of growth has to do with dimming prospects for future natural resource-based growth. The 'resource curse' literature dwells exclusively on the consequences of natural resource abundance for long-term economic growth, and this is the theme we have pursued in this paper. In the Indonesian case, however, the long-term survival of key resource-based industries is also in serious doubt. The country's oil and gas reserves are nearing exhaustion, and its old-growth forests and fisheries are rapidly being depleted (RESOSUDARMO 2005). According to the *World Development Indicators,* Indonesia's 'genuine' savings rate, taking account of these and related environmental trends as well as net additions to the stock of human capital, is far below its measured savings rate based on the conventional System of National Accounts. Slower growth due to reliance on natural resources – the primary concern of the 'resource curse' literature – is one issue; the prospect of structural discontinuities based on the exhaustion of resource stocks and the industries they support is quite another, and must soon be confronted in Indonesia. A shift toward production based on renewable resources, most prominently human capital, is not merely desirable for long-run growth; it is also necessary.

5.2 Implications for development policy

After the sustained growth and structural transformation of the New Order era, Indonesia is once again at a development policy crossroads. The development challenges facing the country at present are similar to those of the period from the late 1960s to the 1980s, in that big interventions are required to provide critical public goods (institutions and infrastructure) and to overcome coordination failures (education, skills acquisition, health care). But the specific challenges are of course different, as should be expected, not only from altered domestic and international conditions but also from the qualitative differences between the prerequisites for the transition from a low income to a lower-middle income economy and those for the subsequent transition to upper-middle income and beyond. Indonesia's middle income regional neighbors, while themselves hardly paragons of good governance or policy, have nonetheless managed to achieve and sustain faster transitions away from resource dependence and toward skills- and technology-intensive production. They have achieved this while facing more or less the same international conditions as those confronted by Indonesia. Though each country's story is unique, key differences between neighboring countries and Indonesia appear to be sustained higher rates of investment in

education, more open and stable FDI policies and a more favorable policy and institutional setting (FRANKEMA and LINDBLAD 2006). Indonesia's transformation may also have been hampered, especially in the past half-decade, by a higher level of vulnerability to the structural effects of high energy and resource prices.

Just as rural development programs funded by oil revenues reduced chronic poverty and hastened Indonesia's earlier transformation to middle income status, it is now time to direct the proceeds from the current resource export boom toward an industrial transformation that accelerates diversification away from natural resource and labor-intensive industries. This can be achieved, up to a point at least, without the risk of 'picking winners', by investing in generalised rather than specialised capacity: human capital, R&D and entrepreneurial capability, and a policy and institutional environment in which the country is viewed as a more favorable host for manufacturing sector FDI. Inconsistencies and unpredictability in policies on FDI (TAKII and RAMSTETTER 2007; MANNING and ROESAD 2006) must be reduced, and complementary policies supporting the expansion of the skilled labor force are urgently needed. A firm and sustained commitment to policy innovations in these areas improves the chances that Indonesia can take advantage of the rapid growth and integration of the Asian parts and components trade, the dynamism of neighboring economies and the internal productivity dynamics of skills-based industries. This would enable it to reduce dependence on exhaustible natural resources and low-skilled labor, lift itself out of the lowest rank of high-tech exporters, and establish skills-based industries as leading contributors to its future economic growth.

Annex: Countries in the Data Set

Region	Countries		Region	Countries	
Sub-Saharan Africa	Benin	Mauritius	South Asia	Bangladesh	Pakistan
	Botswana	Mozambique		India	Sri Lanka
	Cameroon	Niger		Nepal	
	C. Afr. Rep.	Senegal			
	Congo	South Africa	Middle East & North Africa	Algeria	Jordan
	Ethiopia	Sudan		Bahrain	Kuwait
	Gambia	Swaziland		Cyprus	Malta
	Ghana	Togo		Egypt	Syria
	Kenya	Uganda		Iran	Tunisia
	Lesotho	Zambia		Israel	Yemen
	Malawi	Zimbabwe			
	Mali		Other industrialised economies	Australia	Italy
				Austria	Netherlands
Latin America & Caribbean	Argentina	Guyana		Belgium	New Zealand
	Barbados	Honduras		Canada	Norway
	Bolivia	Jamaica		Denmark	Portugal
	Brazil	Mexico		Finland	Spain
	Chile	Nicaragua		France	Sweden
	Colombia	Panama		Germany	Switzerland
	Costa Rica	Paraguay		Greece	Turkey
	Cuba	Peru		Iceland	UK
	Dominican Republic	Trinidad & Tobago		Ireland	United States
	Ecuador	Uruguay			
	El Salvador	Venezuela	Eastern Europe & former USSR	Russia	Lithuania
	Guatemala			Bulgaria	Poland
				Croatia	Romania
East Asia & Pacific	China	Malaysia		Czech Rep.	Slovakia
	Fiji	PNG[a]		Hungary	
	Hong Kong	Philippines			
	Indonesia	Singapore			
	Japan	Thailand			
	Korea	Vietnam			

[a] PNG = Papua New Guinea.

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are as mobile as possible, both geographically and sectorally. This will allow any necessary adjustment to a higher exchange rate to be smoothly accommodated.

