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TRIPLING AFRICA'S PRIMARY EXPORTS: WHAT? HOW? WHERE?

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Contents

TRIPLING AFRICA'S PRIMARY EXPORTS: WHAT? HOW? WHERE?

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Abstract

Income growth in Africa sufficiently high to achieve the internationally agreed development goals implies a rise in the region's per capita income by the early 2020s to about Latin America's current level. This would be associated with roughly a tripling of Africa's primary exports. Increased African supply on world commodity markets would tend to make prices lower, but not by much, given the smallness of its market shares. Rising global demand from sustained rapid growth in natural-resource-poor Asian countries, particularly China, would moderate, or even compensate, such a potential fall in prices and provide sizeable new opportunities for Africa's primary exports. In Africa, extractive industries would be poised best to benefit directly from China's rising imports, while exporters of agricultural products would be more likely to benefit indirectly from rising world market prices associated with Asia's growing primary imports.

I. INTRODUCTION

Reducing poverty through sustained growth is the key development challenge facing sub-Saharan Africa (henceforth Africa). A rise in Africa's income sufficiently high to achieve the internationally agreed development goals also implies a rise in the region's per capita income by the early 2020s to about Latin America's current level. Given that the export-GDP ratio of most countries changes only little as their incomes rise, Africa's economic development will be accompanied by an expansion of its exports, both primary products and manufactures. Since the relative position of Africa in the world's constellation of resource endowments is unlikely to change rapidly in the near future, primary products will constitute a major part of Africa's future export expansion. This will be the case even accounting for the fact that economic development typically involves structural transformation away from activities in the primary sector.

Any potential expansion of Africa's exports raises questions as to the region's supply capacity and the demand potential for additional exports of primary products and manufactures. Given the abundance of studies on supply constraints and on Africa's potential for rising manufactured exports,[1] this paper concentrates on demand for Africa's primary exports. It addresses the following questions: What magnitude of primary export expansion would accompany a rise in Africa's average per capita income to Latin America's current level? Where could African exporters of primary products find markets which are large enough to absorb greater volumes without a decline in prices? Which products and African countries would benefit the most?

[1] See, for example, Wood and Mayer (1998, 2001), UNCTAD (1998) and UNIDO (2004).

The paper starts from two observations. First, easing the widespread supply constraints is clearly crucial if Africa is to increase its primary exports. However, many of the existing supply constraints apply across all economic sectors and are related to Africa's poor overall economic performance. Thus, they need to be addressed in any case to achieve the rise in income with which rising primary exports will be associated.[2] Second, it is often argued that due to declining or relatively slow growth in global demand for primary commodities, their relatively low income elasticity of demand and the persistent protection in developed countries agricultural sectors, any attempt to raise export earnings through expanding primary export supply is self-defeating because it will lead to declining prices. It is indeed likely that growing primary exports from Africa will tend to make commodity prices lower than they otherwise would be, thus requiring increases in Africa's export volumes to exceed any given increase in export values. But for most commodities this price decline will not be large because of the smallness of Africa's shares in the world markets for most primary commodities. More importantly, rising global demand for primary commodities could moderate, or even compensate, the fall in prices caused by expanded African supply. Growing world demand for primary exports from rapidly growing natural-resource-poor Asian countries, particularly large ones such as China and India, has sharply increased Africa's potential for primary commodity exports. Africa's exporters will benefit directly from increasing their exports to China. Moreover, given the price effect from rising Asian demand, Africa's earnings from primary commodity exports will rise even if it does not sell directly to these Asian countries.

The paper is organized as follows. The next section uses an updated dataset to revisit the analysis and results of Wood and Mayer (1998, 2001; henceforth WM) that section III employs to calculate by how much Africa's exports of both primary products and manufactures would be higher if the region had Latin America's current per capita income level. Section IV examines Africa's prospects to achieve such a rise in its primary exports without facing declining prices. After briefly addressing Africa's supply potential for primary exports, it concentrates on new export opportunities provided by (i) improved market access to, and the elimination or substantial reduction of domestic support measures and export subsidies by, developed countries in the context of ongoing WTO negotiations on agriculture; (ii) meeting market entry conditions and standards and regulations associated with international trade in food products; and, in particular, (iii) a sustained increase in China's demand for primary imports. Section V summarizes the main conclusions and discusses actions required at both the national and international level for Africa to raise agricultural productivity and seize emerging opportunities to expand its primary exports.

II. AFRICA'S EXPORT PERFORMANCE IN COMPARATIVE PERSPECTIVE REVISITED

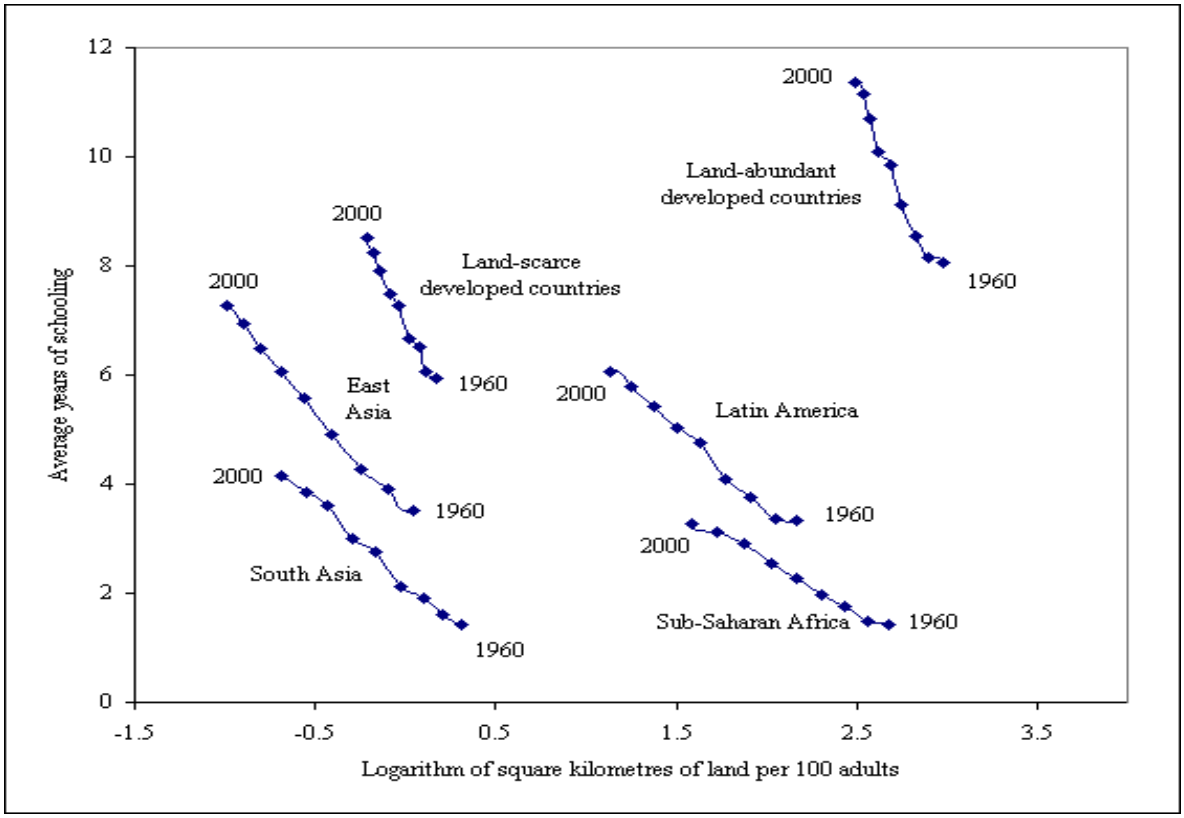
This section uses an updated dataset to revisit the analysis and results of WM and Wood (2003). WM and Wood (2003) use the Heckscher-Ohlin (henceforth HO) trade theory, which predicts that the composition of a country's exports depends on the composition of its resources. They concentrate on relative endowments of labour, land and human capital but omit capital (physical and financial) from the list of

[2] Using a sample of nine African countries, Söderbom and Teal (2003) show that there is a positive association between growth of income and growth of exports, while they find no evidence that manufactured exports have a stronger effect on aggregate income than other exports. The distribution of the rents associated with rising exports of primary products, particularly from extractive industries, between foreign and domestic agents, and the use of these rents, influence the developmental impact of growing primary exports. However, such distributional issues are beyond the scope of this paper. For discussion see, for example, UNCTAD (2005a and 2005b).

resources. Though of vital importance as an input to production, capital 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.[3] Moreover, there are strong complementarities between human and physical capital. Contrary to some other variants of the HO theory, the formulation in WM and Wood (2003) requires a much weaker and more plausible assumption on efficiency and factor-price equalization, 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 and that the skill-labour input ratio in manufacturing is always greater than in agriculture.

Figure 1 provides a view of the evolution of these two resource ratios for six groups of countries over the past four decades. The vertical axis measures the skill-labour ratio (h), proxied by average adult years of

Figure 1
Regional resource combinations, 1960–2000 (at 5-year intervals)
(Unweighted averages)



Sources: Barro and Lee (2001) and World Bank, *World Development Indicators*.

[3] 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, provided that investors expect favourable demand prospects and political stability. It may be useful to recall in this context that, although oil reserves in Chad and Sudan were discovered in the 1950s, their exploitation did not start until the twenty-first century. Moreover, because domestic capital markets are linked to international capital markets, the cost of capital is similar in most countries. There are exceptions to these generalizations, particularly in African countries where perceived political risk has been an important factor in limiting private capital inflows, but they appear to be a good first approximation of the truth.

schooling, and the horizontal axis measures the land-labour ratio (n), proxied by square kilometres of land per 100 adults. The six groups include the four main developing regions (Africa, East Asia, Latin America (including the Caribbean), and South Asia); and two groups of developed countries, divided on the basis of their land-labour ratios – land-scarce developed countries include Japan and Western Europe; while land-abundant developed countries include Australia, New Zealand, North America, and Scandinavia. Three of the six groups are land abundant (Africa, Latin America, and land-abundant developed countries) and three are land scarce (South Asia, East Asia, and land-scarce developed countries). In terms of skill-labour ratios, the six groups divide into three pairs: two at low levels of education (Africa and South Asia): two at intermediate levels of education (East Asia and Latin America); and the two highly educated developed country groups.[4] One striking feature of figure 1 is how much the composition of resources varies among regions. The other striking feature is how little the pattern of variation changed between 1960 and 2000. There are some differences in the degree of movement upwards and leftwards, but for the most part the positions of regions relative to one another were the same in 2000 as they had been in 1960. It seems likely, moreover, that the persistence of this pattern over the past few decades will be a feature also of the next few decades: even large increases in school enrolment rates feed through only slowly to the average education level of the labour force, and population growth rates will not differ by enough to alter the ranking of regions by land-labour ratios.

