Trade and Development Strategy Options for the Poorest Countries: A Preliminary Investigation

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The paper aims to provoke thought on the apparent entrapment of the poorest countries in a vicious circle of self-perpetuating backwardness. It begins with a selective review of the debate on growth failure, covering conventional and structuralist arguments and new growth theory. Two main explanatory hypotheses are then developed, one relating to imbalance between human and natural resources, the other to failure to diversify exports. These hypotheses are subjected to a series of statistical tests, which draw attention to various anomalies, questions and issues that require further investigation.

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Introduction

The limited economic progress of the great majority of low-income countries over the past few decades is deeply troubling. The most conspicuous recent manifestation of this problem has been the lack of success of structural adjustment programmes in Africa. Looking further back, it is clear that most of the countries that were extremely poor forty or fifty years ago are still extremely poor today, and seem likely to remain so for the indefinite future. In short, the poorest countries appear to be trapped in a vicious circle of self-perpetuating backwardness, which conventional aid and policy advice strategies have not been able to break.

This Working Paper looks again at this large issue - with the aim of generating fresh ideas for more substantial subsequent research, which may in turn yield clues for future policies and assistance strategies. It reviews some of the facts about low-income countries, and explores various hypotheses about the causes of their persistent poverty. The words `various' and `hypotheses' should be emphasised, since this paper does not try to arrive at any simple diagnosis, let alone cure. Its objective, rather, is to provoke thought.

Needless to say, many others - in universities, in governments, and in international organisations - are studying this or closely related issues. This paper draws on their ideas and findings, but does not attempt to provide a full review, nor to map out all the differences of opinion that emerge. However, it is worth making a simplified contrast between the approach of this paper, and what has become the standard approach of most official development agencies, epitomised by the World Bank. The official approach may be summarised as domestic-policy-oriented, short-to-medium term, and concerned with individual countries. The approach of this paper, by contrast, is internationally oriented, long-term, and concerned with the experience of country groups.

The paper is organised into four main sections. The first is a selective review of the state of the debate on growth failure, covering conventional arguments, structuralist arguments, and new growth theory, with some preliminary statistical analysis. The next two sections, which between them constitute the bulk of the paper, discuss two alternative (but not mutually exclusive) hypotheses about the persistence of national poverty: imbalance between human and natural resources; and failure to diversify exports. Each of these hypotheses is elaborated and statistically tested. The fourth and final section draws together some of the threads from earlier sections into a pattern for future research.

The State of the Debate on Growth Failure

There is no shortage of ideas about the determinants of growth or the reasons why growth fails to occur. But the distressingly low success rate for the remedies so far applied to the poorest countries' problems suggests that existing formulations are not wholly satisfactory, and that there may be room for additional contributions. This section reviews some of the current ideas in circulation under three headings: the conventional wisdom of Western governments and international financial institutions; the structuralist critique; and the concepts of new growth theory.

Conventional views on growth failure

The `Washington Consensus', in its application to the poorest countries [see Williamson, 1991], suggests that growth failure stems from inappropriate policies in up to eleven key areas. These are:

- **Fiscal indiscipline**, defined as an operating budget deficit of more than 2% of GDP.
- **Wrong public expenditure priorities**, which neglect areas with high economic and social returns, such as primary health and education, and infrastructure.
- Inadequate **tax reform** to broaden the tax base and cut marginal tax rates.
- Lack of **financial liberalisation**, to achieve an undistorted structure of interest rates and a positive average real interest rate.
- Failure to maintain a realistic and unified **exchange rate**, which hinders growth of non-traditional exports and general export competitiveness.
- Failure to **liberalise trade**, where the target (over 3-10 years) should be a uniform tariff of 10-20%.
- Failure to encourage **foreign direct investment**.
- Lack of **privatisation** of state and parastatal enterprises.
- Absence of **deregulation** (except where justified by criteria such as safety, environmental protection or prudential supervision of financial institutions).
- Poorly specified **property rights**, which should be secured by the legal system without excessive cost (and be available to the informal sector).
- For the **poorest countries**, the Washington Consensus also emphasises the failure by the international community to provide sufficient aid - though it does not specify how large concessional transfers should be (either in absolute terms or as a share of GDP in donor or recipient countries).

It is perfectly possible to agree with much of the Washington Consensus's broad diagnosis of

the causes of failure without also accepting its proposed remedies for inadequate growth performance in the poorest countries, which are strongly market orientated. For example, even where growth has been hindered by failure to engage in tax reform, financial illiberalism, inappropriate exchange rates and trade illiberalism, it does not necessarily follow that appropriate finance and trade policies should all be non-discriminatory. Another example of shared diagnosis leading to differing prescriptions is provided by our hypothesis about failure to diversify exports. In one sense this is a part of the Washington Consensus. But it is treated in the Consensus purely in terms of failure to develop appropriate price incentives. By contrast, we would also emphasise the neglect of relevant non-market institutions, and also the scope for reform to state enterprises to make the management of large export projects more efficient.

Structuralist views on growth failure[1]

The structuralist view of the failure of growth performance in the poorest countries stands in contrast to that of the Washington Consensus. It can be summarised under four headings:

Reliance on primary products

Typically, the poorest developing countries rely heavily on primary commodity exports. It is argued that these products are particularly subject to adverse terms of trade, revenue instability (due to export volume and world market price fluctuations), protectionist obstacles in developed countries, and slow technical progress. These problems can only be resolved by developing the manufacturing sector and confining reliance on foreign firms to technical transfer and the supply of market information.

Failure of trade policy

In the area of trade policy, and in sharp opposition to the Washington Consensus, structuralist writers emphasise:

- failure to develop domestic manufacturing through import substitution policies based on the infant industry argument;
- neglect of selective industrial policy to promote manufactured exports (with upstream import substitution);
- absence of optimal export taxes for relevant commodities and of appropriate co-operation among supplying countries;
- insufficient exploitation of the scope for trade policy based on special and differential treatment giving non-reciprocal access to developed-country markets;
- inadequate use of quantitative import controls (QRs) to regulate the balance of payments, and as an instrument of industrial and export promotion policy.

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[1] We are grateful to Hans Singer for assistance in preparing this statement of structuralist views.

Inadequate transfers

The structuralists point to failure to provide sufficient emergency aid, including food aid, for natural and man-made disasters, failure to link these transfers to development, and failure to make large rehabilitation transfers (which, in the case of Japan and Germany, were very productive). Long-term aid flows are regarded as seriously deficient, with the target of 0.7% of developed-country GDP for Official Development Assistance being met by only a few Nordic countries. Debt relief is also insufficient, though it would be of major importance, and is not associated with improved access to developed-country markets, or with less trade policy conditionality in developing countries.

Inappropriate domestic policies

Failure to maintain full utilisation of resources (as a primary objective), supplemented by failure to control inflation and fiscal indiscipline, prevents sustained growth. Moreover, there is a vicious macro policy circle - retrenchment today leads to retrenchment tomorrow (in contrast to the conventional argument that retrenchment today prepares the ground for growth tomorrow). This is largely because it involves cutting public investment in education and other forms of human and physical infrastructure.

The Washington Consensus and the structuralists share a similar view of the consequences of failure to develop human resources. However, in trade and macro policies there are striking contrasts between them. On trade policy, in the Washington Consensus it is the lack of uniform incentives which informs the diagnosis of policy failure, whereas in the structuralist view a failed trade policy is one which is not intimately linked with the special problems of primary commodity exports and the selective incentives required for the development of a manufacturing sector. On the question of macro policies, the Washington Consensus and the structuralist views are similarly at loggerheads. It is only in recent new growth theories (reviewed in the next section) that conventional thinking has assimilated some of the arguments concerning externalities and scale economies which underlie the structuralists' emphasis on cumulative and circular causation. As a consequence of these differences, there is a marked divergence between the Washington Consensus and the structuralists not only on the right size of aid transfers but also on the role of associated policy conditionality.

Testing the trade and macro policy failure hypothesis

This sub-section reports on some preliminary tests that have been made for a sample of 27 states (see Appendix 4) to illuminate some of the areas of controversy between these two approaches.

There is a substantial literature on testing the effects of trade policy on economic growth, some of which was summarised in a recent report on the growth performance of mineral exporting economies [Auty and Evans, 1993]. The methodology adopted by Auty and Evans for both trade policy variables and macro performance indicators has been used in the present exercise.

On the trade policy side, the difference between domestic and world prices for imports is

measured for the period 1973-91 and two sub-periods, 1973-81 and 1982-91, using mainly the UNCTAD data set on trade control measures. In each period, countries are classified into groups of `low', `medium', `high' or `very high' protection.

The effect of macro policies was measured by calculating the real exchange rate index and observing its trend and variation (standard error of estimate of trend). In addition, the average black market discount on the official exchange rate was calculated for those countries with the necessary data.[2]

The average growth rate of (constant-price) GDP in each time period was then regressed on the trade policy, real exchange rate trend, real exchange rate variation, and black market discount variables. The results of these regressions are reported in Table 1.

Table 1
Regression results

		Constant	X Coefficient	R Squared
Growth against RER trend				
1a)	1973-81	4.96	-18.50	0.09
			(11.69)	
1b)	1982-91	3.21	-2.65	0.01
			(6.02)	
1c)	1973-91	4.06	16.60	0.04
			(17.11)	
Growth against RER variation (ERV)				
2a)	1973-81	5.35	-8.34	0.05
			(7.39)	
2b)	1982-91	4.38	-7.37	0.11
			(4.25)	
2c)	1973-91	4.87	-5.90*	0.17
			(2.70)	
Growth against protection				
3a)	1973-81	4.45	0.02	3.56E-05
			(0.52)	
3b)	1982-91	2.78	0.20	0.01
			(0.39)	
3c)	1973-91	3.00	0.22	0.01
			(0.40)	
Growth against BMD				
4	(1973-83)	-1.61	7.48**	0.30
			(2.42)	

Notes: BMD = black market discount (official e-rate/black market e-rate) measured in local currency/US$
Standard errors in brackets
** significant at the 1% level
* significant at the 5% level

[2] Real exchange rates are calculated in such a way that increases in the real exchange rate index indicate appreciation, and decreases depreciation. The black market discount (BMD) is given by the official exchange rate divided by the black market exchange rate (the official and black market rates are both in terms of domestic currency per US$). The black market discount is available for the period 1973-83 only.

The regression results are illuminating in some respects, and give some support to the Washington Consensus. The black market discount variable (BMD) has a significant coefficient with the expected positive sign (note that a higher value of BMD indicates a smaller gap between the official and black market exchange rates). Further, for the whole period the exchange rate variability variable (ERV) has the expected sign and its coefficient is significant at the 5% level.

On the other hand, the trade policy results can be viewed as consistent with the structuralist perspective. In particular, the failure of the trade policy variable to be negatively related to growth contradicts the Washington Consensus view that high protection has *harmed* growth. It thus leaves open the structuralist possibility that selective trade policy intervention can have beneficial effects on growth, although there is no direct evidence in these results of positive medium- to long-run benefits of infant industry protection.

The results for the real exchange rate trend are more puzzling. Among other things, its lack of influence on growth suggests that there were no Dutch Disease effects, which is at variance with a considerable body of country case study literature - for example Bevan, Collier and Gunning [1990]. However, there are two different effects which are not disentangled in the regression analysis: mineral discoveries that result in a move toward a higher sustainable rate of growth (for example, Botswana); and unsustainable mineral or commodity booms (such as affected Kenya and Nigeria in the 1970s).

What can be learned from new growth theory?

During the past five years or so, there has been a veritable explosion of work in the area of `new growth theory' [surveyed by Shaw, 1992], which has brought development issues back to the attention of mainstream economists, and revived interest in some old and unorthodox strands of thought. Some of the new work is of little or no relevance to the poorest countries, for example because it is concerned with growth in developed countries, or with the creation of new knowledge, or with steady-state models. However, some of the insights and findings of new growth theory seem highly relevant.

Convergence and non-convergence

The theoretical work has been associated with an empirical debate about whether or not there is any general tendency for differences in *per capita* income among countries to shrink over time, i.e. for countries to converge. The debate has focused particularly on the period 1950-90, using the purchasing power parity data set developed by Summers and Heston [1991], though some studies have pursued smaller samples of countries much further back in time.

Most participants now accept that during 1950-90 there is no evidence of `unconditional convergence' - no simple tendency for poorer countries to grow faster than (and hence to catch up with) richer ones. There clearly was convergence within the group of developed countries - mainly a matter of catching up with the USA - and a few countries, epitomised by Korea and Taiwan, made rapid progress from a much lower starting point. Overall, however, the recent historical record provides no reason to suppose that the problem of the poorest countries will eventually go away of its own accord: countries that start at the bottom tend to stay at the bottom.

There remains a dispute about `conditional convergence', or the potential advantages of initial backwardness, which creates an opportunity for rapid growth and catch-up, provided that certain conditions and requirements are met. The empirical case for conditional convergence stems largely from a cross-country regression in Barro [1991], which relates growth of income (*per capita*) during 1960-85 to: the level of income in 1960 (negatively); school enrolment in 1960 (positively); and the number of revolutions and coups during 1960-85 (negatively). His conclusion is that, for countries with initially high levels of education and stable political systems, low initial income permits faster subsequent growth - a result which has been repeated in many subsequent papers [for instance, Levine and Zervos, 1994:Table 4, and Romer, 1993:17].

Barro's finding clearly gives more ground for hope about the prospects of the poorest countries: catching-up is possible, and can be facilitated by the apparently simple strategy of raising enrolment rates in primary and secondary schooling. The same conclusion emerges from work by Azariadis and Drazen [1990], who found that a necessary condition for rapid growth was to start with an `overqualified' labour force (measured by the initial literacy rate relative to initial *per capita* income). On the other hand, the significance of Barro's `revolutions and coups' variable is a salutary reminder of the profound political obstacles to economic progress in many poor countries.

However, some economists reject Barro's `conditional convergence' result (the negative coefficient on initial income), arguing that his regression is fundamentally mis-specified.[3] In particular, Friedman [1992] and Quah [1993a] maintain that it is in principle wrong (Galton's fallacy) to draw inferences about convergence of levels from regressions of growth rates on levels. The correct approach is to look directly at what has happened to the dispersion of levels over time. When Quah [1993b] does this, he finds no evidence of convergence, even conditional. This finding does not mean that poor countries cannot catch up, for example by investing heavily, but just that their poorness gives them no special advantage in this regard.

Investment and returns

Common to many strands of new growth theory is the view that investment is important - that high rates of accumulation are vital to raising countries out of poverty. This may not seem surprising to development practitioners, or to theorists with non-neoclassical backgrounds, but it is a sharp break from the `old' Solow model, in which growth depends on exogenous technical progress, and investment plays only a transitional role.

The difference between the old and the new models arises essentially from their assumptions about rates of return to investment. In a Solow model, returns to investment are assumed to be greatest at low *per capita* levels of capital (and income), and to decrease as capital per head rises. Hence, investing a given share of income each year would raise income by smaller and smaller proportional amounts. Correspondingly, if all countries were to invest an equal share of income, poor countries would tend to catch up with rich ones. In new growth models, by

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[3] Barro himself comes close to recognising this in the first footnote of his article [1991:407].

contrast, returns to investment are assumed, for one reason or another, to be non-decreasing. As a result, a constant investment share can yield growth at a constant rate, and poor countries need to invest more than rich countries to catch them up.

The view that rates of return are no higher, and perhaps lower, in poor countries than in rich ones is of fundamental importance. It undermines the common supposition that there is some natural tendency for capital to flow from rich to poor countries - that foreign investment would flood in if only administrative and political obstacles could be removed. And it makes the task of raising domestic savings (including public revenues for investment in education and infrastructure) seem much more daunting. The human and political costs of reducing consumption are greater, the lower the level of living standards, and there is no compensating incentive in the form of an unusually high rate of return. It is thus all too easy to see how poor countries may remain trapped at low levels of income, with escape to higher levels being the exception rather than the rule.

Various reasons for non-decreasing returns have been proposed. One class of reasons focuses on investment in research and other forms of knowledge creation, though critics have argued that it is not realistic to think of new knowledge as emerging from any particular sector or type of activity. More persuasive, and of more obvious relevance to poor countries, are the explanations for non-decreasing returns which stress *externalities*. Each act of physical investment, for example, creates opportunities for further investments, and so on, in a never-ending chain [Scott, 1992]. Similarly, the gains from educating and training workers spill over to other workers, raising the productivity of their existing skills and increasing the rate at which they learn new skills. Or, to put it another way, the scarcity of skilled workers in poor countries makes their social marginal product lower rather than higher than it would be if they were more numerous.

