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NATURE, POWER, AND GROWTH

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NATURE, POWER, AND GROWTH

Abstract

This essay reviews the relationship between natural-resource abundance and economic growth around the world, and presents some new results. The principal reasons why resource-based production can inhibit economic growth over long periods are traced to the Dutch disease, neglect of education, rent seeking, and economic policy failures. Across a large number of countries in the period from 1965 to 1998, the share of the primary sector in the labour force is shown to be inversely related to exports, domestic and foreign investment, and education, and directly related to external debt, import protection, corruption, and income inequality. The cross-sectional data show, moreover, that the share of the primary sector in the labour force is inversely related to per capita growth across countries. None of this lies in the nature of things, however. What seems to matter for economic growth is not the abundance of natural resources *per se*, but rather the quality of their management, and of economic management and institutions in general.

Keywords: Natural resources, rent seeking, economic growth.

JEL Classification: E0, O4, Q0.

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The accumulation of high-quality capital through saving and investment is an important driving force of economic development around the world. The standard definition of capital, however, in the sense of machinery, equipment, factories, and so on, is too narrow to fully serve the purposes of modern growth theory. The concept of capital must be enlarged to include at least four different types of capital: (a) physical capital in the traditional sense; (b) human capital which is embodied in the education, know-how, and training of manpower, in addition to health care; (c) social capital, by which is meant the infrastructure and institutions of a society in a broad sense: its culture, law, system of justice, rules and customs and so on (sometimes also referred to as social capability);[1] and (d) natural capital, in the form of vegetation, fishing banks, minerals, energy in the form of fossil fuels, thermal and hydroelectric power potential, and so forth.

I. Physical, human, and social capital

Although investment and capital in the narrow sense are an important source of wealth, this is by no means always the case. A high level of investment is indeed generally associated with significant economic growth. Increasing investment from, say, 15% to 25% of gross domestic product (GDP) generally increases per capita economic growth (i.e., the growth of GDP per person) in the long term by about 2% or so per year, when examined across countries and time (see, e.g., Barro and Sala-i-Martin, 1995, Ch. 12). There are, however, certain exceptions to this rule in countries where the investment is of poor quality, though of sizeable quantity. This is especially true of centrally planned economies, most of which have now deserted their former practices. Decisions on investment there were generally taken with scant or no heed for concerns of profitability or the market, with the result that the capital stock returned less and less as time progressed (Easterly and Fischer, 1995). In these countries the huge investment made was of so low quality that economic growth was in fact negative for decades as a result (and for other reasons as well). The centrally planned economies were bound to collapse under the vast pressure of unproductive capital even without other problems. Various other countries, in parts of Africa for example, display the same characteristics, which is not surprising since many of them saw the Soviet Union as an economic example to be followed. The danger of poor or even useless capital is much less in a market economy because the market demands that investment provide satisfactory returns. From this we can deduce one of the major grounds for private rather than public ownership and operation of banks and other financial intermediaries. The main point is that *capital* itself is not the whole story, but that its *quality* makes a vital difference, not only its intrinsic quality in a physical sense, but also the efficiency with which it is used in conjunction with other inputs. Rapid economic growth demands extensive and high-quality investment.

[1] For a good discussion of the concept of social capital, see, e.g., Paldam and Svendsen (2000). See also Temple and Johnson (1998).

Having made this distinction between quantity and quality, let us now look at the other types of capital. Take human capital, acquired, for example, through education. Surprisingly, it is only recently that scholars of economic growth have paid much attention to the contribution of education towards economic growth; for a long time economic growth was regarded as merely the result of population growth and technological progress. Among growth theorists, there was not much appreciation of how good education could accelerate technological progress in the long run. True, there were exceptions (e.g., Nelson and Phelps, 1966) and development economists and economic historians did realise the role of education in economic development, but growth theory followed its own independent paths, which seemed to leave little or no room for other explanations for long-term economic growth than population expansion and technological progress. This would, however, change. The endogenous-growth revolution that started around the mid-1980s ignited new ideas on the nature of economic growth, which would radically alter conceptions of the principal sources of growth. First, there was the realisation that everything which increases efficiency also stimulates economic growth in the long run. Although this is scarcely a new discovery (it can be traced back to Smith, 1776), it had been neglected. Second, it was now understood that, over long periods, even the traditional theory of exogenous growth could include considerably more factors than simply population growth and technical progress. The revolution in economic growth theory over the past 10-15 years is not unlike the revolution of macroeconomic theory which Keynes set in motion, when he rebelled against the powerlessness of public authorities in dealing with unemployment in the 1930s and rejected the macroeconomic theory which lay at the root of this impotence. The new growth theory has also attacked the powerlessness of public authorities faced with the enormous problem of poverty in the developing countries; it does not, however, have to completely jettison older theories of economic growth, but instead merely reinterpret, improve, expand upon, and strengthen them. This work is well underway.