Wood (2003) analyzes the economic effects of these differences in factor endowments ratios on the basis of a Heckscher-Ohlin model set out by Krueger (1977) and extended by Leamer (1987). In this model, accumulation of physical and human capital drives growth by raising labour productivity and per capita income. The model shows that the sectoral structures of production and trade evolve differently in the course of development in different countries, depending on their initial land-labour ratios. At any given level of capital per worker, a country with more land per worker will have a larger primary sector and a smaller manufacturing sector than a country with less land per worker. Thus, land-abundant countries, or regions such as Africa, are likely to remain net exporters of primary products for longer than land-scarce countries. Indeed, primary products may account forever for a sizeable share of these countries' exports. This means that as Africa develops, the structure of its exports will resemble more that of Latin America or land-abundant developed countries than that of East and South Asia or Western Europe.

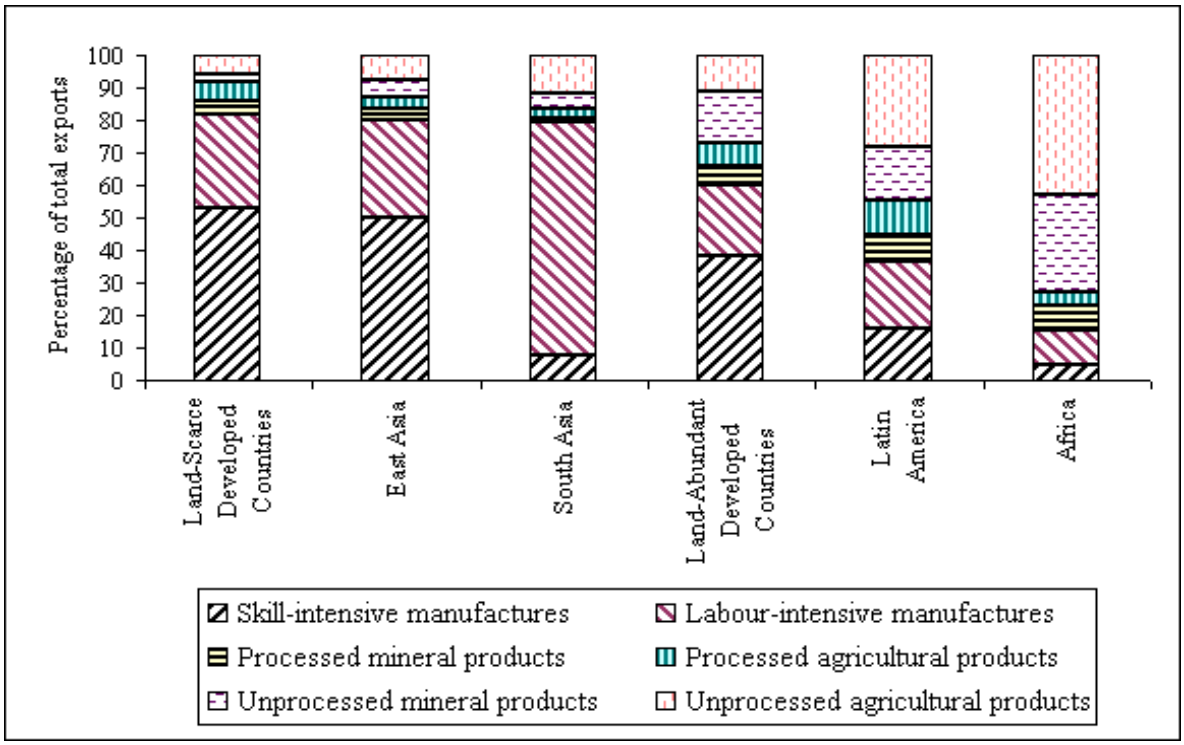
Turning to export structure, WM divide merchandise exports into four broad sectors: (i) manufactures (*NM*), based on the narrow definition of trade statistics which include categories 5 through 8 less 68 (non-ferrous metals) of the Standard International Trade Classification (SITC); (ii) primary products (*BP*), which follows the broad SITC-definition – and thus includes also natural-resource-based products made in factories (such as canned food, paper, and refined petroleum) that production and employment statistics, based on the International Standard Industrial Classification (ISIC), include into their category of manufactures; (iii) within primary products, they separate unprocessed (or "narrow") primary products (*NP*) from processed primary products (*PP*) which are the goods that are classified in ISIC as manufactures but in SITC as primary products; and (iv) within the category of manufactures, they separate goods of high (*NMH*) and low (*NML*) skill intensity. Further disaggregations lead to divisions of (i) processed primary products into processed agricultural products (*PPA*) and processed fuels, minerals and metals (*PPM*); and (ii) unprocessed primary products into unprocessed agricultural products (*NPA*)

[4] It is clear that there is, sometimes wide, variation in terms of both the land-labour ratio; and less so, the skill-labour ratio among the countries within all six groups. Nonetheless, regional averages provide a useful broad-brush starting point for further analysis. For further discussion of intra-group variations, see WM and Wood (2003:165–166).

and unprocessed fuels, minerals and metals (*NPM*). Combining unprocessed and processed agricultural primary products gives total agricultural primary products (*BPA*).[5]

Using this categorization, figure 2 shows the actual export structure of the six country groups as averages for the period 1999–2001. In accordance with the Krueger-Leamer model there are differences between land-abundant and land-scarce groups at each level of development: the share of primary products in exports (the sum of the top four slices) is much larger for land-abundant developed countries than for land-scarce developed countries, for Latin America than for East Asia and for Africa than for South Asia. Also in accordance with the model, as the level of education increases within both the land-abundant and the land-scarce country groups, the share of primary products in exports falls and the share of processed items in primary exports rises (except between Latin America and land-abundant developed countries). It is also interesting to note that agricultural and mineral products are roughly of equal importance in Africa's total exports – a feature which Africa has in common with East Asia and land-abundant developed countries – while in the other three groups agriculture is of relatively greater importance in the respective group's total exports. This could indicate that a major part of staple food in Africa consists of crops that are non-tradeable internationally outside Africa. As discussed in more detail below, it could also reflect the fact that agricultural land in Africa is of lower quality than that in the other groups, that agricultural productivity is particularly low in Africa, or that market access and entry barriers are particularly high for agricultural products of export interest to African countries.

Figure 2
Regional export composition, 1999–2001
(Unweighted averages)



Sources: COMTRADE and estimates by UNCTAD.

[5] See Wood and Mayer (1998, Annex 1) for detailed discussion of these product categories.

Compared to data for the period 1989–1991 used by WM, the share of manufactures in total exports in 1999–2001 is higher in all six country groups, with the strongest absolute increase in East Asia and the strongest proportional increase in Africa. Most of the former is probably due to the rising importance of regional production sharing and associated double counting of exports measured in gross values. Part of the latter reflects a statistical effect caused by the lower average level of prices in 1999–2001 (compared to 1989–1991) for many primary commodities of importance for Africa's exports, including cocoa, coffee, cotton, copper, gold, etc. (UNCTAD 2003, Table 2.2).

The results of cross-country regressions that describe the relationships between export structure and factor endowments in 2000 are reported in table 1. They cover all countries with populations of over one million for which data are available.[6] The first regression shows that variation in manufactured-primary export ratios is rather well explained simply by variation in skill-land endowment ratios. But the second

Table 1
Regressions explaining sectoral export structure, 2000

	Dependent variable	*Constant*	*Coefficients on independent variables*				*F-value*	*R2*	*Adjusted R2*
			h/n	*h*	*n*	*p*			
(1)	NM/BP	–4.83***	0.81***				90.6	0.46	0.45
		(–13.00)	(12.27)						
(2)	NM/BP	–7.52***		1.39***	–0.58***	0.28***	39.6	0.53	0.52
		(–9.47)		(5.04)	(–6.56)	(3.04)			
(3)	NM/BPA	–5.88***		1.59***	–0.35***	0.28***	40.8	0.54	0.52
		(–7.48)		(6.46)	(–3.77)	(3.81)			
(4)	PP/NP	–3.81***		1.61***			64.6	0.38	0.37
		(–8.76		(6.79)					
(5)	PP/NP	–4.56***		1.51***	–0.10	0.08	22.2	0.39	0.37
		(–6.48)		(5.66)	(–1.24)	(0.65)			
With Africa dummy variables									
(6)	NM/BP	–7.91***		1.23***	–0.66***	0.34***	21.0	0.59	0.56
		(–5.97)		(3.21)	(–5.96)	(2.90)			
Africa dummy variable coefficients									
		5.01**		–0.43	0.47	–0.43			
		(2.15)		(–0.73)	(2.07)	(–1.76)			
(7)	PP/NP	–4.02***		1.40***	–0.16	0.01	10.0	0.41	0.37
		(–3.27)		(3.92)	(–1.56)	(0.05)			
Africa dummy variable coefficients									
		–0.62		–0.14	0.30	0.15			
		(–0.29)		(–0.25)	(1.40)	(0.66)			

Source: Authors' calculations.

Notes: Dependent variables are export ratios. NM = narrow manufactures. BP = broad primary products. BPA = broad agricultural primary products. PP = processed primary products. NP = unprocessed primary products. 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. All regressions are ordinary least squares with White heteroskedasticity-consistent standard errors and covariance. *** significant at 99 per cent confidence level. ** significant at 95 per cent confidence level. * significant at 90 per cent confidence level. 109 countries in all regressions, of which 35 are African countries.

[6] Contrary to the regressions in WM, the regressions that underlie the results reported in Table 1 exclude Liberia and Sierra Leone because their recent export data do not include diamonds. Thus, the two countries have an improbable large share of manufactures in their total exports. Skill data for 12 African countries and 5 countries in MENA were imputed as described in Appendix II. WM discuss the properties of the regressions, results of diagnostic tests and the inclusion of trade policy variables, and potential weaknesses of the resource variables.

regression improves the explanation by splitting the skill-land ratio into two separate factor ratios (skill-labour and land-labour), which allows also for variation in labour intensity, and including a country size variable (*p*) to allow for economies of scale in manufacturing. It shows that the ratio of manufactured to primary exports tends to be higher in countries that have more skill per worker and less land per worker and that are bigger. These results confirm those in WM. In regression (3), where the denominator of the dependent variable is agricultural rather than total primary exports, the coefficient on *n* is smaller than in regression (2). This implies that the share of agriculture in primary exports falls as the land-labour ratio (*n*) rises, indicating systematic variation in agricultural land quality (i.e. the quality of agricultural land is lower in sparsely populated countries, but such countries have an even stronger comparative advantage in mining).