There is a division of opinion in the new growth theory literature as to whether investment in physical capital or in human resources matters most. Advocates of the importance of physical investment emphasise that there is a strong cross-country correlation between the share of investment in GDP and the growth rate. The association is especially strong for investment in machinery and equipment [De Long and Summers, 1991]. The existence of this correlation is not disputed, nor is its important lesson that large and sustained increases in output would be inconceivable without a lot of physical investment. However, there is much controversy about its causal interpretation and policy implications. There are widespread doubts that investment itself could be the driving force, and even more reluctance to believe that raising investment rates is sufficient to cause growth.

Greater importance has been attached to human capital formation in many formal models, starting with that of Lucas [1988], an emphasis which has received support from the statistical significance of education variables in the empirical work of Barro [1991] and others. Among other things, it has been argued that the returns to physical investment are generally low unless the labour force possesses complementary skills, with a good basic education (and hence the capacity to learn more specialised skills) being particularly important. Thus a well-educated labour force can provide an incentive for both domestic and foreign firms to invest. Critics of this view have noted, however, that education is not a sufficient condition for rapid growth - counter-examples being Sri Lanka and the Philippines.

Ideas and openness

In contrast to the emphasis on accumulation in most of new growth theory, Romer [1992, 1993] has argued that `ideas' and `idea gaps' are what matter. An idea is an input to production which is distinguished from an `object' by being `non-rival'. The use of an idea in one place or activity, unlike that of a machine or a skilled worker, does not preclude its simultaneous use in other places or activities. This feature means that the diffusion of ideas is a powerful and low-cost means of increasing output.

On this basis, Romer argues that `object gaps' are not the main reason why countries are poor, and that accumulating more objects (including physical and human capital) is not the key to growth, as evidenced, for example, by the poor economic performance of the Soviet Union despite high investment in both material objects and education. Poor countries suffer, he argues, mainly from `idea gaps', and the few that have grown rapidly have done so fundamentally by importing and using ideas from rich countries. Thus, for instance, Romer attributes the success of Mauritius as a garment exporter to the arrival of businessmen from Hong Kong, whose specialised knowledge of production and marketing greatly increased the economic value of local labour and capital. More generally, Romer sees multinational companies as the single most important channel for international transmission of ideas, and views the development prospects of poor countries as depending heavily on their ability and willingness to attract foreign investment.[4]

Romer's argument clearly contains an important element of truth - as did the rather similar arguments of some earlier advocates of openness to trade as the key to growth, who emphasised the acquisition of knowledge (both from importing and through the process of exporting). Yet it is also clearly not the whole of the truth. Ability to attract foreign investment often depends on prior object accumulation (Mauritius had a literate workforce and good infrastructure). Some countries, most notably Japan and Korea, have achieved spectacular growth without foreign investment. Conversely, there are many countries - most obviously in Latin America, but also in much of Africa - where extensive involvement by multinational companies over long periods has been associated with poor economic performance.

An intriguing gap

Nowhere in the voluminous literature on new growth theory, including the associated empirical work, does there appear to be any mention of natural resources. This is not hard to explain from an analytical point of view: growth theory assigns a central role to the accumulation of reproducible inputs (physical and human capital), while the supply of land is taken to be fixed. From a practical point of view, however, and particularly in the context of the present paper, this omission seems more puzzling. We know that the current economic situation of most poor countries (and most poor people) is closely bound up in various ways with land, with other natural resources, and with primary products. Is it conceivable that this basic fact is of no relevance to their future economic prospects? Ricardo has been long forgotten!

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[4] Lucas [1990] arrived at much the same policy conclusion by a different route.

The Human Resource-Natural Resource Balance Hypothesis

The hypothesis is that countries with low levels of education but moderate amounts of land and minerals get trapped at low levels of development. It is this malign *combination* of human and natural resources that lies at the root of the problems of the poorest countries.

A simple model of development

The essence of economic development is assumed to be accumulation of human skills. The most fundamental difference between developed and developing countries is the skill levels of their labour forces [Wood, 1994b:chs 2, 3]. There is a strong cross-country correlation between *per capita* income and average years of schooling - most poor countries have low literacy rates - and heavy investment in education has been a feature of all cases of rapid and sustained catching-up, most conspicuously in Japan and Korea. However, formal schooling is not a sufficient condition for acquiring economically useful skills: specific training and practical experience are also needed to realise and develop the potential of educated labour.

A simple model of trade

There are two sorts of traded goods: primary products, including processed primary products such as canned food; and manufactures, broadly defined to include traded services. Production of each of them requires two factors: skill (human resources), and land (natural resources), as well as capital, which is internationally mobile, and so not a factor of production in the usual sense. [For a fuller account of the model and its assumptions, see Wood, 1994a, and Berge and Wood, 1994.]

The essential distinction between the two goods is that primary production requires a lower ratio of skill to land than manufacturing (at any given set of relative factor prices). As a consequence, for standard Heckscher-Ohlin reasons, comparative advantage is determined by relative supplies of skill and land: countries with low ratios of human to natural resources tend to export primary products, while those with high ratios of skill to land tend to export manufactures.

Virtuous and vicious interactions

When put together, the model of development and the model of trade imply that the fortunes of different countries are likely to diverge, depending on their natural resources. Consider, in particular, two countries with the *same* low initial level of skill per worker, but *different* amounts of land per worker, which become open to trade as a result of reductions in artificial or natural barriers. Country A, with fewer natural resources, and so a higher skill/land ratio, will become an exporter of manufactures, while country B, with a lower skill/land ratio (though the same level of human resources) will become an exporter of primary products.

There are various familiar (structuralist) reasons why it may be disadvantageous to be an exporter of primary products, including secularly declining terms of trade and world price volatility. However, the present pair of models conjures up a rather different, and potentially more profound, disadvantage, which is that exporting primary products tends to retard skill

acquisition, the most fundamental engine of development. The reason is intuitively clear: trade pushes countries with more natural resources into activities which are inherently less skill-intensive.

The problem can be illustrated formally but simply by introducing supply elasticity into the static Heckscher-Ohlin model, letting factor supplies respond to changes in factor prices, rather than making endowments fixed. This modification is particularly appropriate for skill, whose supply is dependent on the decisions of households and firms. H-O theory tells us that trade affects factor prices, and more specifically that the abundant factor gains and the scarce factor loses. In country A, with the higher skill/land ratio, the abundant factor is skill, whose earnings thus rise relative to those of land, causing an increase in its supply. In country B, by contrast, skill is the scarce factor, which suffers a reduction in earnings as a result of trade, and whose supply thus tends to contract.

The effect of trade is therefore to enlarge the initial difference in the skill/land ratio between the two countries. Indeed, in this hypothetical case, trade creates a difference in the absolute level of skill which was not there initially. Why should this matter? Trading in accordance with comparative advantage is efficient, and the supply response ought to make it even more efficient. However, new growth theory and common sense both suggest that this static evaluation of the outcome is misleading, because it ignores important features of the process of skill acquisition, and in particular various externalities which generate increasing returns at the aggregate level.

Some of these externalities are to be found within the sphere of formal education, such as the effects of the education of parents on the school performance of their children. The rest are in post-school training and learning from experience, such as the skills which workers learn from one another. Their common feature is that skill acquisition is a cumulative and interactive process: the more skills you have to begin with, and the more skilled the people around you, the better your chances of acquiring more knowledge and expertise. As a result, trade-induced increases and reductions in skill supplies are likely to be perpetuated and amplified, with substantial effects on longer-term development.

Theory and reality

All this, of course, assumes that other things are equal. Thus a country with few natural resources might happen for cultural reasons to be opposed to female education, while one with more natural resources might also have a government which for ideological reasons gave high priority to schooling, making the outcome quite different from the simple tale of countries A and B above.[5] The tale may also be misleading for countries with really large natural resource endowments - such as Botswana and Kuwait - which are able to finance rapid expansion of education.

The issue is thus whether, and to what extent, the simplified pattern of causation suggested here can be discerned through all the complications of reality. Two well-known recent pieces of

[5] However, it is worth bearing in mind that culture and politics may be influenced by resources, rather than being exogenous: for example, the political case for educational expansion is weaker where there are fewer industrial jobs for educated workers.

empirical work on growth provide it with striking, albeit unwitting, support. One is Barro [1991:435-6], who found that the long-term growth rates of Africa and Latin America were inexplicably low, after controlling for many influences, including initial levels of education and income, and political instability. What these two continents have in common, however, is unusually large amounts of natural resources per worker. Their mysteriously low growth rates could thus be explained by their unusually low initial ratios of skill to land.

The other piece of evidence comes from the East Asia Miracle study of the World Bank [1993:Table A6.3], which found that total factor productivity growth is positively correlated with the share of manufactures in exports, again after controlling for a range of other influences. If this finding is combined with the present hypothesis that the share of manufactures in exports is fundamentally determined by a country's ratio of skill to land (and not, as the Bank study implies, a matter of policy choice), it seems eminently consistent with the conclusion that long-term development tends to be adversely affected by generous endowments of natural resources.

The idea that natural resources may be more of a curse than a blessing is not, in itself, a new one. Mahon [1992] is the latest of several authors (cited in his article) to attribute the poor economic performance of Latin America, as compared with East Asia, to their differing natural resources. Likewise, Auty [1993b] argues that the uneven economic performance of six large newly industrialising countries was mainly a result of the adverse effects of richer natural resources. Other work by Auty [1993a], and by Gelb [1988], alleges under-performance in mineral economies, especially oil exporters, for reasons explored in the extensive and long-established literature on Dutch disease [e.g. Daniel, 1986, 1992].

What distinguishes the present hypothesis from these earlier contributions are two related points. First, its argument that what matters is not the absolute amount of natural resources, but the ratio of land to skill: this means that the `resource curse' can operate in countries with only moderate natural resources, if they have even fewer human resources - or, in other words, that this is a widespread problem of poor countries, not simply one confined to rich mineral economies. The second distinguishing feature of the present hypothesis is its argument that the `curse' operates basically by long-term retardation of the process of skill acquisition, rather than through the various other (mainly shorter-term) mechanisms suggested in the literature.

Testing the hypothesis

Methodology

A proper test of this hypothesis would have to include several ingredients. One is to check its explanation of trade, and in particular its contention that the shares of manufactures and primary products in a country's exports are determined mainly by the country's ratio of human to natural resources. Results for the largest possible sample of countries strongly support this contention [Wood, 1994a:Figure 5], but it remains to examine the situation of the poorest countries more closely.

A second obvious ingredient is to test, both for the poorest countries and more generally, whether low human-to-natural resource ratios are associated with low growth, controlling for other relevant influences. If this is so, a third step would be to investigate whether this association is generated by the hypothesised mechanism - retardation of skill formation.

This third step would need to be subdivided: the comparatively easy aspect would be to

examine progress in formal education, asking whether this was slower in countries with low initial skill/land ratios; the other and much harder aspect would be to examine the rate and determinants of progress in other sorts of skill acquisition. Though total factor productivity growth calculations may be interpreted as providing some indirect evidence on this latter aspect, it is doubtful that much progress could be made by standard cross-country or time-series statistical methods, simply because there is not enough data on skills acquired outside the formal education system.

An alternative and better approach, which could throw light also on other aspects of the hypothesised set of relationships, would be case studies of specific countries. It would be particularly interesting to make a close examination of countries and regions whose experience seems to contradict the hypothesis - both those that have prospered despite having low ratios of human to natural resources (such as Botswana, and historically the USA), and those that have stayed poor despite high human/natural resource ratios (such as Sri Lanka and the Indian state of Kerala).[6]

A preliminary attempt has been made to test these hypotheses. This has involved relating human and natural resource endowments to income, growth and trade. The results, which are presented in this section, seem sufficiently interesting to warrant further investigation, but the picture is clearly not simple!

Variables and samples

Human resource endowment is measured by years of schooling, and natural resource endowment by total land area. Total land is a crude measure of natural resources, but it is an unbiased measure since a country with a larger land area is more likely to be endowed with the various types of natural resources.[7]

Two samples were used:

- a larger group (88 countries - see Appendix 4), consisting of those countries in Barro's growth regression [Barro, 1991:Table 1, regression 1] for which data on average years of schooling for 1960 were available;

- a smaller group (43 countries - see Appendix 4) of the countries used in the

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[6] It is interesting and perhaps not coincidental that both Sri Lanka and Kerala, though not all that well endowed with natural resources by global standards, experienced integration into the world economy as exporters of particular primary products a long time ago. This historical accident may have irreversibly tilted their economic structures (and in particular the priorities and specialised skills of their entrepreneurs and traders, domestic and foreign) away from other activities such as manufacturing.

[7] We experimented with a more detailed breakdown of natural resources (oil and gas reserves, mineral reserves and arable land) in the regression of export composition against resource endowments, but the coefficients were insignificant and the fit improved only marginally. It may be worth testing whether a more detailed breakdown of natural resources would affect the results in the growth regression.

analysis of export diversification in the next section for which data from Barro [1991] and data on average years of schooling in 1960 were available.

For more details on definition of variables, data sources and samples see Appendix 1.

Income, growth and human resources

Simple scatters of income against human resources

The strong correlation between income levels and human resources is readily observable from Figure 1, which shows real *per capita* GDP in 1985 against mean years of schooling in 1985 (the latest available year).

Figure 1
***Per capita* GDP against education (88-country sample)**

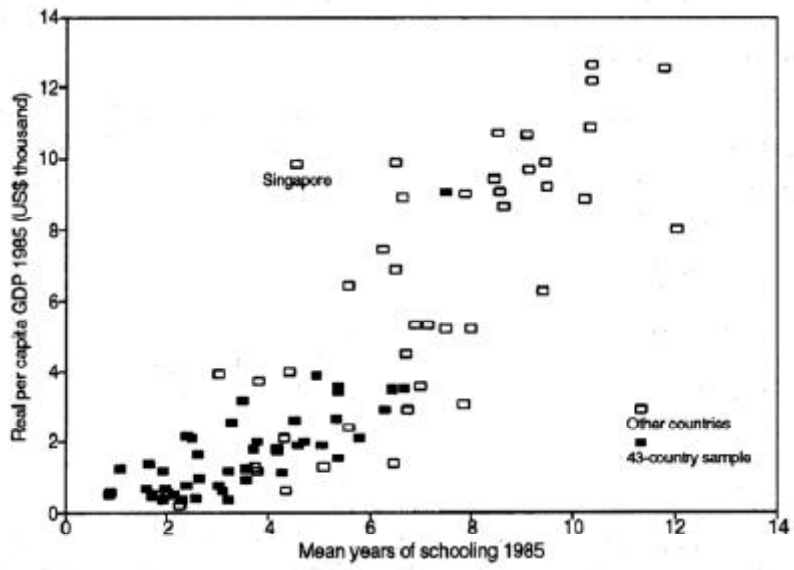


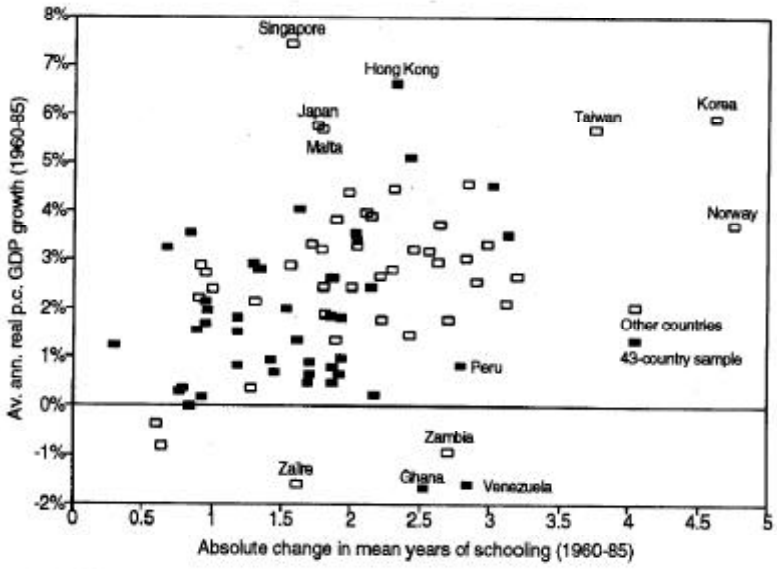
Figure 2 shows how *changes* in income are linked to *changes* in human resources over time by relating average annual growth rates of *per capita* GDP between 1960 and 1985 to absolute changes in average years of schooling over the same period. The reason for mixing absolute and proportionate changes in the comparison is that problems were identified when using either absolute or percentage changes in both variables. Some countries with low average years of schooling in 1960 have had enormous increases in percentage terms. When absolute change in *per capita* GDP was related to absolute changes in average school years, the increases in developed-country GDP dwarfed the effects of changes in average years of schooling on *per capita* income in developing countries.

Figure 2 does suggest that larger increases in average years of schooling have been associated with higher growth rates, although the correlation is not as striking as that between *levels* of GDP and human resources in Figure 1. There are also some conspicuous outliers in Figure 2.