Viele Jahre hatte die Schweiz einen Leistungsbilanzüberschuss. Doch in den letzten 15 Jahren ist dieser Überschuss auf ein Niveau angeschwollen, das von fast keinem anderen OECD-Land je erreicht wurde. Dieser Artikel betrachtet zunächst den Schweizer Leistungsbilanzüberschuss aus dem Blickwinkel der Zahlungsbilanz sowie unter dem Gesichtspunkt des Übermasses nationaler Ersparnis gegenüber Inlandsinvestitionen. Anschliessend werden Erklärungen für den Aufwärtstrend gesucht und analysiert, ob dieser auf Markt-, institutionelles oder Politikversagen zurückzuführen ist. Dabei werden eine Reihe von Messungsproblemen angesprochen. Die zentrale Empfehlung dieses Artikels ist jedoch, dass die Behörden sich auf eine mögliche starke Wertsteigerung des Schweizer Franken vorbereiten sollten. Diese Wertsteigerung ist möglich, falls und sobald im «carry trade» engagierte Investoren ihre Positionen auflösen. Aus diesem Grund sollten die Behörden Arbeits-, Kapital- und Produktmärkte untersuchen und deren grösstmögliche Flexibilität und die Mobilität ihrer Faktoren sicherstellen. Dies sowohl in geographischer als auch in sektorieller Hinsicht. Eine solche Vorbereitung wird allenfalls notwendige Anpassungen an höhere Wechselkurse erleichtern.

Prospects for Skill-based Export Growth in a Labor-abundant, Resource-rich Developing Economy

Ian Coxhead and Muqun Li

In an integrated global economy, specialisation in trade is an increasingly prominent strategy. A labor-abundant, resource-rich economy like Indonesia faces stiff competition in labor-intensive manufactures; meanwhile, rapid growth in demand for resources from China and India exposes it to the 'curse' of resource wealth. This diminishes prospects for more diversified growth based on renewable resources like human capital. Using an international panel data set we explore the influence of resource wealth, foreign direct investment and human capital on the share of skill-intensive products in exports. FDI and human capital increase this share; resource wealth diminishes it. We use the results to compare Indonesia with Thailand and Malaysia. Indonesia's reliance on skill-intensive exports would have been greater had it achieved higher levels of FDI and skills. Its performance in accumulating these endowments, and its relative resource abundance, impedé diversification in production and trade. We present policy options flowing from these findings accommodated.

In einer integrierten globalen Wirtschaft ist eine Spezialisierung auf den Handel eine zunehmend verbreitete Strategie. Eine Volkswirtschaft reich an Arbeitskräften und natürlichen Ressourcen wie die Indonesiens tritt bei arbeitsintensiven Produkten starker Konkurrenz entgegen. Gleichzeitig belegt

die dank China und Indien wachsende Nachfrage nach natürlichen Ressourcen das Land mit dem «Fluch» des Ressourcenreichtums. Denn dieser Wohlstand vermindert die Erfolgsaussichten eines diversifizierteren Wachstums basierend auf erneuerbaren Ressourcen wie dem Humankapital. Aufbauend auf internationalen Paneldaten erforschen wir den Einfluss von Ressourcenreichtum, ausländischen Direktinvestitionen und Humankapital auf den Anteil «skill»-intensiver Produkte an den Ausfuhren. Ausländische Direktinvestitionen und Humankapital erhöhen diesen Anteil, während Ressourcenreichtum ihn verkleinert. Wir nutzen unsere Ergebnisse zum Vergleich von Indonesien mit Thailand und Malaysia. Indonesiens Anteil von «skill»-intensiven Exporten wäre grösser gewesen, hätte es höhere Niveaus in ausländischen Direktinvestitionen und handwerklichen Fertigkeiten erreicht. Seine Bilanz bei der Anhäufung dieser Elemente und sein relativer Ressourcenreichtum verhindern jedoch die Auffächerung von Indonesiens Produktion und Handel. Diese Befunde berücksichtigend präsentieren wir abschliessend verschiedene Politikoptionen.

Competition Effects and Terms of Trade Effects of Exchange Rates and International Prices: Evidence for Germany

Kerstin Stahn

The effects of the latest period of Euro appreciation from 2006 to 2007 on the German economy, especially on exports, are cushioned, in the short run, by the regional pattern of foreign buyers, invoicing practices and hedging activities, enterprises' favorable cost development and their currently comfortable profit situation. In the longer run, volume effects (competition effects) may be expected to occur owing to the incomplete pricing-to-market of exporters and importers. Purchasing power effects on real incomes must also be taken into account. Although these two effects have, in some years, had a rather powerful impact on real income growth, their overall impact was virtually neutral on average over the 1993–2007 observation period.

Die Effekte der jüngsten Euro-Aufwertungsphase von 2006 bis 2007 auf die deutsche Wirtschaft, insbesondere die Exporte, werden kurzfristig durch die regionale Struktur des Außenhandels, die Fakturierungsusancen und Absicherungsmaßnahmen, die günstige Kostenentwicklung in den Unternehmen sowie ihre derzeit komfortable Gewinnsituation abgefedert. Langfristig ist zu erwarten, dass sich aufgrund des unvollständigen Pricing-to-Market der Exporteure und Importeure Mengeneffekte (Wettbewerbseffekte) einstellen werden. Darüber hinaus sind Kaufkrafteffekte beim Realeinkommen in Rechnung zu stellen. Obwohl diese beiden Effekte in einigen Jahren einen recht starken Einfluss auf das Wachstum des Realeinkommens ausgeübt haben, war ihre Wirkung im Durchschnitt des Beobachtungszeitraums von 1993 bis 2007 insgesamt praktisch neutral.

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