Regressions (4) and (5) explain cross-country variation in the ratio of processed to unprocessed primary exports. In the full specification (5), 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 (4), with *h* as the sole explanatory variable, fits the data almost as well as the full specification.

To see whether there are significant differences between Africa and the rest of the world regarding the relationship between export structure and resources, regressions (6) and (7) include dummy variables, allowing the intercept and the *h*, *n* and *p* slopes to differ between Africa and all other countries. The results show that there are no significant differences between Africa and the rest of the world in the processed/unprocessed primary export dimension (regression 7), but that there are some differences in the manufactured/primary export dimension (regression 6). The coefficient on the h dummy variable in regression (6) is insignificant, indicating that a higher level of skill raises the share of manufactures in exports to the same degree within Africa as among non-African countries. By contrast, the coefficient on the *n* dummy variable is positive and significant, indicating that there is less difference in manufactured export ratios between high-*n* and low-*n* countries within Africa than elsewhere. The coefficient on the *p* dummy variable is also statistically significant showing that variation in country size has less effect within Africa than elsewhere. These results also support the findings in WM.

To shift from the discussion of Africa's average export structure and its average combination of human and natural resources to an assessment of these relationships for individual African countries, the results of regression (6) can be used to predict the export structure of each country, and these predictions can then be compared with each country's actual export structure. Table 2 shows, for each African country, the predicted and actual share of manufactures in total merchandise exports for 1990 and 2000. The table shows that for the majority of the 35 countries both the actual and predicted shares in 2000 are higher than in 1990. But given that actual shares increased more than predicted ones, the discrepancies between actual and predicted shares became smaller. These discrepancies are particularly large, for both 1990 and 2000, in a number of countries with low levels of land per worker, including Burundi, Ghana, Malawi, Nigeria, Rwanda, and Uganda. This is another reflection of the above finding that there is a smaller difference in

Table 2
Actual and predicted export composition of African countries, 1990 and 2000
(Percentages and percentage points)

	Share of manufactures in total exports 1990			*Share of manufactures in total exports 2000*		
	Actual	*Predicted*	*Actual minus predicted*	*Actual*	*Predicted*	*Actual minus predicted*
Angola	0.3	6.5	-6.2	0.4	6.9	-6.5
Benin	4.5	11.0	-6.5	6.0	13.1	-7.0
Burkina Faso	7.2	7.2	0.0	16.6	6.0	10.5
Burundi	4.0	20.1	-16.1	0.6	20.3	-19.7
Cameroon	8.2	16.8	-8.6	4.4	20.1	-15.7
Central African Republic	2.2	3.0	-0.8	5.3	3.3	2.0
Chad	4.7	2.1	2.6	5.2	1.7	3.5
Congo	4.4	9.0	-4.6	2.0	8.5	-6.5
Côte d'Ivoire	5.7	19.2	-13.5	17.2	23.3	-6.2
Democratic Rep. of the Congo	5.1	15.4	-10.3	3.3	18.2	-14.9
Ethiopia	4.1	20.4	-16.3	10.4	25.3	-14.9
Gabon	4.0	4.7	-0.7	3.2	3.6	-0.4
Gambia	0.6	10.7	-10.1	15.7	13.5	2.2
Ghana	3.2	32.1	-28.9	12.5	36.8	-24.2
Guinea	0.7	8.3	-7.6	21.8	8.2	13.6
Guinea-Bissau	4.6	2.4	2.2	1.1	1.9	-0.8
Kenya	21.1	27.9	-6.8	22.1	35.3	-13.2
Madagascar	14.2	16.3	-2.1	25.1	17.8	7.3
Malawi	4.9	24.2	-19.3	10.8	29.6	-18.8
Mali	0.6	2.3	-1.7	7.9	1.8	6.1
Mauritania	0.8	1.0	-0.2	2.6	1.7	0.9
Mauritius	61.2	64.8	-3.6	74.4	64.1	10.3
Mozambique	46.4	5.3	41.1	9.0	4.9	4.0
Niger	1.7	1.6	0.1	20.0	1.8	18.2
Nigeria	0.9	37.8	-36.9	0.3	45.4	-45.1
Rwanda	0.8	31.8	-31.0	2.3	39.9	-37.6
Senegal	13.5	14.8	-1.3	37.7	15.7	21.9
Somalia	5.0	4.4	0.6	6.7	3.0	3.6
South Africa	28.6	37.5	-8.9	49.7	47.5	2.3
Sudan	4.8	6.3	-1.5	5.0	8.7	-3.8
Tanzania, United Rep. of	9.9	18.4	-8.5	8.8	19.9	-11.1
Togo	8.5	20.8	-12.3	35.3	22.5	12.8
Uganda	0.8	20.5	-19.7	4.8	36.4	-31.7
Zambia	4.0	14.2	-10.2	20.2	17.5	2.8
Zimbabwe	34.4	18.2	16.2	23.3	28.2	-4.9
Memo item:						
Regional average (unweighted)	9.3	15.9	-6.6	14.0	18.6	-4.6

Source: Authors' calculations.
Notes: Predicted shares based on coefficients of regressions excluding African countries.

manufactured exports shares between low-*n* and high-*n* countries within Africa than in the rest of the world.[7]

Taken together, the results in tables 1 and 2, based on data for 2000, reproduce the results in WM and Wood (2003), based on data for 1990. The relationships between export structure and resource endowments have remained largely unchanged over the past few years and the HO approach that underlies these results provides a useful tool for analysing these relationships on the basis of broad product categories even over a period of time, rather than just for one specific year. Measurement errors in the resource and trade data are likely to be part of the reason why all of the regressions leave half or more of the cross-country variation in export structure unexplained. Moreover, trade and exchange rate policies, which are omitted from HO theory, have a systematic influence on trade. Finally, trade data refer to gross exports, while trade theory refers to net exports. Indeed, the rising difference between gross and net exports associated with the growing importance of international production sharing over the past few years, combined with wide variation across countries in their involvement in international production networks, could be a reason why most of the regressions for 2000 have a lower fit than the regressions for 1990 reported in WM and Wood (2003).[8]

III. RISING PER CAPITA INCOME AND THE IMPLIED RISE IN AFRICA'S PRIMARY EXPORTS

This section uses the Krueger-Leamer model in combination with the regression results of the previous section for some rough calculations as to the rise in primary exports that would accompany a rise in Africa's average per capita income to Latin America's current level. Per capita income growth sustained at about 7 per cent per annum – i.e. the rate generally quoted as required for Africa to meet the Millennium Development Goals by 2015 – would allow Africa to reach Latin America's current level of per capita income roughly within the coming two decades. The question examined in this section is, given that Africa as a region has a comparative advantage in primary exports (i.e. a large share of its exports will continue to consist of primary products), what rise in the quantity of primary exports does a rise in Africa's per capita income to Latin America's current level imply?

Latin America's per capita income in terms of purchasing power parity currently is slightly more than 4 times that in Africa. However, Africa's primary exports will increase less than its income because (i) the share of the primary sector in total output will decline, and (ii) its export-GDP ratio will decline as income rises, given that internal economic integration is likely to increase. Using plausible assumptions on these two factors, some rough calculations – which Appendix I explains in some detail – show that Africa's primary exports will roughly be three times their level in 2000 when the region reaches Latin America's current per capita income. They also imply that Africa's manufactured exports will be about 7 times their level in 2000. It is clear that these calculations are crude and they should not be understood as a precise estimate, as discussed in Appendix I. But they most likely are of the right general magnitude.

[7] For some countries, the reported rise in the share of manufactures in actual exports is due to a strong rise – which is sometimes temporary and partly reflects re-exports – in the exports of one or two products, such as exports of textile yarn and articles from Burkina Faso; printed matter from Guinea; passenger motor cars and woven cotton fabrics from Niger; and lime, cement and building materials from Togo. By contrast, the reported rise in the share of manufactures in Zambia's exports reflects a decline in the value of copper exports.

[8] Part of the decline in the statistical fit of the regressions is also caused by the use of a different source for the export data, as explained in Appendix II.

Tripling its primary exports over the next two decades from the level reached in 2000 would imply a rise in the value of Africa's primary exports by about US$95 billion. This number is a particularly rough estimate because price fluctuations often cause the value of Africa's primary exports to change by 20–25 per cent from one year to the next. In this context, it may be useful to recall that between 1990 and 2000 the value of Africa's primary exports rose fourfold but that this represented a rise by only 60 per cent over their level in 1980. Assuming the value of total world primary exports to remain at its level in 2000, tripling Africa's primary exports implies an increase in its world market share to about 12 per cent[9] – 7 per cent for food products, 8 per cent for agricultural raw materials, 12 per cent for minerals and metals, and 19 per cent for fuels. Hence given the current low world market share of Africa in all but a few products, growth of the region's primary exports could greatly exceed growth in world demand without, for most primary commodities, causing strongly declining prices.

Rising global demand for primary commodities could moderate or even compensate the fall in prices caused by expanded African supply. This could be the case in particular because of continued rapid growth in natural-resource-poor Asian countries, especially large ones such as China and India. Rising demand from these countries will increase Africa's potential for primary exports both directly, through expanding exports from Africa to China and India, and indirectly, because the price effect from rising Asian demand will increase Africa's earnings from primary exports even if Africa's exporters do not sell to these Asian countries.

IV. PROSPECTS FOR EXPANDING AFRICA'S EXPORTS OF PRIMARY COMMODITIES

This section discusses the opportunities for Africa to substantially increase its primary exports. Africa's share in world primary exports has declined over the past two decades in spite of the fact that many African countries have enjoyed preferential access to developed country markets. It is therefore of crucial importance for African governments to address failures on the supply side, such as insufficient production capacity, weak macroeconomic management and physical infrastructure, little technological capabilities to produce and export a product competitively, etc.

Most of these supply constraints apply across all sectors and thus need to be removed in any case to achieve the rise in income assumed in the previous section. Others specifically regard primary exports. For example, Gabre-Madhin and Haggblade (2004:754) argue that the further development of key agricultural support institutions (such as national agricultural research organizations, farmer organizations, market information systems, etc.), which provide collective services, is critical to the expansion of production possibilities and improved agricultural performance. Moreover, countries whose main exports are bulk primary commodities are disadvantaged in terms of transport logistics, because their exports require large amounts of shipping space, while their imports tend to be finished products that require much less. As a result, many ships arrive empty to these countries, putting exporters at a disadvantage when negotiating with international shipping lines.