- Zaïre, Zambia, Ghana and Venezuela all have moderate increases in education, but negative growth rates. Note that all are exporters mainly of primary products.

- By contrast, growth was much faster than would have been predicted from the rise in education in Singapore and Hong Kong. (Singapore and Zaïre both increased their average years of schooling by about 1.5 years, but their annual average growth rates differ by at least 8%.)

Figure 2
GR6085 against change in AVSY6085 (88-country sample)



However, the countries which have been able to grow fast without increasing their human resources seem to have had the advantage of starting off with high *levels* of education. Average years of schooling were 5.2 years for Hong Kong and 3.0 years for Singapore in 1960, high levels for developing countries at the time.

Although Figures 1 and 2 show a strong correlation between the skill level of the population and *per capita* income, there is a problem of determining the direction of causality. It may be argued that at higher levels of GDP countries can afford to invest more in education. Similarly in relation to Figure 2, countries which are growing faster can also afford to increase expenditure on education.

Explaining growth in terms of human resources

To overcome the causality problem it is necessary to employ a more sophisticated method of testing. Relating *initial levels* of human capital to subsequent growth rates allows for a better assessment of the direction of causality. (The chronology of these variables implies that causality can only run from human capital to growth, not *vice versa*.)

The following takes as its starting point Robert Barro's growth regression [Barro, 1991:Table 1, regression 1]. Barro regresses average annual *per capita* GDP growth (1960-85) on, among other variables, initial (1960) level of human capital and initial GDP. He finds growth to be positively related to initial levels of human capital (measured by enrolment rates) and negatively related to initial levels of *per capita* GDP. However, there is a problem with using

enrolment rates as a measure of human capital since they measure the flow of investment in human capital rather than its initial stock. As Barro points out, the positive effects of enrolment rates could reflect a favourable situation that shows up in high investment in human capital as well as in rapid growth of GDP.

Replicating Barro's equation, but using data on educational stocks, would help solve the problem of third-factor-causality. This was done using recently available data on the educational attainment of the adult population [Barro and Lee, 1993]. The stock of human capital, reflected in average years of schooling, takes a long time to build up. If a favourable situation were to be the simultaneous cause of high growth rates and high levels of human capital, it would have had to have been in existence for the 20-40 years prior to 1960 as well as in subsequent decades, which is unlikely (but not impossible, especially if the relevant influences were political or cultural).

The main regression results, summarised below, refer to the 88-country sample. The same regressions were also run for the reduced sample of 43, but this made little difference to the results. Regression results for both samples are reported in full in Appendix 2, Table A1.

Using average years of schooling rather than enrolment rates makes little difference to the regression results.[8] The coefficient on average years of schooling (AVSY60) is positive and significant. It is smaller than that on primary and secondary enrolment, but this is due to differences in the units of measurement. In other words, a one-year increase in average years of schooling embodies a larger increase in human capital than does a one percentage point increase in the primary or secondary enrolment rate.

Using both initial GDP and initial level of human resources as independent variables in a multiple regression tests the impact of human resources on growth *holding income level constant*. The positive effect of human resources on growth in the regression cannot, therefore, be attributed to differences in income levels. Hence, the finding is not subject to indeterminate causality, as was the case with the scatter diagrams. The result shows that the initial level of human resources has a positive and significant effect on growth.

Human resource accumulation, trade and endowments

The hypothesis suggests that accumulation of human resources is affected by countries' relative endowments of human and natural resources. The mechanism operates through countries trading according to their comparative advantage.

Relating trade to endowment ratios

Figure 3, which distinguishes between low-income countries (as defined in *The World Development Report 1992*) and other countries, shows (a) the ratio of exports of manufactured goods to exports of primary products against (b) a simple measure of the ratio of human to natural resources (number of school years per square kilometre - which is the same thing as average years of schooling per person multiplied by population density). Both ratios are measured on a (natural) log scale. They are clearly strongly correlated, supporting the present hypothesis about the determinants of trade.

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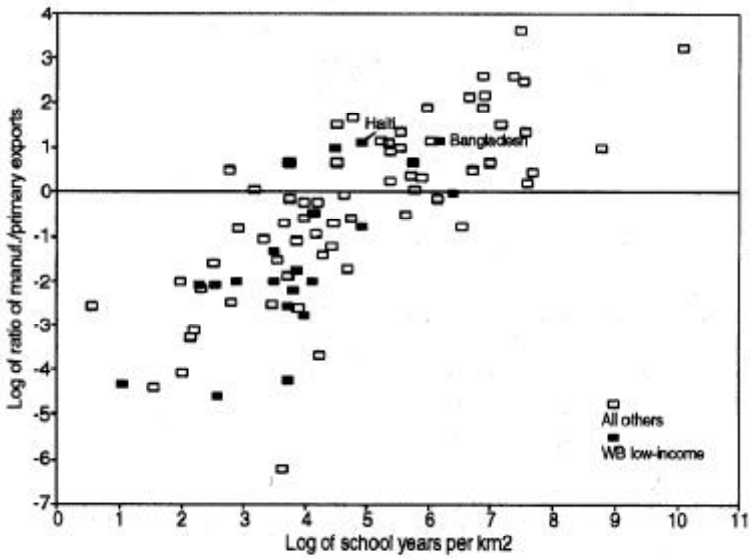
[8] This applies to both samples.

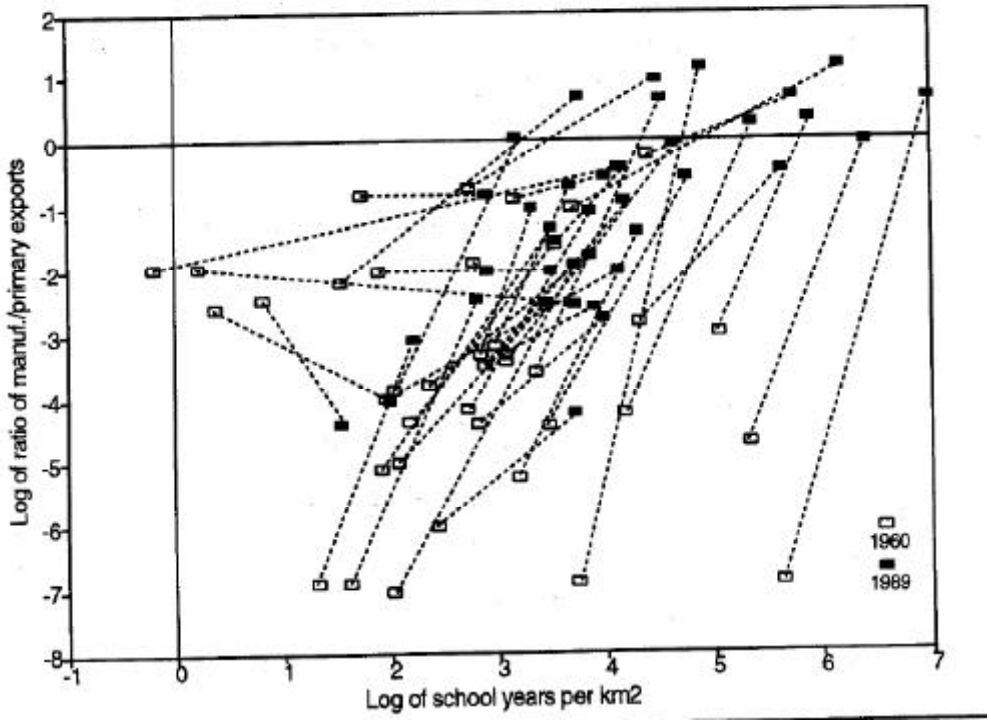
Figure 3
Export composition against endowments (1989)



Being a low-income country is not synonymous with being a primary exporter. Although the low-income countries are concentrated in the lower left-hand quadrant of the scatter, there are many middle-income countries with high ratios of primary to manufactured exports. Nor does being an exporter of manufactured goods ensure a high income level, as the cases of Haiti and Bangladesh attest.

Figure 4 traces the change in trade patterns and resource endowments over time (between 1960 and 1989), for 39 of the countries (see Appendix 4) in the 47-country sample (data for 7 countries were incomplete and Hong Kong, as an outlier, was omitted to improve legibility of the rest). We can see from the general pattern of these lines that rises in the ratio of manufactured to primary exports are generally associated with rising skill to land ratios. However, the figure also suggests that there are other important influences on changes in the pattern of trade, the most obvious possibility being changes in trade policy. For example, the long upward trajectories of the countries to the right of the figure suggest realisation of a previously latent comparative advantage in manufactures, as a result of more open trade policies. The figure highlights the scope for further analysis.

Figure 4
Export composition against endowments (1960 and 1989)



Relating growth to endowment ratios

The hypothesis suggests that having a lower ratio of human to natural resources *ceteris paribus* results in lower growth. A direct test was made for this relationship between growth and endowment ratios.

☐ Regional averages:

A preliminary overview of the relation between growth and other indicators in low-income countries is provided by regional comparisons, using sub-Saharan Africa and South Asia as proxies for the poorest countries. Table 2 shows that income and human capital levels are similar in sub-Saharan Africa and South Asia. Yet South Asia has grown much faster than sub-Saharan Africa. Other marked differences between the two regions illustrated in the table are:

- in the ratio of human to natural resources: South Asia has a much higher ratio of school years to land, with 538 years of schooling per km^2 compared to sub-Saharan Africa's 34;

- in the share of primary goods in total exports: primary commodities account for 92% of exports in sub-Saharan Africa, but only 30% in South Asia.

Table 2
Income and resource indicators in South Asia and sub-Saharan Africa

	South Asia	Sub-Saharan Africa
Similarities:		
Per capita income level (US$)	330	340
Illiteracy rate (%)	53	50
Mean years of schooling	2.4	1.6
Differences:		
Per capita income growth (1965-90)	1.9	0.2
Population per km^2	224	21
School years per km^2 (mean years of schooling x population per km^2)	538	34
Primary share of exports (%)	30	92

Sources: World Bank, 1992a:Tables 1 and 16; UNDP, 1992:Table 25.

These figures are consistent with the hypothesis that the poor countries which have been getting poorer are those with low ratios of human to natural resources (and consequently high proportions of primary commodities in their exports).

☐ Regression:

The hypothesis that endowment ratios affect growth may be tested more formally by regressing growth on the ratio of human to natural resources. The Barro-type growth regression used in the preceding section is employed again to control for other influences. In this case, the ratio of human to natural resources is added as an independent variable. The regression then becomes one of growth against *per capita* GDP in 1960, average years of schooling in 1960, share of government expenditure in income, political instability, and resource endowment ratio.

This regression was run for the 88-country sample (see Appendix 2, Table A2(i), for full results). The ratio of human to natural resource endowments has a positive and significant (at the 5% level) effect on the growth rate. If average years of schooling is excluded from the regression, the level of significance of the resource ratio increases to 1%. If, alternatively, the human/natural resource ratio is replaced by our measure of natural resource endowments alone (log of land per person), its coefficient is also significant (at the 5% level).[9]

These results give some support to the hypothesis that abundant natural resources, relative to human resources, tend to retard the pace of economic development. However, the effect, as measured by these regressions, appears quite small. For example, the regressions

[9] Barro found dummies for Africa and Latin America to be significant in explaining *per capita* growth. It was expected that including the endowment ratio or the land variable would render them insignificant, but this was not the case, which could mean either that our measure of natural resources is imperfect, or that the unusually slow growth of these two regions has causes other than natural resource abundance. The results are presented in full in Appendix 2, Table A2(ii).

suggest that a ten-fold increase in the area of land per person in a country would reduce its annual growth rate by only about half of one percentage point.

Relating human resource accumulation to trade

The final part of the hypothesis to be tested concerns the mechanism by which initial resource endowments affect growth. It is suggested that this mechanism involves the influence of endowments on the composition of trade, which in turn influences the accumulation of human resources.

One way of testing the effects of the human/natural resource ratio on accumulation of human resources is to run cross-country regressions of the change in average years of schooling on the initial endowment ratio. Similarly, the effects of trade on accumulation of human resources can be tested by regressing changes in average years of schooling on the composition of trade during the period concerned.

The regressions are presented in full in Appendix 2, Table A3. The results give weak support to the hypothesis that a higher initial human/natural resource ratio has a favourable impact on the subsequent accumulation of human resources. For the 88-country sample, the coefficient on the log of the resource ratio is positive and significant at the 10% level. (Using a developing-country-only sample (n=68 - see Appendix 4), the coefficient maintained its sign but lost all significance.)

Similarly, the impact of the trade ratio on the accumulation of human resources is weak. The impact was significant (at the 10% level) only when the log of the end-of-period trade ratio was used.

In all these regressions, incidentally, the initial level of income has a positive and significant effect, at the 10% level, on change in average years of schooling. The initial level of schooling has a negative but insignificant effect.

A more sophisticated model might or might not reveal a stronger relationship between the human/natural resource ratio and subsequent accumulation of human resources. As noted earlier, ideology and culture also have a significant impact on education policy and human resource accumulation. Moreover, countries with abundant natural resources, such as oil, can afford to invest heavily in education, as the Gulf states and Norway have.

The Export Diversification Hypothesis

The potential importance of the commodity composition of exports as a determinant of economic growth is supported both by the structuralist critique and by empirical analysis of world price trends over the past two to three decades. Countries that have been able to export manufactures, for example, have been trading in a more buoyant market for much of the period than have most countries exporting mainly primaries. To what extent, therefore, can economic stagnation be linked to a country's failure to alter the structure of its exports?

The broad assumptions of the hypothesis are that: the proximate cause of the poorest countries' problems is their failure to diversify out of exports with poor market prospects into items with a more dynamic outlook; and that there *may* be common underlying causes of this failure. This, it should be emphasised, is not simply a matter of failure to diversify out of primaries into manufactures. The primary commodity markets are variegated, and the failure to diversify is as much within as between broad product groups. The situation is most clearly described by examining hard and soft commodities separately.

Minerals

Product differentiation

It is frequently argued that the international trade outlook for primary commodities is so bad that poor primary exporters have no choice but to diversify their sources of export earnings as soon as possible. This is a very strong assertion and requires examination. In particular, the question that needs to be asked of countries with deposits of a wide range of minerals (which would include, for example, most states of Southern Africa) is whether it is diversification *out of* minerals or diversification *into new* minerals that is most appropriate.

In what follows, the discussion is confined to primary mineral commodities: exports of the derivatives of exhaustible mineral resources in `first saleable product' form - that is, without processing beyond the minimum stage necessary to find a sale on an international market. The range of these commodities is much wider than is sometimes supposed. Although by value world production of metal minerals is dominated by five commodities (copper, gold, aluminium, iron ore and zinc), there are at least 17 other mineral commodities for which the value of annual production exceeds US$ 1 billion. In addition, there are oil and gas - often treated differently, but presenting many of the same economic policy problems.

The range of minerals includes:

- energy minerals: coal, petroleum (including natural gas) and uranium;
- precious minerals: diamonds and gemstones, gold, silver and platinum group metals (PGMs);
- non-ferrous base metals: copper, nickel, bauxite, lead, zinc, tin, etc.;
- iron ore;
- specialty minerals: heavy minerals (titanium ores, rare earths), tungsten, cobalt,

chrome, etc.;

- industrial minerals: phosphates, soda ash, potash, building materials (especially high value ones, such as marble), filtration minerals (e.g. diatomite), processing materials (graphite, industrial diamonds).

Although each of these has in common the economic properties of minerals - exhaustibility, resource rent and natural monopoly in efficient exploitation of an individual deposit - they have differing market characteristics. Most of them are widely traded on international markets and priced internationally as traded goods (not subject to mark-up pricing by supplier cartels). The predominant exception to the pricing rule is, of course, diamonds.

Market trends are not likely to be uniform across the whole range. The declining material intensity of economic growth in the main importing markets may be a phenomenon especially affecting only base metals and iron ore. One possibility for poor, mineral-rich countries may be diversification into other types of mineral exports.

The analysis of mineral-exporting countries that have failed to grow should not, therefore, accept as a simple fact the proposition that adverse market conditions are responsible. In cases where there are exploitable deposits of minerals with better market prospects than the traditional exports, and where diversification has not occurred, the question to be asked is why. And in cases where the traditional exports have faced adverse market trends, the question to be asked is whether these have had similar effects on all exporters. In some cases of minerals facing relatively declining international markets (decline in consumption per unit of industrial country GDP), there has been a marked shift in the regional pattern of revealed comparative advantage in mineral production. The obvious case of this is in the production of copper, where Africa's share has markedly declined while Chile's has grown rapidly and even production in supposedly `high-cost' North American mines has revived sharply in the past decade.