One aspect, which we now see in a much clearer light than before, is the significance of education for economic growth. It has not, however, proved easy to get a grasp of this connection, because how are we to measure education? Attempts have generally been based on the level of formal education, but in so doing we end up in the same quandary as was previously mentioned concerning capital: formal education varies in quality. Using only formal education as a measurement means in fact measuring output by input. All the same, a fairly strong correlation has been found between the level of formal education – primary, secondary, tertiary – and economic growth around the world. A typical finding is that increasing the portion of each cohort enrolled in secondary school from 50% to 80% increases per capita economic growth by an average of about 1% per year in the long term. This tells us that a nation with long-term per capita economic growth of 1% annually can in time double this rate by merely increasing the number of students in secondary schools from 50% to 80% of each cohort, even if nothing else is changed. This shows the importance of education, as well as the seemingly unlimited global economic growth potential,

if we play our cards right. Other measurements of education, such as number of years of formal education, or public expenditure on education, tell a similar tale.

Table 1. Composition of national wealth around the world, 1994

Area	National wealth (USD thousands per capita)	Human capital (%)	Physical capital (%)	Natural capital (%)
North America	326	76	19	5
Western Europe	237	74	23	2
Middle East	150	43	18	39
South America	95	74	17	9
East Asia	47	77	15	8
East and South Africa	30	66	25	10
West Africa	22	60	18	21
South Asia	22	65	19	16

Source: World Bank (1997).

Of the various types of capital, human capital is by far the greatest. Table 1 shows the World Bank's assessment of the composition of national wealth around the world (social capital has been omitted for lack of usable statistics). These numbers need to be viewed with some caution, since they represent an attempt to measure aspects which are difficult to quantify with a fair degree of accuracy. The table shows that human capital is everywhere considered to range from 2/3 to 3/4 of national capital, with the exception of the Middle East, where natural wealth (oil) is found in great abundance. In North America and in Western Europe especially natural wealth is, on the other hand, of nominal importance as compared with capital and human resources. In all cases, the share of physical capital is somewhere between one-sixth and one-quarter.

Similarly, social capital affects economic growth in a variety of ways (Woolcock, 1998). To take but one example: corruption, i.e., the misuse of public authority to private advantage. At first glance, one might expect that corruption[2] would not necessarily reduce efficiency and economic growth substantially, but could even have the opposite effect and stimulate the economy, like oil greases an engine. If people cannot obtain, for example, permission to operate a business without paying a bribe to the issuing authority, the permission is nonetheless obtained through payment under the table and the economic activity can proceed. Bribes, some observers have claimed, can in fact speed up the processing of an operating licence, improve public administration, increase efficiency, and in so doing encourage economic growth. On the other hand, there is the problem of scarce resources and benefits ending up in the wrong hands, if bribes have an extensive effect on resource allocation. For example, cronyism or nepotism – in short, appointment corruption – can cause economic damage, in assigning to the wrong people important tasks (e.g., as judges,

[2] See, e.g., Gray and Kaufman (1998), Kaufman (1997), and Bardhan (1997).

ambassadors, or bank directors). Recent research has uncovered a strong, statistically significant relationship between corruption and various determinants of economic growth (Mauro, 1995).

But how can corruption be measured? It is measured by, for instance, systematically collecting information from domestic and foreign businessmen who are willing to report how often and how forcefully bribes and the like are demanded of them in various countries, and how high these are. We can look at indices of corruption compiled from many different sources to enable the ranking of countries according to estimated corruption. Corruption indices compiled from varying sources correspond fairly well, which would indicate that these indices are reasonably credible. According to one such index (from Transparency International, Berlin), Nigeria is at the bottom of the corruption list for the year 2000 (implying that corruption is greatest there), with Indonesia, Russia, India, and China only slightly higher up,[3] while the Nordic countries, New Zealand, Canada, and Singapore are at the top of the list (i.e., with least corruption).