However, apart from a brief discussion of the supply potential of Africa's natural resource base in sub-section A, the remainder of this section does not examine supply constraints. Rather, it emphasizes

[9] This number refers to the standard definition of primary products as SITC 0 through 4 plus 68 and thus excludes gold and diamonds.

demand because the demand side of Africa's primary exports has not been given much attention in the literature and, most importantly, because there is less that is new to be said on the supply side. More specifically, sections B and C address the questions as to where African exporters of primary products could find markets which are large enough to absorb greater volumes without a decline in prices, and which products and African countries would benefit the most from rising exports.

A. Supply potential for primary exports

Does the quality of Africa's natural resource base allow the region to substantially expand its primary exports within the coming 20 years? Regarding mining, Africa is a major producer of several of the world's most important minerals and metals including bauxite, chromium, cobalt, copper, diamonds, gold, manganese, nickel, platinum group elements, and uranium. It is widely agreed that Africa has the potential for greatly increased output of many sorts of minerals (Gooding 1997). Most of this potential is confined to half the countries in the region. Improvements in physical infrastructure, particularly rail and road transport facilities, will be crucial to allow such opportunities to be seized beyond high-value products (such as gold and diamonds) and countries with long coastlines. But some of the other countries, whose geology offers little or no prospect of more hard-rock mineral production, have promising oil and gas reserves, such as Angola, Nigeria and countries in the Gulf of Guinea. According to media reports, Africa presently accounts for less than 5 per cent of proven global oil reserves but hosts about 20 per cent of new worldwide production capacity.[10] Successful exploitation of these reserves could lead to a rapid and very substantial increase in these countries' primary exports. At the same time, however, it would lead to a further increase of the already high share of petroleum – i.e. almost 50 per cent on an aggregate basis – in Africa's total primary exports.

Africa's agricultural output potential is more controversial. Tropical climate, diseases and pests degrade the quality of Africa's agricultural land. However, as discussed by Wood (2003:179–180), while Africa has land of lower quality than, for example, Asia, none of the available indicators of land quality suggests that this quality difference could cancel out Africa's tenfold advantage in land area per worker. Agricultural production in Africa takes place in a difficult, risky and fragile natural environment. However, serious undercapitalization and resulting low land and labour productivity are among the key problems of African agriculture (Ruttan 2002). Over the past few years, agricultural production growth has been achieved predominantly from area increases rather than from increased use of purchased inputs, especially seeds and inorganic fertilizers (Kydd et al. 2004). Sachs et al. (2004) argue that there is significant scope in Africa for a technological green revolution and its accompanying intensification of irrigation and fertilizer use. Some national yield differences are clearly due to agro-ecological differences, such as soil and climatic conditions, which cannot be narrowed. But others are the result of differences in crop management practices, such as the amount of fertilizer and irrigation used. According to the World Resources Institute (2003:250–251), fertilizer use in Africa is only 12 kilogram per hectare of cropland compared to the world average of 92 kilogram, and only 4 per cent of total cropland is irrigated compared to the world average of 18 per cent. Gabre-Madhin and Haggblade (2004:760–761) also document that agricultural growth in Africa is "clearly possible" even though the individual success cases in their study "have simply not been sufficient in numbers or scale to keep pace" with the daunting challenges.

[10] *Oxford Analytica*, "Prospects 2005: African oil/gas key to global demand", 22 December 2004.

B. Opportunities for raising exports to main developed countries

The importance of developed countries as a destination of Africa's primary exports has substantially declined over the past few years. They, nonetheless, continue to account for about 60 per cent of Africa's non-fuel primary exports and about 75 per cent of its fuel exports (down from 70 per cent and 85 per cent in 1990, respectively). Thus, access and entry conditions on developed country markets will continue to have a sizeable influence on Africa's export opportunities for primary commodities.

Border protection, domestic support and export subsidies in the main developed countries have been major factors affecting world agricultural markets and hampered agricultural production and exports in Africa.[11] It is widely recognized that the implementation of the Uruguay Round Agreement on Agriculture has only modestly reduced the level of border protection in the main developed countries (Aksoy 2005). Moreover, in 2003, producer support in developed countries amounted to $257 billion, equivalent to almost one-third of gross farm receipts (OECD 2004).

It is clear that current multilateral trade negotiations need to address remaining agricultural protection. However, estimates indicate that the percentage rise in Africa's exports following multilateral agricultural liberalization will be modest (Laird, Cernat and Turrini 2003), at least in the short run. On the other hand, the rise in world prices that would be a likely result of the abolition of domestic support and export subsidies in developed countries would provide incentives for investment and productivity growth and, thus, tend to stimulate agricultural production in Africa in the long run.

Export diversification into market dynamic products represents another opportunity for Africa to raise primary exports to developed countries. Horticultural products have been the most dynamic agricultural product category in world trade over the past few years. Moreover, compared to Africa's traditional exports to developed markets (such as cocoa, coffee, cotton, sugar, etc.), price and demand prospects are more favourable for horticulture and seafood, as well as differentiated products such as niche coffee varieties, mainly because of the relatively high income elasticity of demand of these products.

However, market entry conditions in the form of product and quality standards, health and safety requirements, and environmental and labour standards have become important determinants of accession to global value chains that are dominating international trade in food products. The main difference between market access and market entry conditions is that the former are subject to international jurisdiction under WTO-rules, while the latter are often private standards or codes of practices set by dominant retail chains (such as supermarkets) and large distribution networks in order to manage quality and safety issues in the supply chain of food products. International trade and marketing of food products have in principle been covered by several WTO-agreements, including the Agreement on Agriculture and the agreements on technical barriers to trade (TBT) and on sanitary and phyto-sanitary measures (SPS). But in most cases large retailers and distribution networks impose standards that are more stringent than government regulations, which reflect the requirements of WTO-agreements, and thus in practice determine the binding constraints in food supply chains (UNCTAD 2004a).

[11] Tariffs on minerals and metals are generally low or non-existent, and there are few non-tariff measures affecting developing-country exports of these products. However, anti-dumping actions concerning minerals and metal products have become increasingly common.

The main objective of standards and regulations on food production and processing is to ensure that the quality, health and safety concerns of consumers are met. These consumer concerns have put enormous pressure upon the food and retail industry to improve farming practices in accordance with quality and safety standards and to arrange transparency and traceability in the supply chain. The greater role of health and quality standards in international trade of food products is intimately linked to the increased concentration and vertical integration of different stages of the supply chain. Standards, particularly those relating to product quality, are increasingly shaping access to global value chains and, given concentration, become a sine qua non for market entry. The food retail business in Europe and North America has gone through an intense process of mergers and acquisitions, combined with internal growth, particularly in the late 1990s. As a result, the market share of the top retailers now exceeds 50 per cent in most EU countries and in the United States (UNCTAD 2004a).

There is some indication that consolidation and globalization of retail distribution chains have been accompanied by a reduction in the share of the retail price received by developing-country suppliers, as reflected in widening spreads between consumer prices and international commodity prices. Morisset (1998) shows that fuels and coffee, i.e. two commodities that are key export products in many African countries, have seen the widest decline in the ratio between world and consumer prices in importing countries. He also shows that coffee is the sector where price asymmetry is greatest and that this asymmetry has been caused largely by the dominant position of the international trading companies on the world market.[12] The broad movement towards greater bargaining power of large retailers, processing companies and distribution networks in the global value chains of many commodities has allowed them to impose stricter requirements on suppliers in terms of quality, technical specifications, delivery of a minimum volume of a given variety with consistent quality, and the nature of the production process, possibly including identification of a social and environmental content.

Matching these requirements is likely to impose additional costs for suppliers, ranging from upgrading management skills to new equipment purchase and establishment of quality control and coordination systems. Indeed, while this situation may create opportunities for those who succeed in entering global value chains, it carries the risk of marginalizing and excluding a large number of producers, processors and traders from developing countries who are unable to respond quickly to the new requirements due to lack of access to information, know-how or financing.

Distribution networks increasingly dominate food retailing also in developing countries. In Africa, supermarkets have spread very quickly over the past 5–10 years in Southern and then Eastern Africa, while there still are only a few of them in the relatively poorer regions of West and Central Africa (Weatherspoon et al. 2003). Nonetheless, the leading supermarket chains have far reaching expansion plans across Africa. The increased density of supermarkets across Africa is due to urbanization, population growth, and rising income with the ensuing growing demand for inexpensive products and the convenience of one-stop shopping with consistent product availability and high quality. Moreover, domestic marketing and cross-border trade liberalization have allowed retailer and distribution chains to spread across national borders.

[12] It is clear that the spread between consumer and international commodity prices also reflects differences in wages between the countries concerned. In this sense, retailing would appear to absorb a large share of the consumer price mainly because the labour involved in retailing gets paid many times more than farmers in the producing countries. But the fact that retailers are in fierce competition among themselves may imply that they try to roll over cost-saving pressure on suppliers.

Supermarkets have more direct contacts with food producers and processors. Contrary to small retail shops or street hawkers they, thus, do not procure their produce from wholesale markets. More important, most supermarkets apply stringent private standards regarding pesticides and microbial residues, as well as quality requirements regarding size, colour, etc. These large chains tend to move towards requiring European Private Retail standards (EUREP) certification of all suppliers and some supermarkets apply Hazard Analysis at Critical Control Point (HACCP) rules for perishables and fresh products like fruits, vegetables, fish and meat. According to Weatherspoon et al (2003) such sophisticated supermarket supply systems are likely to emerge into a dominant position in Africa, following the pattern of other regions. Hence, supermarket supply systems will increasingly determine the conditions and the potential for domestic producers to sell food products to the domestic urban markets, so that the distinction in quality requirements between world and local food markets is fast disappearing. As a result, African producers will increasingly need to meet the requirements of supermarkets in domestic markets, but doing so will qualify them also to enter food value chains that supply developed markets.