The next question is to ask why, if mineral production is a *cul-de-sac* from the economic development point of view, there exist large, growing and profitable international companies which have not diversified out of mineral production. If anything, a reduction of diversity has taken place in recent years in the activity portfolios of, say, BHP, RTZ, Placer, Newmont and, in a somewhat different vein, the Anglo-South African mining finance houses. All of them have become more, not less, concentrated on primary mineral production.

Reasons for differences in country experience

Is it possible that the answer lies in a global reallocation of mineral rents since the mid-1970s? In parallel with Western economic policies and technological developments that have helped to depress mineral consumption and prices has gone reduction in host-country taxation, most strongly exemplified in Chile, where mining is taxed no differently from any other kind of business activity. On the other hand, the answer may simply lie in the ability of such companies to operate internationally and to move more quickly out of unprofitable minerals (such as bauxite) into, say, precious metals than is possible for a nation state.

There are not only successful mining *companies*. `Successful' mining *countries* (in terms of mineral output growth, attracting investment and market share) in the developing world include Chile, Indonesia, Papua New Guinea and Botswana. The first two are also well-diversified

into manufacturing activities. Chile and Papua New Guinea (and Indonesia to a lesser extent) built their mining sectors around the very base metals that represent a *cul-de-sac* for, say, Zaïre and Zambia. Why the difference?

It is useful to consider an ideal `life-cycle' (Dudley Seers' term with reference to Trinidad) for a mineral-exporting economy:

1. Exploration is encouraged by reform of the regulatory and taxation frameworks, and by the offer of risk-reducing operating conditions to private investors (foreign exchange retention, freedom to market, to import inputs, expatriate skills, etc.). Where non-fungible aid allocations are available for exploration work, these are used to enhance the state's claim on a share of rents.

2. If discoveries are made, and project construction begins, countervailing macro-economic policies are quickly put in place to minimise `Dutch Disease'.

3. The taxation regime is maintained at a level and structure expected to maximise the discounted present value of fiscal receipts from mining (i.e. a balance between stimulating new investment and taking the largest possible share from existing mines).

4. Revenues are saved offshore because of domestic absorptive capacity problems that limit non-inflationary expenditure on physical and social infrastructure, or where reductions in other personal and corporate taxation are not expected to lead to real accumulation of capital in non-mineral activities.

5. The long-term objective is both to maximise mineral revenues and to reduce the share of mineral activity in GDP and exports over time. Present wisdom would suggest that this should be done by emphasising expenditure on human capital, while reducing barriers to investment in other traded goods and services. It might also involve enhancing the administrative capacities of the state and providing adequate social insurance for those eventually displaced from declining mining industries.

Does the apparent worsening of trade prospects for some minerals suggest that countries should follow other steps? The case of the existing large, high-cost base metal industries of, say, Zambia and Zaïre may be different, but given that Zambia has hardly been explored for 25 years its future mineral potential may be considerable. The problem is the starting point: past Dutch Disease has left the rest of the Zambia economy as scorched earth. It is necessary to distinguish between the problems of declining industries in declining markets, and the management of mineral development where a significant probability of generation of mineral rents is estimated. A great deal of research has been carried out on the management of mineral economies when booms occur [e.g. Gelb, 1988; Daniel, 1992]; similar attention is now needed to the pre-conditions for growth (and, where appropriate, diversification) of the mineral sector itself [see, for example, the issues raised in World Bank, 1992b].

Agricultural products

Product differentiation

The soft commodities markets, like those for minerals, have seen substantial price falls as a result of excess supply. But, as in the case of minerals, the overall picture hides a varied pattern, with some commodities experiencing far better price trends than others, at least in some markets. This suggests the need for a similar re-assessment of the conventional hypothesis on the causes of economic problems of primary exporters. Just as with mineral exporting states, it is not sufficient to explain the poorest countries' economic problems simply by the fact that they have been major agricultural exporters during the worst slump in world commodity prices this century. Rather, it is necessary to explain not only why they have failed to diversify out of agricultural products but, additionally, why they have failed to diversify from the worst affected agricultural products into those that have been less badly affected. The answer to the second question may be physical (perhaps it is not possible to grow cherry tomatoes in the geographically most accessible areas of Côte d'Ivoire), but it may also be policy related.

The troubles of the international agricultural markets over the past decade or so hardly need elaboration. But, as the following figures indicate, not all agricultural commodities have fared identically. During the period 1980-87 there was an average annual fall in world food prices of 10.1% (against a rise of only 1% annually over the period 1962-80). In the case of tropical beverages the fall was 2.4% (as opposed to an annual rise of 2.9% over the period 1962-80), while for agricultural raw materials the fall was 4.2% (following a rise of 0.5% in the previous period) [Maizels, 1992:Table 1.2].

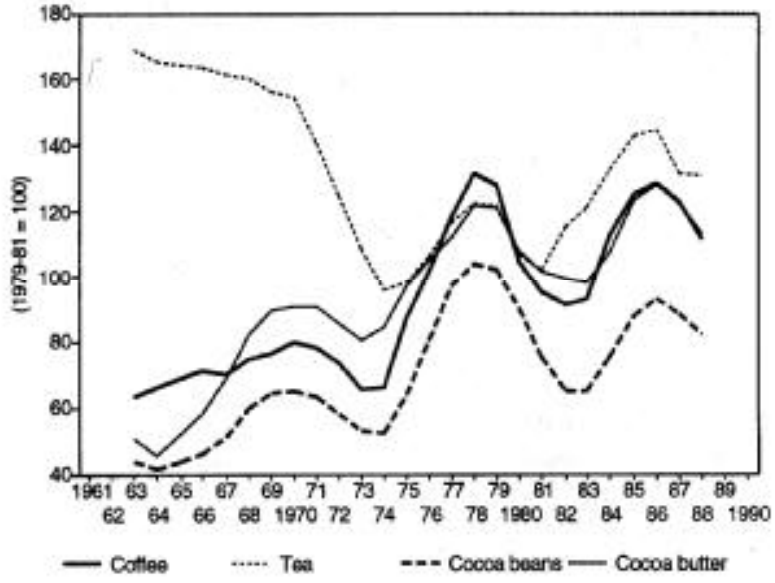
It is helpful to distinguish between three broad groups of agricultural commodities in terms of the prices that have prevailed in some of the markets accessible by some of the poorest countries. These are:

- cereals and other food crops produced behind protective barriers in OECD states;
- `traditional tropical' agricultural products (such as beverages and oils);
- foodstuffs that may be produced in both OECD and developing countries, most notably those that are seasonal in the former, such as some vegetables and flowers.

The first group has seen the most severe falls in world prices, while the third group has seen prices in some markets maintained or even increased.

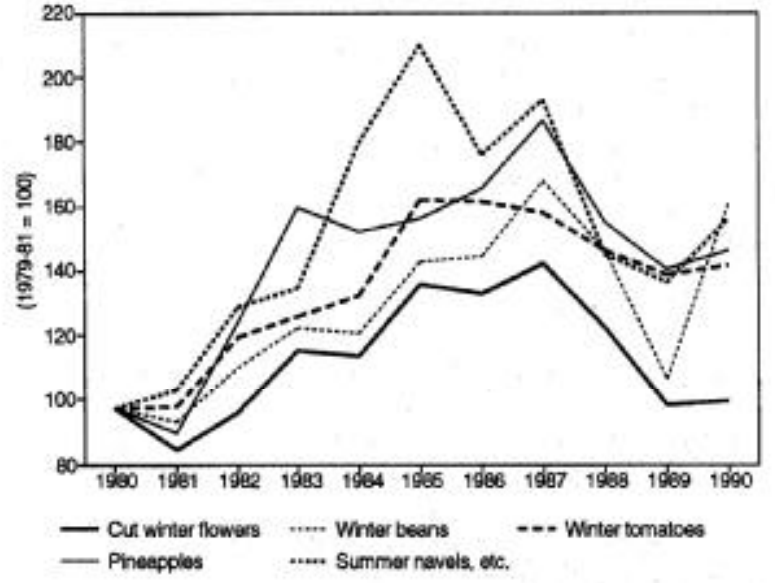
The relationship between these three groups of commodities, and the implications for developing countries, are illustrated in Figures 5-7. Figure 5 plots the intra-sectoral net barter terms of trade between sub-Saharan Africa's cereal imports and its beverage exports during the period 1961-90. The dominant picture presented is of substantial short-term variations with a favourable long-term trend. For the first half of the 1980s, at least, the net barter terms of trade between beverage exports and cereal imports moved in Africa's favour, reflecting the fact that the slump in world beverages prices was more than matched by the decline in world cereal prices (because of protectionism and dumping by OECD states).

Figure 5
Net barter terms of trade: most important sub-Saharan African exports and cereals imports
(5-year moving averages)



Source: FAO, 1991.

Figure 6
Net barter terms of trade: selected sub-Saharan African exports and cereals imports



Source: Eurostat, 1991a and 1991b; FAO, 1991.

Figure 6 provides a similar analysis of intra-sectoral net barter terms of trade, but between the cereal imports of sub-Saharan Africa and its `non-traditional' agricultural exports. The main differences are that only exports to the EU have been taken into account and, because of this, the time period is much shorter (1980-90) because European trade statistics do not distinguish between all the commodities covered in the earlier period. As with beverages, the movement in the terms of trade appears to be cyclical rather than linear, but the favourable movement for much of the 1980s for sub-Saharan Africa is considerably more marked.

The reason for this is that all of the countries in the sub-Saharan Africa category have favourable access to the EU market for some horticultural and floricultural products (South Africa does not, but is excluded from the sub-Saharan Africa aggregate). Although subject to tariff quotas in many cases, those sub-Saharan African exports that do gain access to the European market benefit from the artificially high prices maintained by the Common Agricultural Policy's protectionism.

Country differentiation

Figures 7a and 7b show the overall effect on the net barter terms of trade for food of Africa (Northern and Southern) and a selection of countries in Asia and South America for two time periods. A substantial majority of African states have seen a favourable movement in their intra-sectoral terms of trade over the past three decades. In this they have tended to fare better than South Asia and South America; all countries in the first group and just over half of the second experienced an unfavourable movement. However, the greatest gains, both absolutely and relative to the performance of other regions, seem to have occurred during the 1960s and 1970s. Fewer African states (but still a majority) saw a favourable movement during the 1980s; by contrast, this decade was more favourable for South Asia and South America.

As in the case of minerals, therefore, it has been possible for some countries to do better with a given set of market constraints than others. Not all of the sub-Saharan African countries that are able physically to export non-traditional agricultural products have actually diversified. The most prominent diversifiers have been Kenya, Malawi, Swaziland (although possibly as a front for South African produce), Zimbabwe and, surprisingly, Ethiopia. The West African states have been prominent by their failure to diversify. Indeed, there has been a decline in some horticultural product exports from francophone West Africa.

Testing the hypothesis

There are at least three aspects to the diversification question:

- inter-sectoral diversification (e.g. from primaries to manufactures);
- intra-sectoral diversification (from low-priced mineral or soft commodities to those with better market prospects);
- market diversification (from slow growing markets, such as the EU for traditional primaries, to more rapidly growing markets).

Figure 7a
Change in net barter terms of trade for food
1961-63 to 1988-90

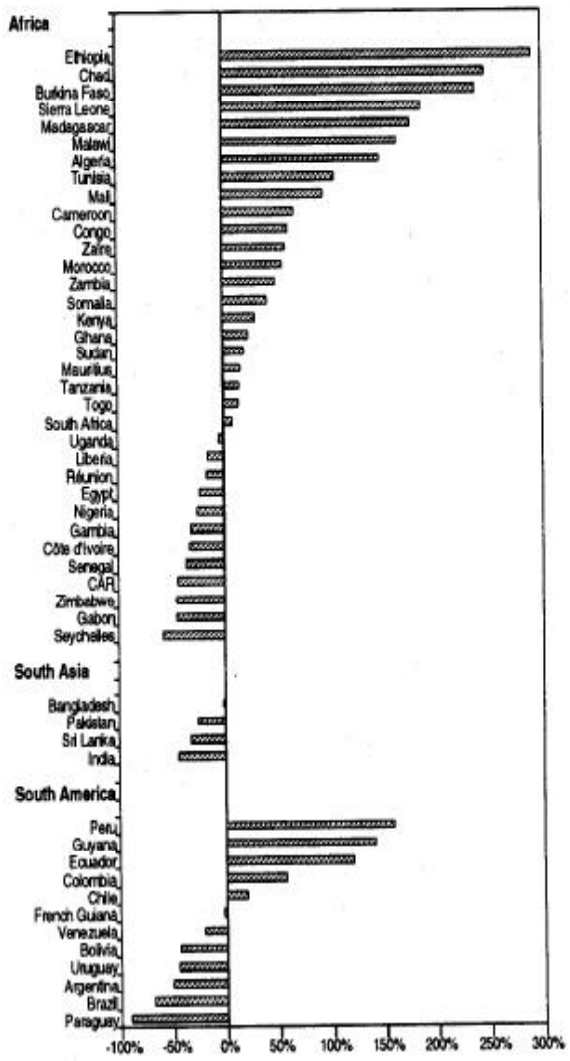
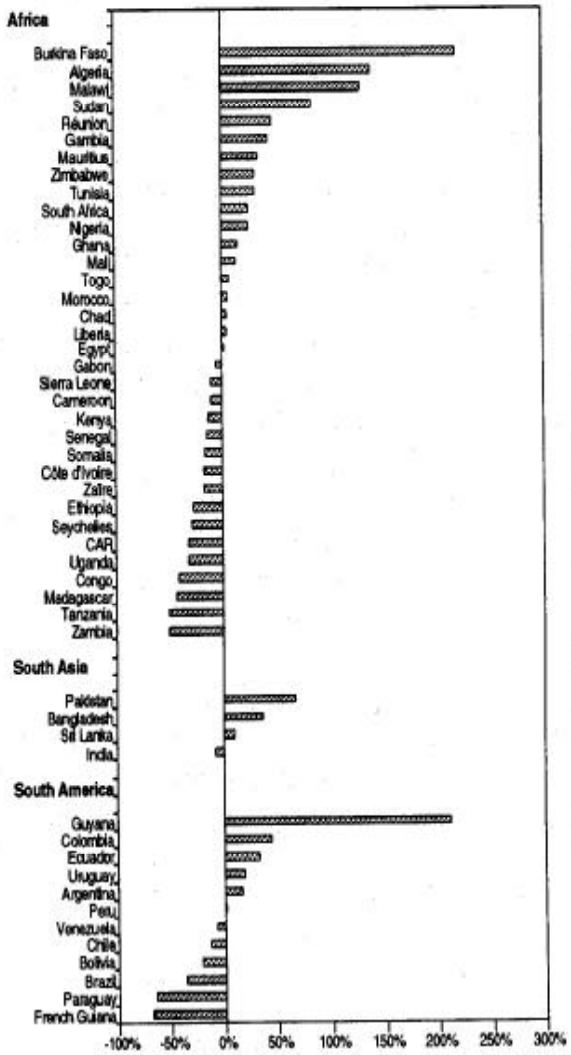


Figure 7b
Change in net barter terms of trade for food
1981-83 to 1988-90



Source: FAO, 1991

The analysis so far has not dealt with the third aspect - market diversification. It is hoped to do so later (subject to the resolution of practical problems identified in the final section).

Which countries?

The selection of countries for analysis in this part of the work was made on a pragmatic, multi-step basis. The methodology was tested on small initial samples of 12 and then 27 countries (see Appendix 4), and then extended to a group that includes a substantial proportion of developing countries other than the smallest. This group, which forms the basis for the

following tables, totals 47 states[10] (Appendix 4). They include lldcs, MICs and NICs. It is the first of these only that is of direct interest to the authors; states in the other two groups are included for comparison.

A number of illustrative features of the 47 states are presented in Table 3, which shows that we are dealing with a mixed bunch of countries. GNP *per capita* ranges from $13,430 to $100 (current US$, 1991), and average annual export growth from 20% to -4.6%. Twenty-one states have a share of non-fuel primaries in total exports exceeding two-thirds, while for eight states the share of manufactures exceeds this level.

To facilitate comparison, the states were divided into four sub-groups on the basis, first, of GNP *per capita* and, second, within each group so defined, GDP growth. The unweighted mean 1991 GNP *per capita* of all 47 states was $1,399. The 17 states with a *per capita* GNP above this level were identified, and an unweighted mean of their 1980-90 GDP growth was calculated; states with a growth rate exceeding this level were put into one sub-group and those with a lower figure were put into another. This process was repeated for the 30 states with a *per capita* GNP below the mean. This process resulted in four sub-groups:

- Group 1 - richer, faster growing;
- Group 2 - richer, slower growing;
- Group 3 - poorer, faster growing;
- Group 4 - poorer, slower growing.