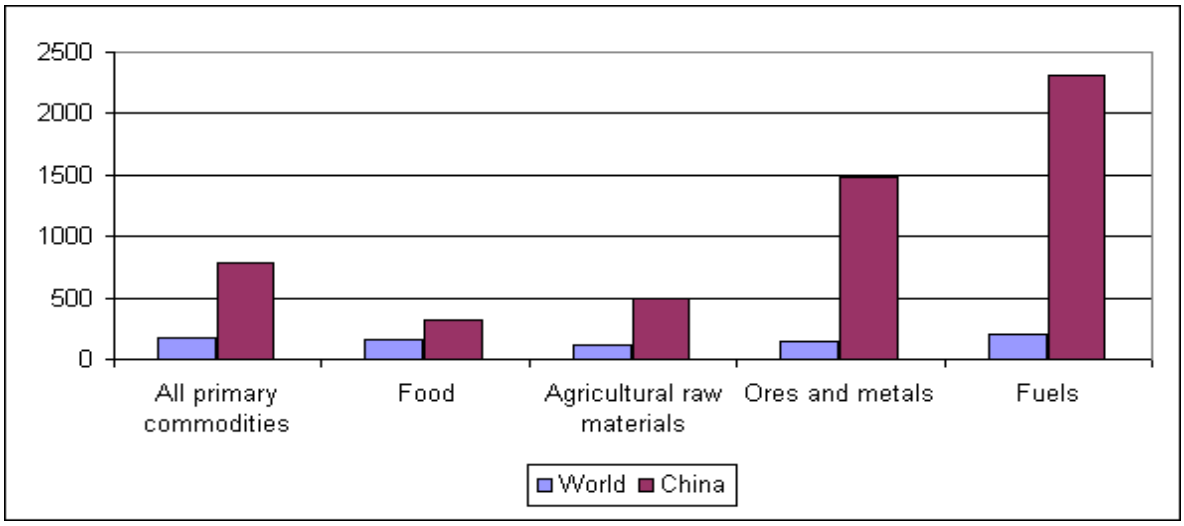
C. Export opportunities from rapid industrialization and income growth in Asia

The emergence of large, populous and natural-resource-poor Asian developing countries, particularly China and India, as a growth pole of the world economy has created new export opportunities for natural-resource-rich countries. This is because per capita income growth generally leads to both a strong rise in food demand and a change in diets, and a sustained high rate of industrialization entails a more intensive use of raw materials, none of which natural-resource-poor countries may be able to meet from domestic production. Given the size of the Chinese and Indian economies – they account for almost 40 per cent of world population and 20 per cent of global income (measured in terms of purchasing power parity) – these two factors have a profound impact on world commodity markets in terms of both prices and traded volumes.

The upward movement in commodity prices since 2002 has been driven by very strong demand and emerging supply constraints. Rising imports by China, and for some commodities also by India, have been the main sources of additional demand. Emerging supply constraints, particularly in the metals and energy sectors, have played a key role in the strong price reaction of commodity markets to the rising demand from China, India and other major importers. This rise in commodity prices has affected all commodity groups, but has been most marked for minerals, ores and metals. While there are downside risks, most medium-term commodity price projections indicate continuous strong demand, although prices may decline in response to rising supply (AIECE 2004).

Sustained rapid industrialization and income growth, as well as sizeable investment in infrastructure, have led to China's emergence as the world's largest consumer of many primary commodities. While China is also a major producer of several commodities, in many cases domestic producers have been unable to meet rising demand. The resulting surge in China's imports, particularly since 2002, contrasts sharply with the slow growth in total world imports of primary commodities. China's primary imports have increased most in the fuels and minerals and metals categories (figure 3).

Figure 3
Rise in total world and China's imports of primary commodities, by major commodity groups, 1990–2003
(1990 = 100)



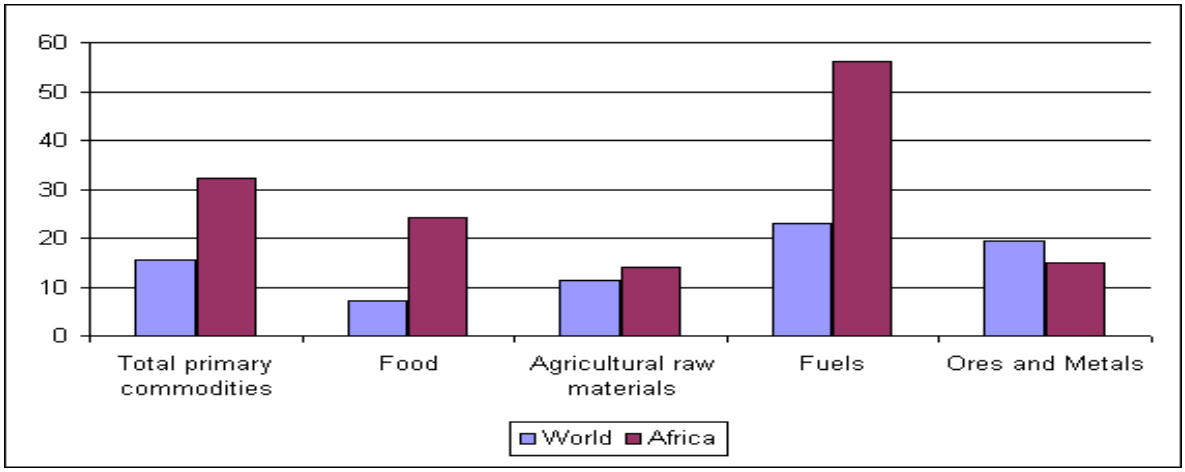
Sources: COMTRADE and estimates by UNCTAD.

Given its much slower pace of industrialization and lower investment in infrastructure, the increase in India's primary imports has been much lower than in China. However, if the role of industrialization in India's further economic ascent is similar to that in China, the growth and pattern of its primary imports may evolve similar to that of China, but with a lag of one or two decades. The remainder of this paper concentrates on rising demand for primary imports from China, because its impact can already be traced in the data, and, as already mentioned, because the surge in China's primary imports may indicate the future development of India's imports.

1. The recent rise in Africa's primary commodity exports to China

Strong dynamism in China's primary imports has been associated with particularly rapid expansion of imports from Africa. During 1999–2003, China's imports in all major primary commodity categories, except ores and metals, grew significantly more rapidly from Africa than from the world as a whole, the difference being most significant in fuels (figure 4). As a result, the share of Africa in China's primary imports has strongly increased over the past decade for all major primary commodity categories, except ores and metals (table 3). This is true in particular for fuels, where Africa's market share increased almost tenfold and accounted for over 16 per cent of total Chinese imports in 2003. The table also shows that the absolute value of China's imports from Africa rose almost 15-fold over the past decade. This rise started from very low levels and China still accounts for only about 8 per cent of Africa's total primary exports. It, nonetheless, represents more than a tripling of the importance of China as a destination for Africa's primary exports, the rise in China's market share in Africa's primary exports being highest in fuels and agricultural raw materials (table 4).

Figure 4
China's primary imports from world and from Africa, by major commodity groups, average annual rate of growth, 1994–2003
(Per cent)



Source: COMTRADE.

Table 3
Share of Africa in China's total imports, by major commodity groups, 1994–2003
(Per cent)

							Memo item: *Change in absolute value 1994–2003 (per cent)*	
	1994	*1996*	*1998*	*2000*	*2002*	*2003*	*Total imports*	*Imports from Africa*
Total primary commodities	2.6	3.4	3.1	8.8	7.6	8.1	362	1348
Food	0.6	1.0	0.9	1.7	2.1	1.5	195	628
Agricultural raw materials	3.2	4.4	4.3	4.3	4.4	5.4	214	437
Fuels	1.7	4.0	3.7	17.3	15.1	16.4	622	6976
Ores and Metals	5.4	4.8	3.7	3.7	4.1	3.6	495	299

Source: COMTRADE.

Table 4
Share of China in Africa's total exports, by major commodity groups, 1994–2003
(Per cent)

							Memo item: *Change in absolute value 1994–2003 (per cent)*	
	1994	*1996*	*1998*	*2000*	*2002*	*2003*	*Total exports*	*Exports to China*
Total primary commodities	1.3	1.2	1.0	2.7	3.5	4.6	290.7	1281.6
Food	0.8	0.7	0.2	1.0	0.4	0.5	94.0	12.1
Agricultural raw materials	2.5	5.4	3.0	5.0	5.9	8.5	85.9	541.0
Fuels	0.5	0.1	0.5	2.8	4.2	5.5	668.5	8198.9
Ores and Metals	3.5	3.2	3.4	3.7	5.3	5.7	217.1	417.0
Memo item:								
Total merchandise exports	0.8	0.8	0.7	2.0	2.6	3.8	120.5	1000.3

Source: COMTRADE.

Table 5 provides product-specific evidence on China's primary imports focusing on the 20 most dynamic primary commodities in China's imports, which are ranked by average annual import value growth during 1999–2003. The left-hand panel of the table concentrates on the importance of these products in China's imports and shows for each of the 20 products the share in China's total imports, China's share in total world imports, Africa's share in China's imports, and the main country of origin in Africa. The right-hand panel of the table provides the same evidence from the perspective of Africa's exports.

Three out of the 20 most dynamic products in China's primary imports are petroleum products, which taken together accounted for over 6 per cent of China's total merchandise imports in 2003. It is useful to recall in this context that in 2004 the country was the sixth largest producer of oil and the leading producer of coal worldwide, and that coal (much of it domestically produced) accounted for 69 per cent of its total energy use (BP 2005). Nonetheless, growing energy needs in industry, rising oil demand in transportation and the declining use of coal in residential housing over the past few years have caused China to emerge as the world's second largest oil-consuming country. Indeed, between 2003 and 2004, China's petroleum imports increased by more than 40 per cent, accounting for more than 30 per cent of the incremental global oil demand (IEA 2005). The table also illustrates the importance of petroleum in Africa's total primary exports, where it is the single most important product, as well as in Sino-African trade. In 2003, Africa was the origin of about one-quarter of China's crude petroleum imports, and China was the destination of over two-thirds of Africa's refined petroleum exports (although of less than 1 per cent of its crude petroleum exports).

Six of the 20 products in table 5 are agricultural raw materials, where Africa accounts for about 20 per cent in China's imports of both cotton and wood. Regarding wood products, rapidly growing demand due to the rise in furniture exports and domestic construction has contributed to China's emergence as the world's largest importer of tropical sawnwood and pulp and paper, and as the second largest importer of veneer (ITTO 2003). Table 5 shows that China sources over 20 per cent of its log imports from Africa, while China is the destination of about 13 per cent of Africa's log exports. Regarding cotton, China accounts for about one-fourth of world production (in volume terms) and, as the world's leading cotton consumer, its represents approximately one-third of total world imports. Thus, combined with a bad harvest in 2003, increasing demand for its booming clothing industry has led to rising imports, which strongly influenced the sharp rise in international cotton prices in 2003. Partly as a result of this price surge, Africa's cotton exports to China quintupled between 2002 and 2003, and China accounted for almost 20 per cent of Africa's total cotton exports. But given that Africa is the origin of over 10 per cent total world cotton exports, the rise in cotton prices led to a substantial rise in the region's earnings from cotton exports even to other destinations. This shows that Africa's primary exports can benefit not only directly, but also indirectly from growing commodity consumption in China through rising world prices or by replacing exports to third markets from countries that have redirected their exports to China.[13]

The boom in China's manufacturing and construction sectors has strongly increased demand for metals and minerals, particularly copper, iron ore and nickel. It has also contributed to the strong rise in world prices for some of these commodities since 2002. The share of Africa in China's imports has remained at

[13] The same argument can be made also for those products in Table 5 for which China imports no or only marginal quantities from Africa, in particular natural rubber and vegetable oils.

Table 5

Import value growth, share in total imports and origin of the 20 most dynamic primary commodities in China's imports, 1999–2003[1]

(*Per cent*)

Rank	*SITC code*	*Product group*	*Average annual import value growth 1999–2003*	*Share in total imports by China 2003*	*Share of imports by China in total world imports 2003*	*Share of Africa in total imports by China 2003*	*Main origin of China's imports from Africa, share in total imports in 2003 by China (In brackets)*		*Share of China in total exports of Africa 2003*	*Share of Africa in total world exports 2003*	*Share in total African exports 2003*	*Main exporting countries in Africa, share in total world exports in 2003 (In brackets)*	
1	683	Nickel	71.2	0.2	8.9	4.3	South Africa (3.7)	Zimbabwe (0.5)	20.6	3.2	0.2	Zimbabwe (1.9)	South Africa (1.2)
2	263	Cotton	69.6	0.3	14.1	18.2	Benin (5.6) Burkina Faso (2.7)	Mali (2.3) Côte d'Ivoire (2.3)	18.3	12.3	1.0	Mali (9.3)[2] Benin (2.6)	Côte d'Ivoire (2.0) Burkina Faso (1.5)
3	282	Iron and steel scrap	44.3	0.3	9.5	0.1	South Africa (0.1)		6.0	0.7	0.1	South Africa (0.5)	
4	335	Residual petroleum products	35.2	0.3	8.3	0.7	South Africa (0.7)		3.0	1.5	0.2	South Africa (1.3)	Côte d'Ivoire (0.2)
5	232	Natural rubber, gums	34.5	0.3	17.2	..			0.0	2.8	0.2	Côte d'Ivoire (1.9) Cameroon (0.5)	Ghana (0.1) Liberia (0.1)
6	281	Iron ore and concentrates	33.9	1.2	29.1	5.9	South Africa (5.9)		35.2	5.7	0.6	South Africa (4.1)	Mauritania (1.6)
7	333	Crude petroleum	31.6	4.8	4.7	24.1	Angola (11.1) Sudan (7.2)	Congo (3.5) Eq. Guinea (1.6)	0.9	9.8	36.0	Nigeria (5.9) Angola (2.2)	Gabon (0.6) Congo (0.4)
8	423	Fixed vegetable oils, soft	31.6	0.3	9.1	–			0.0	0.6	0.1	Senegal (0.3) South Africa (0.1)	Kenya (0.1) Sudan (0.1)
9	287	Base metals ores and concentrates	28.6	0.9	15.0	5.5	South Africa (1.7) Gabon (0.9)	Congo (0.8) Dem. Rep. Congo (0.7)	7.7	6.1	1.3	South Africa (3.0) Guinea (1.2)	Botswana (0.6) Zimbabwe (0.6)
10	222	Seeds for soft fixed oils	27.9	1.3	25.1	0.1	Sudan (0.1)		3.6	0.7	0.1	Sudan (0.4) Ethiopia (0.2)	South Africa (0.1) Tanzania (0.1)

/…

Table 5 (concluded)

Import value growth, share in total imports and origin of the 20 most dynamic primary commodities in China's imports, 1999–2003[1]

(*Per cent*)

Rank	*SITC code*	*Product group*	*Average annual import value growth 1999–2003*	*Share in total imports by China 2003*	*Share of imports by China in total world imports 2003*	*Share of Africa in total imports by China 2003*	*Main origin of China's imports from Africa, share in total imports in 2003 by China (In brackets)*		*Share of China in total exports of Africa 2003*	*Share of Africa in total world exports 2003*	*Share in total African exports 2003*	*Main exporting countries in Africa, share in total world exports in 2003 (In brackets)*	
13	211	Hides and skins, excluding furs, raw	22.7	0.2	16.5	–			1.9	3.4	0.2	South Africa (1.6) Lesotho (0.3)	Somalia (0.3) Botswana (0.2)
14	036	Shell fish fresh, frozen	21.2	0.1	2.7	3.1	Mauritania (1.4) Somalia (1.2)	Senegal (0.2) South Africa (0.2)	1.8	4.1	0.7	Senegal (0.8) South Africa (0.7)	Mauritania (0.7) Madagascar (0.7)
15	682	Copper	20.5	1.4	17.1	1.7	South Africa (0.9) Zambia (0.4)	Namibia (0.4)	18.6	2.0	0.6	Zambia (1.7)	South Africa (0.3)
16	251	Pulp and waste paper	19.5	0.9	16.2	1.2	South Africa (0.8)	Swaziland (0.4)	10.4	2.2	0.4	South Africa (1.7) Swaziland (0.4)	Somalia (0.1)
17	034	Fish, fresh, chilled, frozen	19.2	0.3	4.4	0.6	Mauritius (0.2) Namibia (0.2)	South Africa (0.1)	1.2	3.9	0.9	Namibia (1.2) South Africa (0.9)	Tanzania (0.5) Senegal (0.4)
18	334	Petroleum products, refined	17.8	1.5	3.7	–			35.4	1.6	2.9	South Africa (0.7) Sudan (0.6)	Côte d'Ivoire (0.3) Kenya (0.3)
19	247	Other wood rough, squared	17.4	0.6	23.4	20.5	Gabon (8.4) Eq. Guinea (3.9)	Congo (3.2) Liberia (1.7)	32.2	6.0	0.4	Congo (1.9) Gabon (1.7)	Eq. Guinea (0.8) Côte d'Ivoire (0.4)
20	233	Rubber, synthetic, reclaimed	17.3	0.3	13.3	0.1	South Africa (0.1)		2.9	0.4	0.0	South Africa (0.4)	

Source: COMTRADE.

[1] Includes only those commodities whose share in China's total imports exceeds 0.1 per cent.

[2] In 2002; data for 2003 not available.

.. Not available.

– Negligible.

around 5 per cent in the case of iron ore and nickel and at less than 2 per cent for copper. By contrast, in 2003 China accounted for about 20 per cent of Africa's exports of copper and nickel, and for over 35 per cent of its iron ore exports. Moreover, similarly to the case of cotton, the price effect associated with China's surging imports has supported the growth of Africa's earnings from mineral and metal exports to other destinations.

Regarding food products, population and per capita income growth, combined with urbanization, have resulted in increased demand for food in China and to a shift in the composition of food consumption away from staples, such as cereals, roots and tubers, towards a rising share of meat (particularly poultry and pork), dairy products, fruits, vegetables, fish, and oil crops. Nevertheless, table 5 shows that China has succeeded in maintaining a high degree of food self sufficiency as only 5 food products are among the 20 most dynamic primary commodities in China's imports. Moreover, for most of these products the share in total Chinese imports has remained very small. The major exception to this is oilseeds – which includes soybeans – that is among the products in table 5 with the highest share in China's imports (only petroleum products and copper have higher shares). This reflects the strong rise in China's consumption and imports of animal feed in meat production. Looking at soybeans alone, China imports over half of its consumption and accounts for more than one-third of total world soybean imports. Indeed, the growing Chinese imports go a long way in explaining the rise in total world soybean imports by nearly 17 per cent between 2002 and 2003 (USDA 2004).

2. Projecting China's primary imports

This section examines (i) whether the rapid rise in China's primary imports is likely to continue and (ii) to what extent this could provide opportunities for Africa to triple its primary exports. Regarding the first question, several observers (e.g. Rumbaugh and Blancher 2004) have noted that the rapid rise in China's imports over the past 25 years is similar to that seen during earlier periods of industrialization in Asia, particularly in Japan and the Republic of Korea. Hence, the development of raw material imports by Japan and the Republic of Korea during their economic catch-up can broadly indicate the magnitude of China's future demand for primary imports. It may be argued that the rise in China's primary imports will generally be lower than that in Japan and the Republic of Korea since China has a relatively more abundant natural resource endowment. Thus, it could be argued, China can meet rising commodity demand longer from domestic production, and its supply response to a rise in world commodity prices will be larger than in Japan and the Republic of Korea. However, the much larger absolute size of China's land area requires much larger investment in infrastructure. Such investment has been a key driver of the recent rise in China's primary imports, as discussed above. In addition, only if well-functioning domestic infrastructure, linking rural and urban areas, is available will it be economically more efficient to meet rising demand from domestic sources rather than from imports. Moreover, given the large size of China's economy, even small changes in its primary commodity trade balance can have a sizeable impact on world commodity prices. As a result, proportional changes in the volume of its import demand similar to those in Japan and the Republic of Korea can lead to a much larger change in the value of its primary imports. Such differences between China and the earlier Asian industrializers are reflected in the results of commodity-specific projections on China's import demand that this section uses to complement the estimates of China's future demand for primary imports based on historical analogies.

Regarding the second question, the complementarity between the composition of China's primary imports and that of Africa's primary exports indicates direct export opportunities for Africa that arise from continued rapid import growth in China. As already mentioned, concentrating on Africa's potential for direct primary exports to China represents a conservative estimate of the region's potential benefits, because the price effect associated with surging Chinese imports allows Africa to increase its earnings from primary exports even if no additional unit is exported to China directly.

Table 6 illustrates the potential magnitude of change in imports by China of products that are of crucial importance for industrialization. It shows for Japan and the Republic of Korea the proportional rise in import volumes and values of these products during the first and second decades of their post-war economic catch-up and greater trade integration, as well as during the following 20-year period, and compares these data with the rise in China's imports during the period 1990–2000,[14] as well as with product-specific projections regarding China's imports up to 2010 and, in a few instances, 2020.

Regarding China, the rise in imports of the selected primary commodities during the period 1990–2000 is similar to that during Japan's first two decades of post-War economic catch-up and greater trade integration. However, it is below that of the Republic of Korea during the comparable periods. The two main exceptions to this general pattern are the very rapid rise in China's imports of petroleum and soybeans. But given that China is itself an oil and coal producer, with a high share of coal in its energy use, the recent rise in petroleum imports started from very low levels. China's use of imported soybean as animal feed in domestic livestock production has allowed keeping meat imports at low levels, while both Japan and the Republic of Korea have seen a considerably larger share of meat in their total imports.