There are some clear differences (apart from wealth) between the groups. Agriculture's share of GDP in the richer groups is much lower (at 10% and 13%) than in the poorer groups (30% and 37%), while that of industry is higher. The rate of export growth declines monotonically from Group 1 to Group 4, while the share of non-fuel primaries rises. Hence, the poorer states (Groups 3 and 4) have experienced both lower export growth and a higher dependence on primaries than have the richer states, even those that have grown relatively slowly.

The database

The primary reason for the focus on product rather than market diversification is that the work was based on an analysis of EU import statistics. A key assumption is that there may exist substantial differences between the market characteristics of the items falling within the same trade nomenclature aggregates. In other words, an analysis that is limited to broad product groups (such as `agricultural commodities' and `minerals', or even `food' or `cereals') may fail to recognise a genuine diversification between items within such aggregates with distinct sets of market characteristics. Hence, the analysis has to be undertaken at as high a level of product disaggregation as is feasible. This is much easier to do if it is organised around one importing

[10] This sample of 47 states was derived from an initial list of 69 developing countries (see Appendix 4), which had been produced after the exclusion of some states without scrutiny on the assumption that data would be scarce or particularly unreliable, or that they had experienced known abnormal conditions during the review period (e.g. Laos, Cambodia, Angola and Mozambique). For 14 of these 69 states, recent GNP *per capita* or GDP growth data were unavailable, and so they were excluded. A further eight of the 69 states were excluded because of the low proportion of their exports that is directed towards the EU (for reasons explained below).

state's statistics rather than one of the available databases that combine exporting state figures, since these tend to be organised at a relatively high level of aggregation.

Table 3
Selected characteristics of the sample states

	GNP *per capita* (current $) 1991	GDP growth (%) 1980-90	Share in GDP[a] of: agriculture (%)	industry (%)	Export growth (av.ann.change) (%) 1976-91	Share in exports[a] of: non-fuel primaries (%)	manufactures (%)
Group 1							
Botswana	2,530	11.3	6.5	69.3	17.5	n/a	n/a
Thailand	1,570	7.6	15.1	47.2	16.2	32.3	66.7
Hong Kong	13,430	7.1[b]	0.3	25.2	17.7	3.7	95.7
Mauritius	2,410	6.0	11.0	32.7	10.7	69.7	30.3
Malaysia	2,520	5.2	22.7	41.6	13.2	23.5	61.0
Turkey	1,780	5.1	17.8	33.7	13.8	30.8	66.9
Tunisia	1,500	3.6	18.0	31.5	11.5	13.5	67.9
Unweighted mean			**13.1**	**40.2**	**14.4**	**28.9**	**64.8**
Group 2							
Chile	2,160	3.2	6.5	40.9	10.1	84.4	15.1
Algeria	1,980	3.1	14.1	49.7	6.0	0.9	2.2
Costa Rica	1,850	3.0	16.9	26.4	6.3	72.8	26.2
Brazil	2,940	2.7	10.2	38.6	8.0	42.7	56.0
Jamaica	1,480	1.6	6.9	47.4	3.8	41.4	56.4
South Africa	2,560	1.3	5.0	43.8	7.3	n/a	n/a
Venezuela	2,730	1.0	5.1	47.9	3.2	9.5	12.1
Uruguay	2,840	0.3	12.7	33.8	7.2	59.5	40.5
Panama	2,130	0.2	10.5	12.6	20.0	77.8	21.9
Argentina	2,790	-0.4	14.5	39.6	7.7	65.5	28.2
Unweighted mean			**10.2**	**38.1**	**8.0**	**50.5**	**28.7**
Group 3							
Pakistan	400	6.3	25.6	25.6	11.4	26.8	72.2
India	330	5.3	32.2	27.9	8.0	24.5	72.7
Egypt, Arab Rep.	610	5.0	18.1	29.7	4.0	29.3	40.7
Nepal	180	4.6	59.0	14.3	5.9	11.9	88.1
Burkina Faso	290	4.3	43.6	19.7	8.5	87.8	12.2
Bangladesh	220	4.3	38.3	16.8	10.7	29.1	70.3
Kenya	340	4.2	26.6	22.4	2.3	67.2	20.2
Morocco	1,030	4.0	n/a	n/a	8.6	46.0	51.2

Table 3 *(continued)*

	GNP *per capita* (current $) 1991	GDP growth (%) 1980-90	Share in GDP[a] of: agriculture (%)	industry (%)	Export growth (av.ann.change) (%) 1976-91	Share in exports[a] of: non-fuel primaries (%)	manufactures (%)
Group 3 *(continued)*							
Sri Lanka	500	4.0	26.9	25.0	8.9	35.1	64.4
Burundi	210	3.9[b]	54.6	16.0	3.2	97.7	2.3
Colombia	1,260	3.7	18.8	40.7	8.5	37.9	33.3
Senegal	720	3.0	26.9	27.2	3.8	65.3	22.9
Ghana	400	3.0	59.4	6.5	1.6	98.2	1.1
Zimbabwe	650	2.9	19.5	31.7	4.7	67.3	32.0
Malawi	230	2.9	35.3	19.5	7.3	96.1	3.8
Uganda	170	2.8	51.4	11.8	-4.0	99.3	0.3
Tanzania	100	2.8	60.8	5.2	-1.5	81.0	14.2
Unweighted mean			**37.3**	**21.2**	**5.4**	**58.9**	**35.4**
Group 4							
Paraguay	1,270	2.5	23.3	25.7	12.1	88.6	11.3
Honduras	580	2.3	22.2	27.0	4.6	93.7	5.9
Papua New Guinea	830	1.9	31.9	34.0	6.2	96.7	3.0
Togo	410	1.6	35.8	25.5	8.1	90.4	9.6
Sierra Leone	210	1.5	42.9	14.2	1.6[c]	63.8	32.3
Nigeria	340	1.4	36.8	37.6	1.3	3.3	1.1
El Salvador	1,080	0.9	26.4	23.1	-1.6	59.0	40.5
Guatemala	930	0.8	27.2	20.7	3.3	70.1	27.9
Côte d'Ivoire	690	0.5	37.8	22.5	3.3	78.8	10.7
Peru	1,070	0.3	12.2	50.1	6.2	75.0	18.1
Bolivia	650	-0.1	n/a	n/a	2.0	67.4	4.4
Haiti	370	-0.6	n/a	n/a	3.3	58.2	41.8
Nicaragua	460	-2.2	35.5	28.4	-4.6	86.5	12.5
Unweighted mean			**30.2**	**28.1**	**3.5**	**71.7**	**16.9**

Note: (a) In latest year for which data are available.
(b) For years other than those shown.
(c) 1976-90.

Sources: GDP growth: World Bank, 1992a. All others: World Bank, 1992c.

The value of any analysis based on such figures will be influenced by the relative importance of the importing state in the exporter's trade. A check was made to see whether the EU was a significant market for the countries in the sample. This is reported in Appendix 3, which shows for each of the countries the share of the EU in total exports in 1975 and 1991 (or the closest year for which data are available). The table also shows the change in the relative importance of the EU between these two years. In most cases, the EU is an important market. In two of the four sub-groups the unweighted EU share of exports in 1991 is around one-third and in two it is between one-third and one-half. There are only a few cases where the EU's share of total exports is so small as to cast doubt on its value as a basis for analysis. As explained above, eight states were excluded from further analysis on this basis (since changes in the characteristics of exports to the EU market may simply reflect a redirection of trade rather than a change in total exports). These eight were all states in which the EU accounted for less than 20% of exports in both 1975 and 1991.

One interesting feature of Appendix 3 which is not taken any further in this paper is that there are significant differences between the sample countries in terms of changes in the relative importance of the EU as a market for their exports, but these are not obviously related to wealth or growth rate. In some cases the EU's share has risen significantly, and in others it has fallen equally substantially. One, frequently voiced, hypothesis is that a failure to diversify *geographically* (i.e. over-concentration on slow growing Europe) is a factor in poor economic performance. The table provides little support for this hypothesis. It is true that the rich, fast growers have reduced the share of their exports destined for Europe, but so have the poor, slow growers (with an unweighted average decline of 6%). It is the two middle categories - one fast and one slow growing - that have seen, on average, a substantial increase in the share of exports directed to the EU.

This complex picture reinforces the desirability of extending the analysis to include market diversification. The main obstacle encountered in this so far is that the readily available, PC-readable import statistics for the USA (which is the obvious choice for the next importing country to assess) do not provide a time series over a sufficiently long period to permit a comparable analysis.

The analyses made

Product diversification

For all countries in the sample, EU import statistics for 1976 and 1992 were analysed to show the number of 4-digit product categories that accounted for 80% or so of total exports to the EU. The countries were then ranked according to the degree of change in the number of commodities involved. This was done both in relation to absolute change in the number of exports in the top 80% and in relation to proportionate change. The results are presented in Table 4, which organises the countries according to their position in the four groups and, within each of these, in declining order of the change in the number of items exported. In order to facilitate comparison, the table provides two measures of the average for each country group - an unweighted mean and a median.

On both indicators of change, the table tends to show more diversification by the fast growing groups than by the slow growers. Both the mean and the median are higher for Group 1 than for

Group 2, and the mean is higher for Group 3 than for Group 4. But there are many

Table 4
Product diversification and change in unit value

	No. of 4-digit product groups[a]		Change in no. of 4-digit product groups		Change in average unit value (%)
	1976	1992	absolute	%	
Group 1					
Thailand	12	61	49	408.3	208.5
Turkey	16	62	46	287.5	86.0
Malaysia	5	45	40	800.0	158.6
Hong Kong	19	45	26	136.8	108.3
Tunisia	13	28	15	115.4	332.3
Mauritius	1	9	8	800.0	233.7
Botswana	1	5	4	400.0	
	73.0				
Unweighted mean	**10**	**36**	**27**	**421.2**	**171.5**
Median[b]	**12**	**45**	**33**	**275.0**	**158.6**
Group 2					
Brazil	19	50	31	163.2	63.0
Chile	3	14	11	366.7	22.8
Argentina	16	26	10	62.5	29.0
Uruguay	8	17	9	112.5	74.5
Venezuela	2	4	2	100.0	40.8
Costa Rica	2	4	2	100.0	73.3
South Africa	16	17	1	6.3	-22.9
Jamaica	3	4	1	33.3	145.6
Panama	2	3	1	50.0	106.8
Algeria	1	2	1	100.0	55.1
Unweighted mean	**7**	**14**	**7**	**109.4**	**58.8**
Median[b]	**3**	**9**	**6**	**200.0**	**59.1**
Group 3					
India	24	64	40	166.7	76.9
Sri Lanka	5	28	23	460.0	207.0
Morocco	13	35	22	169.2	269.5
Zimbabwe	1	12	11	1100.0	84.3
Pakistan	19	27	8	42.1	78.4
Tanzania	6	12	6	100.0	29.4
Bangladesh	5	11	6	120.0	746.1
Senegal	4	9	5	125.0	102.7
Egypt, Arab Rep.	3	6	3	100.0	36.8
Kenya	9	11	2	22.2	68.8
Colombia	3	5	2	66.7	-88.6
Ghana	4	5	1	25.0	52.9
Burkina Faso	2	3	1	50.0	276.8
Burundi	2	2	0	0.0	0.5
Malawi	2	2	0	0.0	102.2
Uganda	1	1	0	0.0	-32.6
Nepal	4	1	-3	-75.0	2245.2
Unweighted mean	**6**	**14**	**7**	**145.4**	**250.4**
Median[b]	**4**	**9**	**5**	**125.0**	**78.4**
Group 4					
Peru	6	12	6	100.0	126.9
Côte d'Ivoire	5	11	6	120.0	91.3
Haiti	1	7	6	600.0	-4.5

Table 4 *(continued)*

	No. of 4-digit product groups[(a)]		Change in no. of 4-digit product groups		Change in average unit value (%)
	1976	1992	absolute	%	
Group 4 *(continued)*					
Guatemala	2	6	4	200.0	-0.3
Togo	2	6	4	200.0	47.6
Honduras	2	5	3	150.0	20.6
Paraguay	5	7	2	40.0	-14.8
Bolivia	2	4	2	100.0	-52.8
Papua New Guinea	2	3	1	50.0	26.2
El Salvador	1	2	1	100.0	-24.7
Nicaragua	2	2	0	0.0	19.5
Nigeria	1	1	0	0.0	32.2
Sierra Leone	5	2	-3	-60.0	554.7
Unweighted mean	**3**	**6**	**2**	**123.1**	**63.2**
Median[(b)]	**2**	**5**	**3**	**150.0**	**20.6**

Notes:

(a) Accounting for about 80% of total exports.

(b) The figure for the median in the `Change in number of 4-digit product groups' columns has been calculated from the medians for the number of 4-digit product groups in 1976 and 1992.

Source: Eurostat, 1991a and 1993.

differences within groups as well as between them, as is illustrated by the fact that the median percentage product change for Group 4 is higher than for Group 3 even though the mean is lower (as are both mean and median for absolute product change). The intra-group variations are more pronounced among the two poorer groups. Comparing the two richer groups, for example, only a couple of states in Group 2 have a higher percentage change in product groups than any state in Group 1. In Group 4, by contrast, all states have a higher percentage change than the worst performer of Group 3, and an identical number in the two groups have a change of 100% or more.

The relationship between diversification and GDP growth is further elaborated in Figures 8 and 9, which for each country plot annual GDP growth against the absolute change and percentage change in the number of exported products. Both scatters suggest that a positive correlation does exist, i.e. that higher levels of growth are associated with more diversification. A correlation coefficient was calculated for each of the two sets of data. In neither case did the calculation produce a strong result, but for Figure 8 there is a coefficient of correlation of 0.42 between GDP growth and the absolute change in the number of product groups. (For Figure 9 the coefficient was 0.27.)

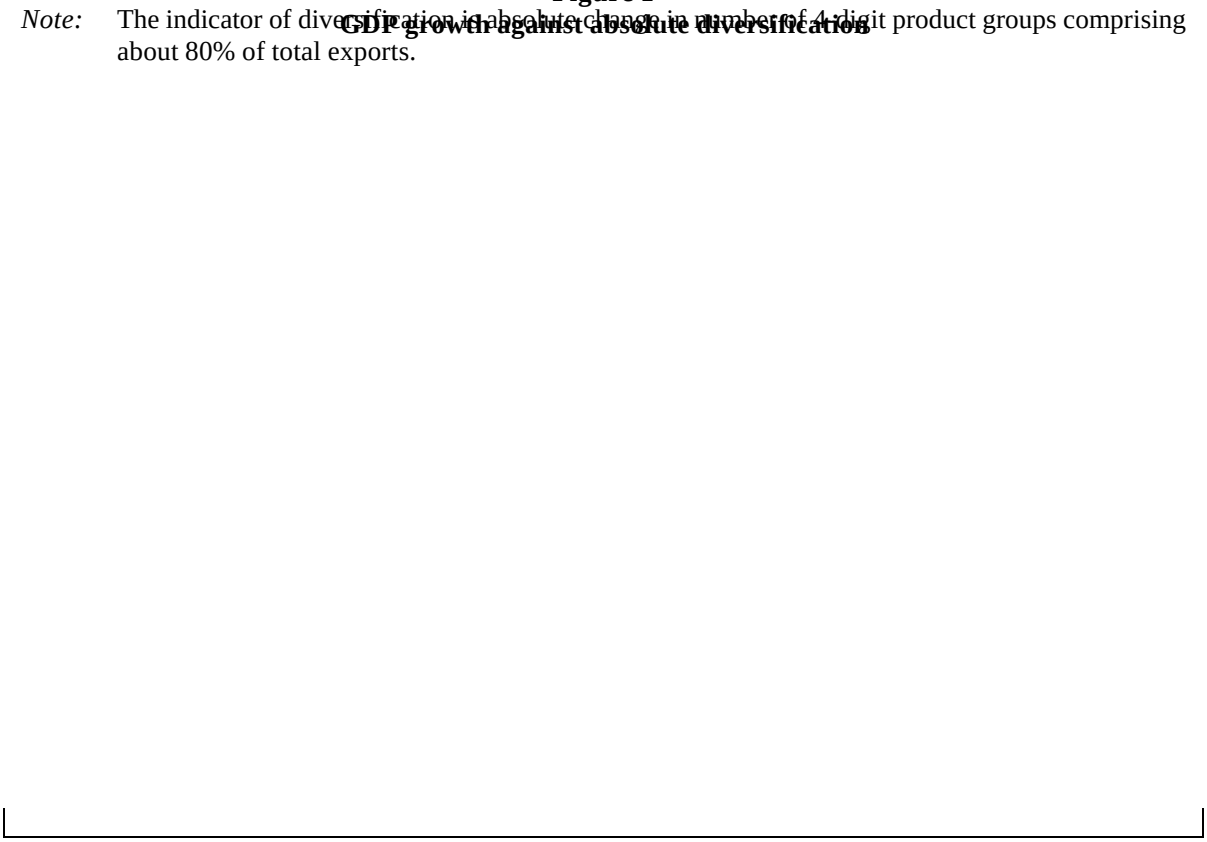
Change in export value

A second set of analyses was made to examine changes in the value of each country's exports. The average unit value of each state's total exports to the EU in 1976 and 1992 was calculated. The results are also presented in Table 4.

With few exceptions, the fast growing countries in each of the two income groups have

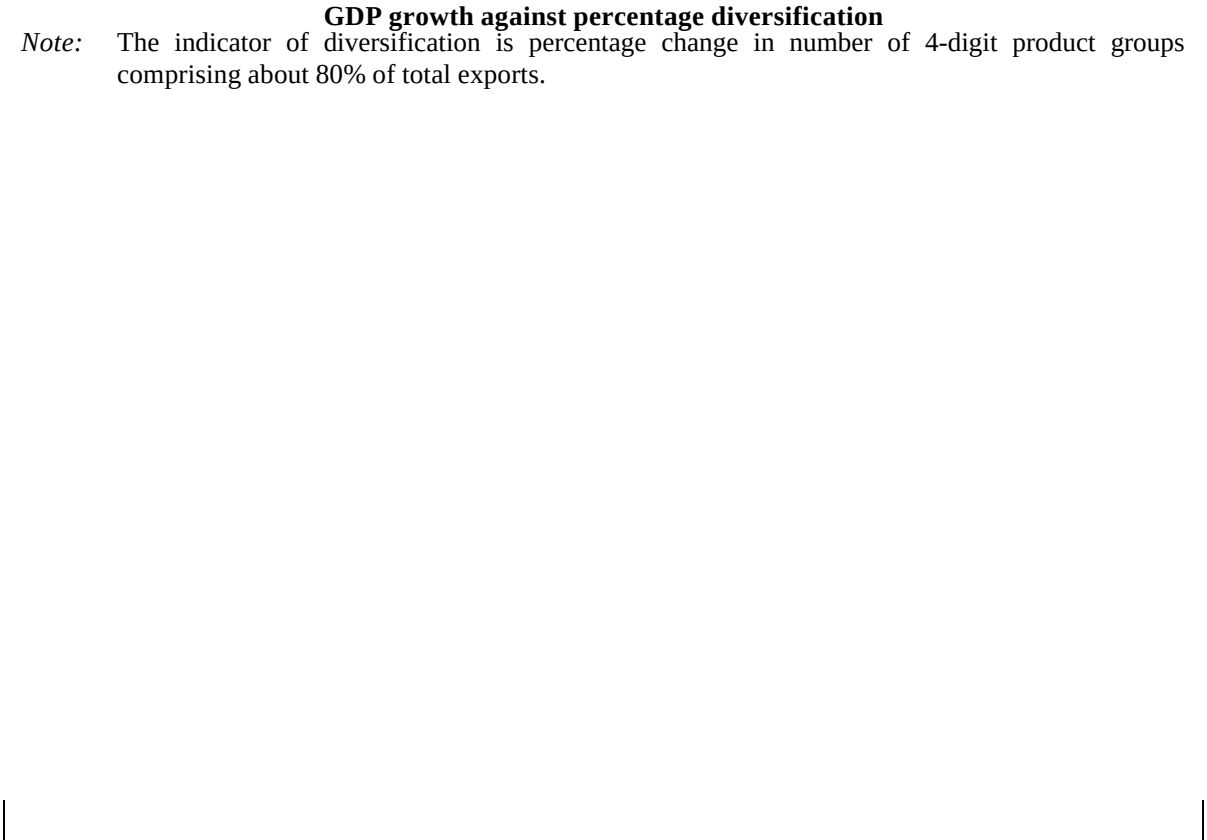
experienced a larger increase in export unit value than have their slower growing peers. The

Figure 1
GDP growth against absolute diversification



Note: The indicator of diversification is absolute change in number of 4-digit product groups comprising about 80% of total exports.

Figure 2
GDP growth against percentage diversification



Note: The indicator of diversification is percentage change in number of 4-digit product groups comprising about 80% of total exports.

median for Group 1 is almost three times as great as that for Group 2, while in the case of Groups 3 and 4 the multiple is almost four. All but two of the states in Group 1, and seven of the 17 states in Group 3 had rates of increase in excess of 100%; only two of the 13 states in Group 4, and two of the ten states in Group 2 achieved this. By contrast, over one-third of the Group 4 states experienced negative growth; for Group 3, fewer than one-twelfth did so.

As with product diversification, the relationship between GDP growth and changes in export unit value has been plotted in a scatter diagram (Figure 10). With the exception of a small number of outliers, it provides an impression of a positive relationship between the two variables. However, the relationship is not a very strong one. A coefficient of correlation of 0.47 was calculated for the relationship between GDP growth and change in unit value for all states except the five outliers (Bangladesh, Botswana, Colombia, Nicaragua and Sierra Leone) and Nepal, which, with a change in average export unit value of 2245%, is excluded from the figure. Clearly, other tests and other permutations of characteristics could be tried.

Figure 3
GDP growth against change in export unit value

The relationship between diversification and unit value

The two sets of indicators - diversification and unit value change - are plotted against each other in Figures 11 and 12. The figures also identify by name outlying states, i.e. countries that are not in the same part of the figure as most other members of their group (Nepal has again been excluded from both figures). Nothing further is done in this paper to analyse other differences between outliers and their peers, but the data will serve as a starting point for subsequent work.

Figure 4
Unit value change against absolute diversification

Note: The indicator of diversification is absolute change in number of 4-digit product groups comprising about 80% of total exports.

Figure 5
Unit value change against percentage diversification

Note: The indicator of diversification is percentage change in number of 4-digit product groups comprising about 80% of total exports.

Neither figure provides any strong hint of a positive correlation between diversification and change in unit value. It did not seem worthwhile to subject the data, as currently presented, to more formal tests for correlation. Rather, the figures suggest a need to think further about possibilities for refining the indicators.

The value of traditional exports

One weakness of such attempts to draw lessons from data on diversification is that they fail to distinguish between countries with traditional exports that have experienced buoyant markets and those that have been unfortunate in this respect. As explained above, not all traditional primaries have experienced adverse market conditions during the review period. The implications to be drawn from a failure to diversify by a state that has rapidly growing export revenue from its traditionals are quite different from those relating to a state facing a sharp fall in traditional prices.

An attempt was made to probe further into the relationship between diversification and increases in the unit value of exports by identifying the extent to which the latter were due to a growth in the unit value of traditional or of non-traditional exports. Wherever possible from the trade statistics, data were collected on the unit value in both 1976 and 1992 of all products that were exported to the EU in both years. This was a difficult exercise, involving a certain degree of judgement, because product categories have changed substantially during this period. In some cases products were identified at the 4- and in other cases at the 6-digit level, according to what seemed to be most appropriate. Traditional exports were deemed to be those that were exported in both 1976 and 1992; those items that were exported in 1992 but not in 1976 were deemed to be non-traditional exports. The rate of change in unit value of all traditional exports between 1976 and 1992 was then calculated.

Ideally, the growth of traditional export unit value should be compared directly with the change in unit value of non-traditional exports. However, the detailed analysis of every year's statistics needed to identify the emergence and track the progress of every non-traditional export was beyond our scope. A rough and ready short cut is to compare the change for traditional exports with the change for all exports. Since the latter is an amalgam of traditional and non-traditional products it cannot be taken as a direct proxy for one group. But a comparison between the experiences of traditional and of all exports may, at the least, suggest areas for more detailed further work.

In this expectation, for each country in the sample the rate of change in unit value of each traditional item was compared to the rate of change for total exports. A record was made of the number of traditional items with growth in excess of (or decline less than) the mean for all exports. The results are summarised in Table 5. One difference between the groups that seems to emerge from the table concerns the relative unit value performance of traditionals in fast and slow growers. In both fast growing categories there were very few countries in which traditionals as a group experienced equal or more rapid unit value growth than the average (and hence, by implication, non-traditionals). In the two slow growing categories traditionals tended to perform relatively better. In Group 2, half of the countries had greater or equal numbers of traditionals with above average unit value growth; in Group 4 the proportion was one-quarter.

Table 5
Relative performance of traditional export products

	Above average[(a)]	Below average[(a)]
Group 1		
Turkey	4	8
Botswana	1	0
Hong Kong[(b)]	1	8
Mauritius	0	1
Malaysia	0	5
Thailand	0	6
Tunisia	0	7
No. with above average >= below average	**1 (out of 7)**	
Group 2		
South Africa[(b)]	9	0
Argentina	5	4
Uruguay	4	2
Chile	3	0
Brazil	3	12
Costa Rica	1	1
Algeria	0	1
Panama	0	2
Venezuela	0	2
Jamaica	0	3
No. with above average >= below average	**5 (out of 10)**	
Group 3		
India[(b)]	4	14
Pakistan	3	6
Colombia	2	0
Tanzania	2	3
Kenya	1	4
Burundi	0	1
Uganda	0	1
Nepal	0	1
Burkina Faso	0	1
Bangladesh	0	2
Malawi	0	2
Ghana	0	3
Egypt, Arab Rep.	0	3
Sri Lanka[(b)]	0	3
Senegal	0	3
Morocco	0	7
Zimbabwe	-	-
No. with above average >= below average	**1 (out of 16)**	
Group 4		
Paraguay	2	2
Bolivia	1	0
Nigeria	1	0
Honduras	1	1
Papua New Guinea	1	1
Nicaragua	0	1
Haiti	0	1
Guatemala	0	1

Table 5 *(continued)*

	Above average[(a)]	Below average[(a)]
Group 4 *(continued)*		
El Salvador	0	1
Togo	0	1
Peru	0	4
Côte d'Ivoire	0	5
Sierra Leone[(b)]		
No. with above average >= below average	**3 (out of 12)**	

Key:
Countries in *italics* are in anomaly group 1, i.e. higher-than average unit value change/lower-than-average percentage change in number of product groups.
Countries in ***bold italics*** are in anomaly group 2, i.e. lower-than-average unit value change/higher-than-average percentage change in number of product groups.
Notes:
(a) The term `average' means the rate of change 1976-92 in the mean unit value of total EU imports from each state.
(b) Excludes diamonds or precious/semi-precious stones, which were exported in both years but for which it is impossible to establish unit values.
Source: Eurostat, 1991a and 1993.

If there is any causality in this apparent link its nature is not made clear by these analyses, nor need it be identical in all cases. Perhaps the table reflects a qualitative difference between diversification in fast and slow growers, with the former able to shift not just into *any* new product but into ones with superior growth characteristics. Perhaps it is an echo of the primary endowment curse: states with *relatively* strong traditionals (compared with the immediately available alternatives) find it more difficult to diversify even though the *absolute* performance of the traditionals is unsatisfactory. In either case, country studies are probably the most sensible way to probe the relationship further.

Another illustration of the fact that there are qualitative as well as quantitative aspects of diversification has been provided by an attempt to link the data in Table 5 with those in Table 4 on percentage change in major exports and unit values. The link between the two tables is that Table 5 emphasises those states with `anomalous' figures on diversification and unit value. This is to facilitate observation of any possible explanations from the underlying performance of traditionals. The anomalies identified are defined as:

- states that have achieved a higher-than-average (for their group) increase in unit value despite a lower-than-average diversification; and

- states that have experienced the opposite - lower-than-average unit value growth despite higher-than-average diversification.

In fact, far from `explaining' the anomaly, the exercise has compounded the problem. The hypothesis being examined was that states with a high unit value growth but only low diversification might have achieved this because they were blessed with buoyant traditionals (and *vice versa* for the second anomalous group). In fact, none of the first anomaly category had more traditionals with above than with below average growth. Indeed, most had no

traditionals with above average growth. Similarly, most of the second group also had more below than above average traditional items. In other words, although they diversified relatively strongly, and their new exports performed better than their old ones, they nonetheless experienced below average unit value growth. It seems clear that the microscope has to be trained more closely on specific countries to find out what is going on.

Linking human resources and export diversification

To what extent do success or failure in export diversification appear to be linked to human resource endowments? As a first step in answering this question, the indicators of diversification and human resources used above have been plotted against each other in scatter diagrams. The results are presented in Figures 13-16.

Figures 13 and 14 both plot absolute change in number of export groups as the indicator of diversification against, respectively, as the indicator of human resources, mean years of schooling and the log of school years per square kilometre. Figures 15 and 16 substitute as the measure of diversification the change in export unit value, and retain the two alternative measures of human resources.

None of the figures suggests a strong correlation between the indicators plotted, an impression that has been confirmed by the calculation of simple correlation coefficients for each of the four pairs of variables. These revealed very weak positive correlations for Figures 13, 14 and 16, and a very weak negative correlation for Figure 15. (None was statistically significant at conventional confidence levels.)

These findings may appear at first sight to be at variance with recent UNCTAD calculations that have found a quite strong correlation between export diversification and a human resource indicator [United Nations, 1994]. In this case, the selected diversification indicator was the share in total exports of the top three commodities, while the human resource indicator was the secondary school enrolment rate.

The difference in findings may be due in part to the different indicators employed, but another factor to be borne in mind is that the two exercises are attempting to measure two subtly different relationships. The UNCTAD exercise is concerned with the absolute level of diversification (and human capital), ours with change in the level of diversification. A relatively strong correlation between the absolute level of diversification and of education is intuitively plausible: the share of manufactures in total exports is higher in countries with more education, and it is less common for predominantly manufactures exporters to have exports concentrated on a small number of products than is the case for primary exporters.

Figure 6
Export diversification against AVSY

Figure 7
Export diversification against ln(HRNR)

Figure 8
Export diversification against AVSY

Figure 9
Export diversification against ln(HRNR)

The Next Steps

There are no conclusions as such to this Working Paper; it is not that sort of paper. Instead, this final section attempts to draw the main threads of the paper together in such a way as to focus attention on areas in which further research appears to be particularly worthwhile.

The human resource-natural resource balance hypothesis

The paper has presented substantial evidence for the positive effect of human resources on growth. An obvious next step is to explore the determinants of human resource accumulation. The paper has found some support for the hypothesis that relative resource endowments influence the accumulation of human resources.

The findings identify three central questions:

- To what extent do relative resource endowments influence skill accumulation?
- What other factors influence skill accumulation?
- Why is skill accumulation so central to growth?

The first of these is narrow and relates directly to the `human resource-natural resource balance' hypothesis. The latter two are broad, but the findings in this paper underscores their importance in defining development strategies.

Further examination of how relative resource endowments influence skill accumulation

- Is the relationship between growth and endowment ratios evident from the comparisons among all regions, not just the poorest? The growth regression showed that the ratio of human to natural resources has a positive effect on growth. It would be interesting to examine whether this relationship exists between and within regions.
- Have relative endowments of human and natural resources diverged over time? Our regressions show only weak evidence of this, however the method of measuring divergence could be improved. Immediate possibilities include a) plotting endowment ratios relative to the world average and b) calculating a transition probability matrix.
- Is the relationship between relative endowments and human resource accumulation linear or does it take some other form? Have large amounts of human resources, e.g. oil, enabled countries to invest heavily in education? Does the `natural resource curse' therefore operate only on countries with low human resources and moderate natural resources?
- Do individual country experiences fit our model? It would be interesting to examine the experience of countries in more detail, including pair-wise

comparisons of countries which conform to and deviate from the model.

Exploration of other factors that influence skill accumulation

- How important are policies and cultural factors in determining human resource accumulation? It might be helpful to include policy variables such as dummies for Universal Primary Education drives, and education expenditure as a percentage of GDP. Do religious conventions impinge upon skill accumulation - particularly in relation to female education?

- Again, it would be useful to look at individual country experiences of human resource accumulation and to compare experiences from selected countries.

Measuring human resources by years of schooling is not ideal. The different components of a country's true human resources are reflected in different variables (some measurable, some not). This is a source of concern if years of schooling is a biased measure, e.g. if it captures more of the true human resource endowment in certain countries than in others. The bias could exist in comparisons between countries at different levels of development and between countries with cultural differences. The examination of alternative ways in which to measure different types of human resources would be desirable.

Why are human resources so important to growth?

This is the focus of some of the work on new growth theory. In the present context it may be interesting to look at individual country experiences. One question is whether human resource accumulation is a necessary and/or sufficient condition for growth. Sri Lanka's experience suggests it is not a sufficient condition. Are there any countries which suggest it is not a necessary condition? What other factors must accompany human resources in order to achieve growth?

The export diversification hypothesis

The hypothesis arose out of research concerned with identifying practical indicators of diversification that can be applied to a large number of countries and appear to produce interesting results. Not very much has yet been done to build upon this exercise. The intention is to apply the methodology initially to discover whether:

- failure to diversify is a characteristic of many or most of the poorest countries that are failing to grow;

- and whether there is any evidence of correlation with other common characteristics of this group.