Looking at import trends for Japan and the Republic of Korea reveals that the growth of Japan's imports (especially by volume) continuously slowed down between 1955 and 1995, while those of the Republic of Korea increased between the first and the second decade of economic catch-up, and subsequently declined. This suggests that imports of commodities and raw materials rise particularly fast during the early catch-up phase.[15]

Does this mean that the magnitude of the rise in China's imports over the next two decades is likely to be smaller than it was during the period 1990–2000? The product-specific projections in table 6 indicate that the volume of China's primary imports is likely to grow less on average than it did between 1990 and 2000. Nonetheless, for extractive industries taken together, as well as for petroleum alone, import volumes are expected to more than quintuple during 2000–2020. Moreover, when China started integrating into the world economy, its per capita income was much lower than that of Japan and the Republic of Korea when they began their rapid integration. Consequently, China can be expected to maintain a relatively strong growth in imports of energy and raw materials for a number of years to come in order to maintain its growth momentum.

[14] Comprehensive product-specific import data for China are available only from 1987, so that the development of China's imports during the country's first one-and-a-half decades of economic catch-up and greater trade integration is not reflected in the table.

[15] While the fallout from the Asian crisis certainly played a role in the observed decline of imports in the Republic of Korea, it is more likely to have accelerated than provoked the decline.

Table 6
Magnitude of change in selected raw material imports by Japan, the Republic of Korea and China, selected periods

	Japan						*China*			
	1955–1965		*1965–1975*		*1975–1995*		*1990–2000*		*2000–2010*	*2000–2020*
Product	*Volume*	*Value*	*Volume*	*Value*	*Volume*	*Value*	*Volume*	*Value*	*Volume*	*Volume*
Soybeans	2.3	2.3	1.8	4.2	1.4	1.5	11491	7073	1.5[a]	2.5[b]
Natural rubber and similar natural gums	2.3	1.4	1.4	1.7	2.4	6.9	2.5	2.0	2.3	n.a.
Wood, lumber and cork	n.a.	8.0	n.a.	5.3	n.a.	3.9	n.a.	5.2	n.a.	n.a.
Cotton	1.5	1.2	1.0	1.9	0.5	0.9	0.6	0.2	3.4	n.a.
Iron ore & concentrates	7.1	6.4	3.4	4.2	0.9	1.4	4.9	4.7	5.0[c]	n.a.
Ores & concentrates of non ferrous base metals	5.3	8.6	3.2	6.1	0.8	2.7	4.0	4.3	2.1[d]	5.6[d]
Coal, coke and briquettes	6.0	4.8	3.6	12.8	2.0	1.9	n.a.	0.9	n.a.	n.a.
Petroleum, crude and partly refined	9.9	7.0	3.1	18.8	1.0	1.5	24.0	35.1	.5[e]	4.1[e]
Petroleum products	n.a.	3.4	n.a.	4.4	n.a.	4.2	6.0	6.5	n.a.	n.a.

	Republic of Korea					
	1964–1970		*1970–1980*		*1980–2000*	
Product	*Value*	*Value*	*Volume*	*Value*	*Volume*	*Value*
Soybeans	3.6	3.3	18.4	48.5	2.7	2.0
Natural rubber and similar natural gums	2.7	2.8	4.6	13.6	2.8	1.3
Wood, lumber and cork	n.a.	6.8	n.a.	7.0	n.a.	1.0
Cotton	1.7	1.7	3.0	9.5	1.0	0.7
Iron ore & concentrates	25.1	149.3	121.3	168.8	4.3	5.5
Ores & concentrates of non ferrous base metals	38.0	25.0	13.7	31.8	6.3	7.2
Coal, coke and briquettes	n.a.	1.2	n.a.	147.8	n.a.	4.9
Petroleum, crude and partly refined	12.4[f]	9.4	2.8	44.9	4.9	4.5
Petroleum products	n.a.	0.6	33.6	69.7	8.0	9.5

Sources: Data for Japan from Japan Statistics Bureau; data for Republic of Korea and China from COMTRADE. Projections for rubber and cotton from FAO (2003); soybeans from FAO (2003) and Rosegrant et al. (2001); iron ore from UNCTAD (2004b); total extraction industries from van Meijl and van Tongeren (2004); and petroleum from International Energy Agency (2004).

Notes: The numbers in the table indicate by how many times imports increased, e.g. "2" indicates a doubling of imports.

[a] Oil meal
[b] 1997 to 2020
[c] Projection up to 2009
[d] Total extraction industries
[e] Projections over base year 2002
[f] 1965 to 1970

n.a. Not available

Cotton is the only commodity in table 6 for which the projected rise in China's imports strongly exceeds import growth between 1990 and 2000. These projections assume a massive expansion of China's clothing exports following the phasing out of quota regulations in global textiles and clothing trade at the beginning of 2005. However, such a massive rise is unlikely to materialize for three main reasons. First, the major developed countries are likely to use safeguard measures to stem rapid growth in clothing imports from China, and preferential trading arrangements with other developing countries to maintain diversity in the origin of their imports. Second, further rapid expansion of clothing exports may not be in the developmental interest of China itself because, as shown in figure 1, its comparative advantage is in relatively skill-intensive manufactures, rather than in standard garments. Third, there can be little doubt from figure 1 about South Asia's persistent strong comparative advantage in labour-intensive manufactures. This means that following the phasing out of quota regulations, global production of standard garments is likely to become heavily concentrated in India and other South-Asian countries, with less exports – and less cotton imports than projected – from China. However, depending on the future development of cotton production in South Asia, this may not change the net effect on the prospects of Africa's cotton exports as they may go to South Asia rather than to China.

Projections on Chinese food consumption generally indicate that China has passed the phase of rapid growth in its demand for food because population growth is slowing and because, for China's population on aggregate, daily per capita calorie intake has come close to developed country standards. FAO (2002:12) expects China's aggregate food consumption to grow at only a quarter of the rate in the past three decades and population to grow at a third of its past rate. But projections also indicate that income growth and urbanization will further change the composition of diets and raise the per capita demand for meat and non-cereal foods. While it is expected that domestic production will meet most of the rising demand for meat, the projections indicate a strong rise in feed grain imports (such as maize, cassava and soybeans), edible oils (such as rapeseed and soybean oil), and sugar. China is also likely to remain a net exporter of total food fish but to import significant volumes of crustaceans and fishmeal. For imports of the former (latter) the net change over the 1997–2020 period is expected to be 630 (227) thousand metric tones, corresponding to eleven (nine) times Africa's exports in 1997 with export opportunities arising in particular from aquaculture (IFPRI and World Fish Center 2003:116–122).

This perspective of export opportunities for food products from Africa appears on first sight to be in conflict with widespread under- and malnourishment in the region. Moreover, the fact that per capita income in Africa remains low also implies that African diets and the composition of African food production have not followed the change in diets in more affluent regions away from cereals towards meat, vegetables and dairy products. However, the assumed rise in African GDP also implies a change in African diets towards a greater intake of meat and dairy products. As such, rising production of cereals that can be used both for human consumption and for feeding livestock will gain in importance. While wheat and rice production has remained low in Africa, coarse grains (maize, sorghum, barley, rye, oats and millet), cassava, and vegetable oils and oilseeds (especially palm oil and soybean) are used in human diets and as livestock feed. As emphasized by FAO (2002:62) the use of cereals as livestock feed may actually help food security because such use serves as a buffer for supply changes, protecting food intakes from supply variations.

Taken together, the volume of China's primary imports is likely to keep growing over the next two decades. Import growth is likely to be highest in the extractive industries (including petroleum, iron ore,

and non-ferrous metals), but be less sustained for agricultural raw materials and food products. Rising food imports are likely to be concentrated in animal feed. Sustained investment in infrastructure and residential construction, as well as growing private transportation, will further propel imports of petroleum, iron ore, non-ferrous metals, rubber, and sawnwood. By contrast, raw material inputs used in labour-intensive processing for exports (such as cotton) will grow less than often argued, if China succeeds in upgrading its export composition towards more skill-intensive manufactures.

Africa's exporters of products in the fuels and minerals and metals categories are clearly poised best to benefit from rising Chinese imports directly – and it is not unlikely that they will triple their export earnings from these products over the next two decades. The outlook for exporters of agricultural products is more mixed. There is little prospect for exporters of tropical beverages, as well as for exporters of food products where there is little complementarity between the composition of Africa's primary exports and China's primary imports (table 7). Moreover, Africa's producers might not be able to benefit from rising export opportunities unless productivity increases substantially and the provision of physical and telecommunications infrastructure improves. Exporters of oilseeds, animal and vegetable oils, some products in the fruits and vegetables and the fish and seafood (particularly from aquaculture) categories could achieve a marked increase in their export earnings – and in some cases indeed triple them over the next two decades – if they succeed in tapping the Chinese market or benefit in third markets from higher world prices for these commodities that may result from rising Chinese demand.

Table 7
The composition of primary commodity trade, Africa's exports and China's imports, 2000
(Per cent)

Product	*Exports from Africa*	*Imports of China*
Food		
Fish and seafood	2.6	2.3
Fruits and vegetables	4.0	1.3
Tropical beverages and spices	5.3	0.2
Oil seeds	0.5	5.5
Animal and vegetable oils	0.3	1.8
Other food products	4.1	5.8
Agricultural raw materials		
Crude rubber	0.2	2.5
Wood products	3.2	10.0
Textile fibers	2.1	4.8
Other agricultural raw materials	0.9	1.9
Ores and metals		
Crude fertilizers and crude minerals	0.8	1.4
Metalliferous ores and metal scrap	3.8	10.9
Non-ferrous metals	3.2	12.7
Fuels	69.1	39.0

Sources: COMTRADE and estimates by UNCTAD.
Note: Shares based on values measured in United States dollar.

V. CONCLUSIONS

Sustained annual average per capita income growth of about 7 per cent – the rate generally quoted as required for Africa to achieve the Millennium Development goal of halving poverty by 2015 – would allow Africa to quadruple its current per capita income level within the coming two decades and reach Latin America's current per capita income level by the early 2020s. Rough calculations indicate that such a rise in Africa's per capita income level will be associated with a sevenfold rise of its manufactured exports and a tripling of its primary exports.