A second-round set of issues to be explored once these questions have been answered persuasively would include the identification of common causes for the failure to diversify and an appropriate set of prescriptions.

But before these issues can be addressed in a serious way, some shortcomings arising from the

genesis of the project need to be addressed. The three most important are:

- to establish more rigorously the assumptions underlying the hypothesis that diversification has had beneficial effects and to distinguish more precisely between policy and physical constraints to diversification.

- to refine the indicators and tests;

- and to extend the analysis to include more importing states.

Indicators and tests

The tests that have been undertaken so far can be taken further (e.g. regression analysis). But are the criteria used the only, or the most important, ones? Moreover, are the indicators used the best ones? Before shooting off a wide range of tests, it is important to think through what it is that the indicators are supposed to show and identify (perhaps through some early country studies) whether or not the picture they paint conforms to reality.

A related point is to consider more carefully the effects on the usefulness of the indicators arising from the characteristics of the commodities in question. One example of the types of problem that must be addressed arises because the trade nomenclatures are not designed primarily to aid scientific enquiry. Probably the most important single influence on the EU's nomenclature is the desire to monitor `sensitive' imports for protectionist purposes. Hence, some product groups may be divided into more sub-categories than others. Does this affect the validity of the *number of 4-digit product groups exported* indicator?

Another example stems from the blunt nature of the *average export unit value* indicators. This has to be established in relation to weight, but this means that a different interpretation may be justified if a given percentage increase results from diversifying out of feathers into copper rather than the reverse.

Commodity and country studies

There are many areas in which more detailed commodity-specific data would be helpful. Among the most pressing are:

- to distinguish more clearly between traditional and non-traditional items;

- to provide some information on what happened between the two years for which data has been collected;

- and to establish more clearly in relation to important commodity groups the evidence on which the hypothesis is based (that diversification has tended to be into items with better market conditions for the exporter).

A limited number of country case studies would help on at least two fronts. One is to identify different country responses to the same set of external stimuli. Some states, for example, have successfully expanded production of commodities even though other countries have been

reducing output of the same item at the same time. A comparison between such pairs of states would provide pointers towards sectoral policy differences between countries.

The second objective is to determine how far the picture presented by the statistical analysis reflects reality. It is very easy to be carried away with a view that *appears* to be justified by trade statistics but which, on investigation, arises from re-exports, or mis-recording, or simply a lack of knowledge of the characteristics of the commodities/industries in question. The best way to guard against this is to undertake country studies in parallel with the trade statistics analysis. The main constraint is that country studies are expensive in terms of money and time. A short cut may be to graft onto country studies being undertaken primarily with other objectives an element of research to inform the export diversification hypothesis work.

Importing states

The analysis should be extended to more importing states. But the data manipulation problems of US statistics are serious. Unless these can be overcome, it would be more cost effective to undertake a limited analysis based on countries for which the EU is the major OECD market than to attempt a broad trawl.

Moreover, even the addition of the USA would not provide a completely adequate picture. A reasonable working hypothesis is that some of the most successful market diversification has been into rapidly growing non-OECD markets. Perhaps the problem could be dealt with best by selecting as the target group only those developing countries for which the EU remains the dominant market. But this approach would compound the problem of establishing the benchmarks against which comparisons are made. Not all states that have diversified their exports away from the EU will have done so for similar reasons or with similar results.

Combining the different characteristics identified in the paper

Two ideas for further work are:

- to examine the interrelationships between the variables;
- to regress growth on all variables simultaneously.

The characteristics (variables) identified were:

- trade and macro policies;
- level of human resources;
- relative resource endowments;
- export diversification.

Identifying interrelationships among the variables

A first step for further work would be to look at interrelationships among the variables. The

paper made a preliminary attempt at relating a) human resource accumulation to endowment ratios and b) export diversification to human resource levels and endowment ratios. Both relationships should be further explored.

Diversification and human resources

The scatter diagrams on pp. 41 and 42 relate changes in trade patterns (diversification) to levels of human resources. Underlying this is the theory that high levels of human resources confer economic flexibility. This is based on the assumptions that educated people can learn new skills more easily and that they are more able to identify lucrative export opportunities. Thus for a given point in time, a high level of human resources will allow for greater diversification in the subsequent period. However, we should also relate a) levels of diversification to levels of human resources and b) changes in trade patterns to changes in human resources.

Export unit value (euv) and human resources

There seems to be a relationship between export unit value and human resources (both absolute and the human/natural resource ratio). However, the pattern is not very clear. Refinement of the variables and methodology may show a closer relationship. In some ways this exercise is similar to relating export composition to endowment ratios in Figure 3. The value added component of euv is related to the ratio of manufactured to primary exports, Xm/Xp. (Higher value added is usually associated with higher Xm/Xp.)

A problem with using euv as a measure of diversification occurs when economies diversify into completely new product groups. (Textiles have a higher unit value index than machinery or electrical equipment, although we know that skill requirements are much higher in machinery and electronics.) It may therefore be useful to look at diversification (changes in euv) within narrower product groups, e.g. textiles, electrical equipment, agricultural products and minerals.

It would also be useful to look at individual country experiences with respect to diversification and human resources.

Regressing growth against all variables

The regression of growth on human resources could be extended to include independent variables for trade and macro policy and export diversification. Each section has examined the relation between a certain variable and growth. A multiple regression would identify the impact of each variable while controlling for other influences. It would also show what proportion of growth can be explained by the variables identified in this paper.

Appendix 1
Definition of Variables and Sources

Definitions of variables from Barro [1991]

ASSASS	Number of assassinations per million population per year (1960-85).
GDP60	1960 level of real *per capita* GDP (1980 base year).
GDP85	1985 level of real *per capita* GDP (1980 base year).
GR6085	Growth rate of real *per capita* GDP from 1960 to 1985.
HSGVXDXE	Share of real government consumption expenditures minus defense and education expenditures. This was used for Barro's G^c/Y which was defined as the average (from 1970 to 1985) of the ratio of real government consumption (exclusive of defence and education) to real GDP.
PPI60DEV	Magnitude of deviation of PPPI60 from the sample mean.
PPPI60	1960 purchasing power parity value for the investment deflator (USA = 1).
PRIM60	1960 primary school enrolment rate.
REVCOUP	Number of revolutions and coups per year.
SEC60	1960 secondary school enrolment rate.

Definitions of other variables

AFR	Dummy for Africa.
AVSY60	Average years of schooling for the population 25 years and older in 1960.
CHAVSY6085	Absolute change in average years of schooling for the adult population between 1960 and 1985.
HRNR	Human resources (SY)/natural resources (LAND).
LAC	Dummy for Latin America.
LAND	Thousands of km^2 of land area.
LANDAD	Km^2 per person (adult).
SY	Total number of years of schooling attained by the adult population (AVSY*AD) (in millions).

Xm/Xp	The ratio of manufactured exports (SITC 5 to 8 -68) to primary exports (SITC 0 to 4 +68).

Data sources

Data on the composition of exports are from the UNCTAD *Handbook of Trade and Development Statistics 1991*, Table 4.1. The data refer to exports in 1989.

The data on human resources (average years of schooling and adult population) are from Barro and Lee [1993], and (for regional averages) UNDP's *Human Development Report 1992*.

The data on land are from the World Development Indicators, *World Development Report 1992*.

For all other variables the data are from what is believed to be Barro's original data-set (provided on a disk by Ross Levine, with other data). It was assumed that variables with the same name as in the Barro [1991] article were the same variables. Where the name was not exactly the same, the variable which seemed closest was substituted. This applies to the use of REVCOUP instead of REV and HSGVXDXE instead of G^c/Y. (Both of these performed similarly in the original and re-worked Barro equations.)

Appendix 2
Regression Results

Re-working Barro's growth equation

In Table A1 we first replicated Barro's regression (1) [Barro 1993:Table 1, regression 1] using what we believe to be his original sample of countries and variables.[11] The results (2) were almost exactly the same as his, except for the two variables ASSASS and PPI60DEV, which were insignificant in our regression. The aberrant behaviour of these variables probably accounted for the small differences in the other variables and the fall in R^2 from 0.56 to 0.52.

The same regression was run for the sample of 88 countries (those for which AVSY60 was available), still using Barro's specification (3). This was to see whether reducing the sample size would affect the regression results, which it did not.

It was decided to drop the two variables which were insignificant and compare subsequent regressions with regression (4) (i.e. Barro's specification, but without ASSASS and PPI60DEV). The remaining regressions substitute average years of schooling for enrolment rates in the Barro regression.

The effect of substituting average years of schooling for enrolment rates

Regression (5) uses average years of schooling as the human resource variable for the 88-country sample. Comparing (5) with (4)[12] we find little difference in the regression results. All coefficients increase slightly in absolute size (negative coefficients become more negative, positive more positive). R^2 falls by 0.02 but R-bar-squared is unchanged, so the fit is essentially the same. As mentioned in the text, the difference in units causes the coefficient for AVSY60 to be smaller than those on primary and secondary enrolment rates. AVSY60 is also slightly more significant than primary and secondary enrolment rates. This is probably because our regression uses one rather than two variables for human resources.

Effects of reducing the sample size

Reducing the sample size from 88 to 43 countries does not greatly alter the results, but there are some changes. Comparing regression (4) with (6) there are notable changes in the significance levels of several coefficients. SEC60 and PRIM60 lose all significance, while HSGVXDXE falls from a 1% significance level to a 5% level. The coefficient on GDP60 becomes more negative. Comparing regression (5) with (7), there are no changes in the sign

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[11] Barro's original data as compiled by Levine and Renelt were used. It is assumed that we have been operating with the same (n=98) countries since the elimination of all countries for which data were missing produces a population of 98 countries (see Appendix 4).

[12] Regressions (4) and (5) were also run excluding Taiwan and South Korea. Their exclusion made no difference to the regression results.

Table A1
Regressions for *per capita* growth (GR6085)

Regression	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
No. obs.	98	98	88	88	88	43	43
Const.	0.0302*** (0.0066)	0.0304*** (0.0067)	0.0340*** (0.0051)	0.0334*** (0.0071)	0.0465*** (0.0051)	0.0326*** (0.0939)	0.0391*** (0.0066)
GDP60	-0.0075*** (0.0012)	-0.0074*** (0.0013)	-0.0075*** (0.0013)	-0.0077*** (0.0013)	-0.0086*** (0.0015)	-0.0102*** (0.0028)	-0.0120*** (0.0025)
SEC60	0.0305*** (0.0079)	0.0328*** (0.0113)	0.0351*** (0.0119)	0.0354*** (0.1200)	---	0.0160 (0.0303)	---
PRIM60	0.0250*** 0.0056)	0.0224*** (0.0065)	0.0183** (0.0070)	0.0191*** (0.0071)	---	0.0191 (0.0120)	---
HSGVXDXE	-0.1190*** (0.0280)	-0.1332*** (0.0290)	-0.1362*** (0.0300)	-0.1332*** (0.0300)	-0.1640*** (0.0298)	-0.1073** (0.0423)	-0.1226*** (0.0585)
REVCOUP	-0.0195*** (0.0063)	-0.0236*** (0.0071)	-0.0242*** (0.0075)	-0.0285*** (0.0069)	-0.0314*** (0.0069)	-0.0233*** (0.0084)	-0.0264*** (0.0115)
ASSASS	-0.0333** (0.0155)	-0.0028 (0.0032)	-0.0031 (0.0032)	---	---	---	---
PPI60DEV	-0.0143*** (0.0053)	-0.0067* (0.0041)	-0.0070* (0.0041)	---	---	---	---
AVSY60	---	---	---	---	0.0050*** (0.0011)	---	0.0064*** (0.0017)
R-sq.	0.56	0.52	0.51	0.49	0.46	0.40	0.50
R-bar-sq.		0.48	0.46	0.45	0.45	0.32	0.44

Notes: *** significant at the 1% level
** significant at the 5% level
* significant at the 10% level

or significance of the coefficients, although the sizes of some alter slightly. The closeness of fit is much the same.

Replacing enrolment ratios with average years of schooling in the 43-country sample has much the same effect as in the 88-country sample. Comparing regression (6) with regression (7), the absolute size of the coefficients increases, which is similar to the change in coefficients between regressions (4) and (5). The variable HSGVXDXE, reflecting government expenditure, becomes more significant. In addition, there is an improvement in fit between (6) and (7), reflecting the significance of AVSY60 in regression (7) and the insignificance of SEC60 and PRIM60 in regression (6).

Incorporating endowment ratios

Taking regression (5) as a starting point, Ln(HRNR) was added as an independent variable (regression (8i) of Table A2(i)). In regression (9i), a measure of natural resources alone (log of number of adults per km^2) was substituted for the human to natural resource ratio. Finally, in regression (10i) no variable for human resources alone was included, only the logged ratio of human to natural resources.

Table A2(i)
Regression for *per capita* growth (GR6085)

Regression	**(5)**	**(8i)**	**(9i)**	**(10i)**
No. obs.	88	88	88	88
Const.	0.0465***	0.0382***	0.0371***	0.0358***
	(0.0051)	(0.0059)	(0.0063)	(0.0061)
GDP60	-0.0086***	-0.0074***	-0.0076***	-0.0039***
	(0.0015)	(0.0016)	(0.0015)	(0.977E-5)
HSGVXDXE	-0.1640***	-0.1357***	-0.1355***	-0.1143***
	(0.0298)	(0.0311)	(0.0314)	(0.0313)
REVCOUP	-0.0314***	-0.0287***	-0.0285***	-0.0292***
	(0.0069)	(0.0068)	(0.0068)	(0.0071)
AVSY60	0.0050***	0.0034***	0.0044***	---
	(0.0011)	(0.0012)	(0.0011)	
LnHRNR	---	0.0022**	---	0.0036***
		(0.893E-3)		(0.791E-5)
LnLANDAD	---	---	-0.0023**	---
			(0.958E-3)	
R-sq.	0.46	0.50	0.49	0.45
R-bar-sq.	0.45	0.47	0.46	0.42

Notes: *** significant at the 1% level
** significant at the 5% level
* significant at the 10% level

The coefficient on the log of the human/natural resource ratio is positive and significant (at the 5% level) (regression 8i). Excluding average years of schooling improves the level of significance of the resource ratio (to 1%). The coefficient of GDP60 becomes less negative due to the high correlation between AVSY60 and GDP60, and the closeness of fit falls slightly (regression 10i). The natural resource variable on its own (regression 9i) is also significant (at the 5% level).

Barro found dummies for Africa and Latin America to be highly significant in explaining *per capita* growth. We anticipated that including the endowment ratio and land variable would render these regional dummies insignificant. However, as may be seen in Table A2(ii), the dummies remained significant. There is clearly some collinearity between our natural resource variable and the regional dummies, as evidenced by the reduction in the significance levels of LnHRNR in regression (8ii) and of LnLANDAD in regression (9ii), but the dummies have more explanatory power (as evidenced by the improvement in the R-bar-squared when they are included). This could mean either that our measure of natural resources is inadequate, or that abundant natural resources are only part of the reason for the unusually slow growth of these regions.

Table A2(ii)
Regression for *per capita* growth (GR6085)
including dummy variables for Africa and Latin America

Regression	**(5ii)**	**(8ii)**	**(9ii)**	**(10ii)**
No. obs.	88	88	88	88
Const.	0.0506*** (0.0047)	0.0441*** (0.0057)	0.0449*** (0.0062)	0.0426*** (0.0059)
GDP60	-0.0083*** (0.0014)	-0.0074*** (0.0014)	-0.0078*** (0.0014)	-0.0044*** (0.921E-3)
HSGVXDXE	-0.1276*** (0.0288)	-0.1107*** (0.0296)	-0.1151*** (0.0300)	-0.0897*** (0.0296)
REVCOUP	-0.0264*** (0.0065)	-0.0247*** (0.0064)	0.0252*** (0.0065)	-0.0251*** (0.0067)
AVSY60	0.0041*** (0.0010)	0.0030*** (0.0011)	0.0038*** (0.0010)	---
LnHRNR	---	0.0016* (0.843E-3)	---	0.0027*** (0.766E-3)
LnLANDAD	---	---	-0.0013 (0.929E-3)	---
AFR	-0.0143*** (0.0041)	-0.0127*** (0.0041)	-0.0129*** (0.0042)	-0.0140*** (0.0043)
LAC	-0.0127*** (0.0034)	-0.0120*** (0.0033)	-0.0116*** (0.0034)	-0.0124*** (0.0034)
R-sq.	0.56	0.58	0.57	0.54
R-bar-sq.	0.53	0.55	0.54	0.51

Notes: *** significant at the 1% level
** significant at the 5% level
* significant at the 10% level

Explaining the change in average years of schooling

In Table A3 the simplest regression (11) tests the impact of HRNR (initial years of schooling per km^2) on the absolute change in mean years of schooling between 1960 and 1989. With HRNR in natural units the relationship is not significant, but when the log of HRNR is used, its coefficient becomes significant at the 10% level, although the fit remains poor.