How realistic is it to expect that such a strong expansion of Africa's primary exports will accompany, rather than impair, its economic development? It is often argued that primary export expansion is associated with impoverishment because competitive producers in developing countries run up against trade policies in main developed countries that protect their internationally uncompetitive producers and because of declining or relatively slow growth in global demand, relatively low income elasticity and declining and volatile terms of trade for primary products. In such circumstances, attempts to expand primary exports may encounter a fallacy-of-composition problem and lead to declining prices.

However, there are at least two reasons to believe that the outlook regarding demand for Africa's exports of primary commodities may be less bleak than often assumed, at least for a few years to come. First, there is a shared interest across policymakers in developed and developing countries to reach an agreement in the Doha Round of multilateral trade negotiations, and without substantial progress in the negotiations on agricultural trade the Doha Round is unlikely to succeed. On the other hand, multilateral trade liberalization is unlikely to boost Africa's primary exports enough to allow for a tripling of its primary exports. Second, rapid industrialization and income growth in natural-resource-poor large Asian developing countries, notably China, have led to a rise in global demand for these products. Indeed, it is in the rapidly growing economy of China where African exporters of primary products could find markets which are large enough to absorb greater volumes without a decline in prices. Which products and African countries would benefit the most from a further rise in Chinese primary imports depends on both the share of African exporters on China's markets and the impact of rising Chinese imports on the world market prices of primary products that Africa exports to third markets. African exporters of products in the fuels and minerals and metals categories are likely to benefit most from rising Chinese imports, while in agriculture exporters of oilseeds, animal and vegetable oils, some products in the fruits and vegetables and the fish and seafood categories could increase their earnings substantially.

Rapid growth and industrialization in other natural-resource-poor countries would boost global demand for primary commodities even further. In particular India's primary imports are likely to grow similarly to those of China, but with a lag of one or two decades, if the role of industrialization in India's further economic ascent is similar to that in the catch-up of China, Japan and the Republic of Korea.

The policy challenges of realizing these opportunities require action on several fronts with the overall objective of addressing the supply constraints, especially in agriculture and infrastructure, of African economies. In this regard, there must be coherence between international and domestic actions, and only concerted high-level political support at both the national and international level will be able to accelerate income and export growth in Africa and provide for sustained development.

African countries need sufficient resources for the sizeable rise in investment required to ease supply constraints. Export expansion itself will provide additional foreign exchange earnings and profits to fund investment, but it is unlikely to be sufficient to meet the challenge ahead. A growing number of advocates – such as UNCTAD (2000), United Nations Millennium Project (2005) and the Commission for Africa (2005) – demands a sizeable rise in aid to finance public investment for infrastructure projects in transport (both external (ports and airports) and internal (especially roads)), energy, water and telecommunications, as well as in health and education. Providing physical and technological infrastructure to support the creation of an effective framework in which firms can operate, and guaranteeing effective education and health provision to support productivity growth clearly are necessary conditions for economic growth. The existence of complementarities in the growth process implies that aid needs to be scaled-up substantially to ignite a big push through the simultaneous improvement of ports, roads, communications infrastructure, etc. In this respect, official financing can play a catalytic role for domestic savings and private capital inflows. Moreover, an exit solution to the debt overhang of African countries is essential if the continent is to use rising aid inflows and export earnings for investment in the development of human and physical infrastructure.

However, a greater domestic policy effort must enhance the catalytic role of rising aid flows. In particular, rising public investment in infrastructure, education and health is unlikely to be sufficient to ignite self-sustaining growth unless it is complemented by improved incentives for entrepreneurs to raise the level and efficiency of private investment in productive capacity, and by a strategy that prevents real exchange rate overvaluation.[16] Thus, even under a favourable external and financial environment, considerable domestic efforts will be needed to ensure that African economies gradually become self-reliant in sustaining rapid growth.

This paper concentrated on Africa's exports of primary commodities in an attempt to complement the many studies in the literature on Africa's potential for rising exports of manufactures. To be sure, Africa's economic development will be associated with an expansion of its output and exports of both primary products and manufactures. But raising agricultural productivity is a crucial determining factor of successful industrialization. The basic policy problem of all predominantly agrarian economies, including those in Africa, is how to manage the relations between agriculture and the rest of the economy in a way that promotes agricultural growth and thus enables a structural transformation in which the relative importance of the agricultural sector declines as other sectors, and particularly manufacturing, move onto a dynamic growth path.[17] In other words, low agricultural productivity can substantially delay industrialization. Thus, the challenge for Africa is to promote both agricultural and industrial development, rather than one at the expense of the other. Moreover, the great majority of output will continue to be sold on domestic and regional markets. Thus, expansion of output for domestic and regional markets will be as crucial to increased prosperity as growth of production for markets outside Africa.

[16] There has recently been much anxiety about adverse macroeconomic effects of large aid inflows dominated by the fear that Dutch disease effects of aid will inhibit the development of the tradable goods sector and lower growth in the recipient economy. But as emphasized by Adam and Bevan (2003) and Nkusu (2004) specific public investment use of aid inflows can avoid Dutch disease effects to result from large aid inflows. This is true in particular for investment, such as in infrastructure, that reduces the cost of inputs to the traded sector.

[17] There is a long theoretical and empirical literature on the linkages between agriculture and other sectors within rural economies, see, for example, Gollin, Parente and Rogerson (2000). Regarding Africa, Delgado, Hopkins and Kelly (1998) estimate that agricultural growth multipliers are around 2.0, i.e. each additional dollar of farm income generates another dollar in total income in the local economy through demand for local products and services that would otherwise not have a market.

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Appendix I

The Growth of Africa's Primary Exports Associated with the Rise in the Region's Per Capita Income to Latin America's Current Level

This appendix lays out the calculation regarding the growth of Africa's primary exports that would be associated with the rise in the region's per capita income to Latin America's current level. This calculation involves four steps:

(1) In 2000 (the year on which the calculation is based), aggregate per capita income in terms of purchasing power parity in Latin America was 4.2 times larger than in Africa, irrespective of whether current or constant income data are compared (data from the World Bank's *World Development Indicators*). According to data from the Penn World Tables 6.1, the magnitude of the income gap was 4.5, but the Penn World Tables include data for fewer African countries than the *World Development Indicators*.

However, Africa's primary exports would need to grow less than this income gap, mainly for two reasons. First, the share of the primary sector in total output will decline. The magnitude of the decline of primary products in total exports that this factor causes can be assessed on the basis of the regression results, as explained in step 2. Second, Africa's export-GDP ratio will decline as income rises because internal economic integration is likely to increase. Rising income is likely to lead to rapidly rising domestic demand as the rise in per capita income will not occur unless supply constraints in production capacity and infrastructure are relaxed. Step 3 of the calculations takes account of the impact of this factor on the rise in primary exports.

(2) Using the coefficients of the cross-country regression 2 in table 1 with weighted data of Africa's land-worker ratio, Africa's population and Latin America's average years of schooling indicates that the share of primary exports in the total exports of this hypothetical Africa would be about 70 per cent, compared to 85 per cent of actual Africa in 2000. Thus, the ratio between its projected and its current share of primary exports is 0.82 (i.e. 70 per cent divided by 85 per cent). Using unweighted education, land and population data, the projected primary export share is 75 per cent and the ratio 0.88.

(3) In 2003, the aggregate export-income ratio (excluding intra-regional exports) was 18.5 per cent for Latin America and 23.9 per cent for Africa. Accordingly, Latin America's export-income ratio was about 0.77 times the size of Africa's ratio (for total exports, this relationship is 0.80). Given that Latin America's export-ratio has substantially increased over the past few years, this relationship is only 0.67 (or 0.71 for total exports) if average data for the period 2000-2003 is used (trade data from the International Monetary Fund Directions of Trade Statistics, various issues; income data from the United Nations Statistical Division, Main Aggregates, various issues).

(4) To gauge by how much less than the rise in its per capita income Africa's primary exports would increase, the calculation in step 1 needs to be combined with those in steps 2 and 3. If Africa's export-income ratio remains unchanged, then steps 1 and 2 need to be combined. Doing so shows that Africa's primary exports will be about 3.5 times (i.e. 4.2 multiplied by 0.82) their level in 2000 when its per capita income reaches Latin America's current per capita income level. If Africa's export-income ratio declines to Latin America's levels (i.e. also including step 3), then its primary exports will increase 2.7 times (i.e. 4.2 multiplied by 0.82 multiplied by 0.77).

Taken together, these calculations imply that Africa's primary exports would roughly be three times their level in 2000 when the region reaches Latin America's current per capita income level. They also imply that Africa's manufactured exports would be about 7 times their level in 2000.

It is clear that these calculations are crude. For example, with population growth likely to continue, Africa will reach Latin America's current average years of schooling with a lower land per worker ratio and a higher average population than assumed. Leaving the regression coefficients unchanged, this would reduce the calculated required rise in Africa's primary exports and raise the calculated rise in its manufactured exports. Moreover, the wide variation in terms of both the resource variables and the export composition among African countries implies that a given average change in the resource variables is associated with a range of possible changes in average export composition depending on the distribution of resource changes across individual African countries. Therefore, the finding that the rise in Africa's per capita income to Latin America's current level would be associated with a tripling of its primary export value should not be understood as a precise estimate, but it most likely is of the right general magnitude.

Appendix II

Coverage and Sources of Data

The data set, containing 109 countries and economies, consists of all countries and economies with populations of over 1 million for which a complete set of trade and resource data is available. In section II, the countries are grouped as follows:

Africa (35 countries): Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Somalia, Republic of South Africa, Sudan, Tanzania, Togo, Uganda, 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.

Land-abundant developed countries (7 countries): Australia, Canada, Finland, New Zealand, Norway, Sweden, United States.

Land-scarce developed countries (15 countries): Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Portugal, Spain, Switzerland, Turkey, United Kingdom.

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

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

East Asia (11 economies): China, Hong Kong China SAE, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Republic of Korea, Singapore, Taiwan Province of China, Thailand.

Source of export data

All export data are from the United Nations COMTRADE database and estimates by UNCTAD.

Definition and sources of resource variables

h average years of schooling per adult (15 and over) in 1990. For most countries, the source is Barro and Lee (2001). However, for 5 MENA countries (Libyan Arab Jamahiriya, 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 for 1990 as discussed in Wood and Mayer, 1998:74) and for 2000 by adding to each individual country's data for 1990 the average increase in years of schooling for its respective region between 1990 and 2000.

n ratio of land area to population aged 15 and over (square kilometres per adult), calculated from data in the World Bank *World Development Indicators*.

p population aged 15 and over from the World Bank *World Development Indicators*.

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