Regression (12) also includes GDP60 and AVSY60 as independent variables. The coefficients on GDP60 and LNHRNR are both positive and significant at the 10% level, while that on AVSY60 is negative and insignificant. The fit is again poor. Running this regression for a 68-country sample, which excludes developed countries, renders all the coefficients insignificant, and the sign on AVSY60 changes from negative to positive.

The next step was to consider the impact of the composition of trade on changes in average years of schooling. For the 88-country sample, data on the ratio of manufactured to primary exports (XmXp) was available in 1960 for only 80 countries, and in 1989 for 85 countries (see Appendix 4). Taking the 80-country sample, and averaging the opening and closing trade ratios, Ln((XmXp1960 + XmXp1989)/2), regression (14) yields an insignificant positive coefficient on the trade ratio. For the 85-country sample, using the 1989 LnXmXp, the coefficient on the trade ratio was positive and significant at the 10% level. (In both these regressions, the coefficient on GDP60 was positive and significant, and that on AVSY60 negative and insignificant, as in the resource ratio regressions.)

Table A3
Explaining the change in average years of schooling (CHG)

Regression	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**
No. obs.	88	88	68	80	85
Const.	1.6198*** (0.1670)	1.5684*** (0.1716)	1.8194*** (0.3875)	1.8790*** (0.1876)	1.8637*** (0.1703)
GDP60	---	0.1730* (0.0881)	0.0838 (0.1249)	0.1580* (0.0922)	0.1636* (0.0876)
AVSY60	---	-0.0954 (0.0721)	0.0383 (0.0963)	-0.0707 (0.0714)	-0.0763 (0.0670)
LnHRNR	0.0808* (0.0411)	0.0876* (0.0809)	0.0400 (0.0497)	---	---
LnXmXp (avg60-89)	---	---	---	0.0621 (0.0514)	---
LnXmXp (1989)	---	---	---	---	0.0932* (0.0504)
R-sq.	0.043	0.087	0.063	0.071	0.094
R-bar-sq.	0.032	0.054	0.020	0.034	0.061

Notes: *** significant at the 1% level
** significant at the 5% level
* significant at the 10% level

Appendix 3
Proportion of Exports to the EU in 1975 and 1991
(47-country sample)

	(%)	**(%)**	**(absolute, % points)**	**(%)**
Group 1				
Tunisia	47.8	76.8	29.0	60.7
Mauritius	86.8	70.3	-16.5	-19.0
Turkey	43.9	54.4	10.5	23.9
Thailand	16.2	20.7	4.5	27.8
Hong Kong	24.6	17.6	-7.0	-28.5
Malaysia	23.2	14.8	-8.4	-36.2
Botswana	n/a	n/a	n/a	n/a
Unweighted mean	**40.4**	**42.4**	**2.0**	
4.8				
Group 2				
Algeria	55.1	71.3	16.2	
29.4				
South Africa	39.6	51.3	11.7	
29.5				
Chile	40.6	32.9	-7.7	
-19.0				
Venezuela	9.4	32.1	22.7	
241.5				
Argentina	28.9	31.8	2.9	
10.0				
Brazil	27.8	31.2	3.4	
12.2				
Jamaica	23.8	30.0	6.2	
26.1				
Costa Rica	19.8	29.7	9.9	
50.0				
Panama	13.9	26.9	13.0	
93.5				
Uruguay	33.9	24.7	-9.2	
-27.1				
Unweighted mean	**29.3**	**36.2**	**6.9**	
44.6				
Group 3				
Uganda	37.8	75.9[a]	38.1	
100.8				
Burundi	41.4	70.4	29.0	
70.0				
Morocco	54.1	62.4	8.3	
15.3				
Senegal	63.4	60.6	-2.8	
-4.4				
Ghana	41.2	60.2	19.0	
46.1				
Nepal	22.4	55.3	32.9	
146.9				
Kenya	35.8	44.5	8.7	
24.3				
Malawi	62.0	43.3	-18.7	
-30.2				
Zimbabwe	30.6[b]	41.0[a]	10.4	
34.0				
Burkina Faso	38.3	39.9	1.6	
4.2				
Egypt, Arab Rep.	11.8	38.2[a]	26.4	
223.7				
Bangladesh	17.3	32.8	15.5	
89.6				
Pakistan	18.6	30.6	12.0	
64.5				
India	20.2	27.5	7.3	
36.1				
Sri Lanka	16.4	25.5[a]	9.1	
55.5				

	1975 (%)	1991 (%)	Change (absolute, % points)	Change (%)
Group 4 *(continued)*				
Papua New Guinea	39.5	27.6[(a)]	-11.9	-30.1
Bolivia	17.7	26.5	8.8	49.7
Peru	20.4	24.7	4.3	21.1
Honduras	19.3	24.2	4.9	25.4
El Salvador	24.3	23.6	-0.7	-2.9
Haiti	20.5	14.2	-6.3	-30.7
Guatemala	30.6	11.1	-19.5	-63.7
Unweighted mean	**38.5**	**31.9**	**-6.6**	**-5.6**

Notes:
(a) 1990.
(b) 1980.
(c) 1989.
Source: UNCTAD, 1992:Table 3.4.

Appendix 4
Sample Countries

Different samples of countries were used for the various analyses reported in the Working Paper. The differences relate to the objectives of each exercise and the availability of data, as explained in the text. For ease of reference, each sample has been given a name that simply relates to the number of countries in the group. This Appendix provides the full membership of each of the samples referred to in the text.

Countries	Sample size										
	98	**88**	**85**	**80**	**69**	**68**	**47**	**43**	**39**	**27**	**12**
Algeria	_	_	_	_	_	_	_	_	_		
Argentina	_	_	_	_	_	_	_	_	_	_	_
Australia	_	_	_	_							
Austria	_	_	_	_							
Bangladesh	_	_	_	_	_	_	_	_	_	_	_
Barbados	_	_	_		_	_					
Belgium	_	_	_	_							
Bolivia	_	_	_	_	_	_	_	_	_		
Botswana	_	_			_	_	_	_			
Brazil	_	_	_	_	_	_	_	_	_	_	_
Burkina Faso							_			_	
Burundi	_						_			_	
Burma	_	_			_	_					
Cameroon	_										
Canada	_	_	_	_							
Central African Republic	_										
Chile	_	_	_	_	_	_	_	_	_	_	_
Colombia	_	_	_	_	_	_	_	_	_	_	
Costa Rica	_	_	_	_	_	_	_	_	_		
Côte d'Ivoire	_						_			_	_
Cyprus	_	_	_		_	_					
Denmark	_	_	_	_							
Dominican Republic	_	_	_	_	_	_					
Egypt, Arab Republic	_	_	_	_	_	_	_	_	_	_	
El Salvador	_	_	_	_	_	_	_	_	_	_	
Ecuador	_	_	_	_	_	_					

Countries	Sample size										
	98	**88**	**85**	**80**	**69**	**68**	**47**	**43**	**39**	**27**	**12**
Ethiopia	_										
Fiji	_	_	_		_	_					
Finland	_	_	_	_							
France	_	_	_	_							
Gabon	_										
Germany	_	_	_	_							
Ghana	_	_	_	_	_	_	_	_	_	_	_
Great Britain	_	_	_	_							
Greece	_	_	_	_		_					
Guatemala	_	_	_	_	_	_	_	_	_		
Guyana	_	_	_		_	_					
Haiti	_	_	_	_	_	_	_	_	_		
Honduras	_	_	_	_	_	_	_	_	_		
Hong Kong	_	_	_	_	_	_	_	_			
Iceland	_	_	_	_							
India	_	_	_	_	_	_	_	_	_	_	_
Indonesia	_	_	_	_	_	_				_	
Iraq	_	_	_	_	_	_					
Ireland	_	_	_	_							
Israel	_	_	_	_	_	_					
Italy	_	_	_	_							
Jamaica	_	_	_	_	_	_	_	_	_		
Japan	_	_	_	_							
Jordan	_	_	_	_	_	_				_	
Kenya	_	_	_	_	_	_	_	_	_	_	_
Korea, Republic	_	_	_	_	_	_				_	_
Liberia	_	_	_	_	_	_					
Luxembourg	_										
Madagascar	_										
Malawi	_	_	_	_	_	_	_	_	_	_	
Malaysia	_	_	_	_	_	_	_	_	_	_	_
Malta	_	_	_	_	_	_					
Mauritius	_	_	_	_	_	_	_	_	_		
Mexico	_	_	_	_	_	_					

Countries	Sample size										
	98	**88**	**85**	**80**	**69**	**68**	**47**	**43**	**39**	**27**	**12**
Morocco	_	_	_	_	_	_	_	_			
Nepal	_	_	_		_	_	_	_			
Netherlands	_	_	_	_							
New Zealand	_	_	_	_							
Nicaragua	_	_	_	_	_	_	_	_	_		
Nigeria	_						_			_	
Norway	_	_	_	_							
Pakistan	_	_	_	_	_	_	_	_	_	_	
Panama	_	_	_	_	_	_	_	_	_		
Papua New Guinea	_	_	_	_	_	_	_	_	_		
Paraguay	_	_	_	_	_	_	_	_	_	_	
Peru	_	_	_	_	_	_	_	_	_		
Philippines	_	_	_	_	_	_					
Portugal	_	_	_	_		_					
Rwanda	_										
Senegal	_	_	_	_	_	_	_	_	_		
Sierra Leone	_	_	_	_	_	_	_	_	_		
Singapore	_	_	_	_	_	_					
South Africa	_	_	_	_	_	_	_	_	_		
Spain	_	_	_	_							
Sri Lanka	_	_	_	_	_	_	_	_	_		
Sudan	_	_	_	_	_	_				_	
Swaziland	_	_			_	_					
Sweden	_	_	_	_							
Switzerland	_	_	_	_							
Taiwan	_	_	_	_	_	_				_	_
Tanzania	_	_	_	_	_	_	_	_	_	_	
Thailand	_	_	_	_	_	_	_	_	_		
Togo	_	_	_	_	_	_	_	_	_		
Trinidad and Tobago	_	_	_	_	_	_					
Tunisia	_	_	_	_	_	_	_	_	_	_	
Turkey	_	_	_	_	_	_	_	_	_	_	
Uganda	_	_	_	_	_	_	_	_	_		
United States	_	_	_	_							

Countries	Sample size										
	98	**88**	**85**	**80**	**69**	**68**	**47**	**43**	**39**	**27**	**12**
Uruguay	_	_	_	_	_	_	_	_	_		
Venezuela	_	_	_	_	_	_	_	_	_		
Zaïre	_	_	_	_	_	_					
Zambia	_	_	_	_	_	_				_	_
Zimbabwe	_	_	_	_	_	_	_	_	_		

References

Auty, Richard M. (1993a). *Sustaining Development in Mineral Economies: the Resource Curse Thesis*, Routledge, London.

Auty, Richard M. (1993b). `Industrial Policy Reform in Six Large Newly Industrialising Countries: the Resource Curse Thesis', forthcoming in *World Development*.

Auty, R. and D. Evans (1993). Trade and Industrial Policy for Sustainable Resource-Based Development: Policy Issues, Achievements and Prospects, UNCTAD/COM series, December 1993.

Azariadis, Costas and Allen Drazen (1990). `Threshold Externalities in Economic Development', *Quarterly Journal of Economics*, 105/2: 501-26.

Barro, Robert J. (1991). `Economic Growth in a Cross-Section of Countries', *Quarterly Journal of Economics*, 106/2: 407-43 and 445-502.

Barro, Robert T. and Jong-Wha Lee (1993). `International Comparisons of Educational Attainment', *NBER Working Paper*, National Bureau of Economic Research, Cambridge, Massachusetts.

Berge, Kersti and Adrian Wood (1994). `Exporting Manufactures: Trade Policy or Human Resources?', *IDS Working Paper 4*, Institute of Development Studies, University of Sussex.

Bevan, D., P. Collier and J.W. Gunning (with A. Bigsten and P. Horsnell) (1990). *Controlled open economies*. Oxford: Clarendon Press.

Daniel, Philip (ed.) (1986). `Mineral Exporters in Boom and Slump', *IDS Bulletin* 17/4, Institute of Development Studies, University of Sussex.

Daniel, Philip (1992). `Economic Policy in Mineral-exporting Countries: What Have We Learned?', in John E. Tilton (ed.), *Mineral Wealth and Economic Development*, Resources for the Future, Washington D.C., 81-121.

De Long, J. Bradford, and Lawrence H. Summers (1991). `Equipment Investment and Economic Growth`, *Quarterly Journal of Economics*, 106/2: 445-502.

Eurostat (1991a). *EEC external trade (Nimexe) 1976-1987*, Supplement 1/1991. Statistical Office of the European Communities, Luxembourg (CD-ROM).

Eurostat (1991b). *EEC external trade (Combined Nomenclature) 1988-1990*, Supplement 2/1991, Office of the European Communities, Luxembourg (CD-ROM).

Eurostat (1993). *EEC external trade - 1988-1992 (Combined Nomenclature)*, Supplement 1/1993. Statistical Office of the European Communities, Luxembourg (CD-ROM).

FAO (1991). *Agrostat PC (Compterized information series)*. Food and Agriculture Organization of the United Nations, Rome.

Friedman, Milton (1992). `Do Old Fallacies Ever Die?', *Journal of Economic Literature*, 30: 2129-32.

Gelb, Alan (1988). *Oil Windfalls: Blessing or Curse?*, Oxford University Press, New York.

Levine, Ross and Sara Zervos (1994). `Looking at the Facts: What We Know about Policy and Growth from Cross-Country Analysis', in Luigi L. Pasinetti and Robert M. Solow (eds), *Economic Growth and the Structure of Long-Term Development*, Macmillan, London.

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

Lucas, Robert E. (1990). `Why Doesn't Capital Flow from Rich to Poor Countries?', *American Economic Review*, 80: 92-6.

Mahon, James E. (1992). `Was Latin America Too Rich to Prosper? Structural and Political Obstacles to Export-Led Industrial Growth', *Journal of Development Studies*, 28/2: 241-63.

Maizels, Alfred (1992). *Commodities in Crisis*. Clarendon Press, Oxford.

Quah, Danny (1993a). `Galton's Fallacy and Tests of the Convergence Hypothesis', unpublished paper, London School of Economics.

Quah, Danny (1993b). `Dependence in Growth and Fluctuations Across Economies with Mobile Capital', unpublished paper, London School of Economics.

Romer, Paul M. (1992). `Two Strategies for Economic Development: Using Ideas and Producing Ideas', *Proceedings of the World Bank Annual Conference on Development Economics 1992*, Washington DC.

Romer, Paul M. (1993). `Idea Gaps and Object Gaps in Economic Development', paper prepared for World Bank conference on `How Do National Policies Affect Long Run Growth?', February 7-8.

Scott, Maurice F.G. (1992). `Policy Implications of "A New View of Economic Growth"', *Economic Journal*, 102 (May): 622-32.

Shaw, G.K. (1992). `Policy Implications of Endogenous Growth Theory', *Economic Journal*, 102 (May): 611-21.

Summers, Robert and Alan Heston (1991). `The Penn World Table (Mark 5): an Expanded Set of International Comparisons 1950-88', *Quarterly Journal of Economics*, 106/2: 327-68.

UNCTAD (1992). *Handbook of International Trade and Development Statistics, 1992*.

UNCTAD, Geneva.

UNDP (1992). *Human Development Report 1992*. Oxford University Press, New York and Oxford.

United Nations (1994). `Improving market opportunities for commodities in the medium term, with emphasis on achieving diversification'. Report by UNCTAD Secretariat, TD/B/CN.1/24, August.

Williamson, J. (1991). `Policy Reform in Latin America in the 1980s', a paper presented to a conference on `Structural Adjustment: Retrospect and Prospect', American University, March.

Wood, Adrian (1994a). `Skill, Land and Trade: A Simple Analytical Framework', *IDS Working Paper 1*, Institute of Development Studies, University of Sussex.

Wood, Adrian (1994b). *North-South Trade, Employment and Inequality: Changing Fortunes in a Skill-Driven World*, Clarendon Press, Oxford.

World Bank (1992a). *World Development Report 1992*. Oxford University Press Inc., New York.

World Bank (1992b). Mining Unit, Industry and Energy Division, *Strategy for African Mining*, World Bank Technical Paper No. 181, Africa Technical Department Series, August.

World Bank (1993). *The East Asian Miracle*, Oxford University Press, New York.

World Bank (1992c). *World Tables 1993*. STARS (Socio-economic Time-Series Access and Retrieval System), version 2.5 (April). World Bank, Washington DC.