When the corruption index is correlated with the main determinants of economic growth, according to Mauro (1995, 1998), an increase in corruption amounting to two points (on a scale from 1 to 10) from one country to another[4] (a) reduces investment as a proportion of GDP by 4 percentage points, other things being equal; (b) reduces government expenditure on education as a proportion of GDP by one-half of a percentage point; and (c) reduces per capita economic growth by one-half percentage point per year, in addition to reducing the influx of foreign capital, encouraging unprofitable public investment, weakening the industrial infrastructure, and increasing the tax burden. All of these effects contribute to hinder economic growth.

Corruption is thus a macroeconomic factor. Moreover, the corruption perceptions index does in fact correlate with another index which has been used to measure another aspect of social wealth, i.e., the quality of economic policy. This refers to how open the economy is to foreign trade, investment, and other influences, how unfettered price formation is in domestic markets, and so on. These indices on the quality of economic policy and various individual facets thereof have been shown to have a significant effect on economic growth. Distinguishing between the effects of individual determinants of economic growth is thus not always easy. The observed empirical relationship between corruption and economic growth could actually be an indication of a relationship between other types of social wealth (e.g., the quality of economic policy) and growth. Most likely, however, both have an effect on economic growth, social wealth in general *and* various positive or negative aspects of this, such as corruption, even though there is no room to include all of them in a single regression, since when they are placed side by side they tend to

[3] Other countries ranking near the bottom of the corruption list since 1995 include Angola, Argentina, Azerbaijan, Brazil, Cameroon, Colombia, Honduras, Kenya, Mexico, Pakistan, Paraguay, Ukraine, Uzbekistan, Venezuela, Vietnam, Philippines, Tanzania, Thailand, Turkey, and Yugoslavia.

[4] An increase in corruption (i.e., a decrease on the corruption perceptions index) of two points can be interpreted as follows: if the situation in Switzerland, which has an index of 8.6, were to worsen to the extent where it was equal to that of Israel, where the index is 6.6, the effects on investment, economic growth, etc., would be as described in the text, other things being equal.

reduce each other's explanatory potential.

Many economists are now grappling with questions of this sort using statistical methods. For example, hostilities between tribes appear to reduce economic growth in Africa (Easterly and Levine, 1997). Ethnic strife spoils economic development simply because all inefficiency, whatever form it takes, impedes economic growth, to varying degrees depending upon the extent of the inefficiency. Rule of law is good for growth, dictatorship is not (Barro, 1997). Even so, many important questions remain to be addressed – concerning, to name but a few, the potential effects of impartial systems of justice, free mass media, independent central banks, and alternative means of organising the labour market on global economic growth.[5] This all, and much more, still remains to be done. For just as corruption and social strife tend to corrode social capital and thereby also impede economic growth, several factors which add to and improve social capital and cohesion tend to quicken the pace of growth. Democracy, pluralism, political stability, fair play, a free press, you name it – all these things ought to enhance economic efficiency and be good for growth, thereby, perhaps, offsetting other less favourable influences.

Which brings us at last to the central question of this discussion.

II. Natural wealth and economic growth

Even though the world's population has more than doubled since 1965 to almost 6 billion in 1998, and there were many predictions that economic growth would hardly be able to keep up with such an increase, per capita incomes around the world have nonetheless grown by an average of 1.4% annually during this period. That means a 58% increase. Other economic indicators tell a similar story: average life expectancy in developing countries, for instance, has increased on average by four months each year since 1970.

This significant success has not, however, been equally shared. Two things have especially caused this inequality: wrong-headed economic policies and the harsh natural forces in the tropical regions, i.e., hot and humid climates and the concomitant disease and wretchedness. Conversely, sensible economic policies and gentler natural forces – better weather! – encourage economic growth.[6]

What about natural wealth? Do fertile land, rich fishing banks, oil reserves and the like encourage economic growth? – or not.

Experience appears to indicate that extensive natural wealth, if not well managed, reduces economic growth in the long run. True, it does provide nations with short-term wealth, often quite considerable, but in the long term this appears to slow economic growth. Imagine a nation which

[5] Economic historians have, it is true, investigated the influence of individual institutions, e.g., the Bank of England in its time, on economic development in England, which turned out to be positive, but that is a different matter. Barro (2000) presents some rudimentary empirical results indicating that labour-market deregulation and liberalisation may be good for growth.

[6] For example, according to Hall and Jones (1996), the Nordic countries "all receive more than a 145 per cent increment

discovers valuable oil reserves or fertile fishing banks within its jurisdiction. The national economy will, at least for a while, benefit from this discovery. But if economic growth slows down as a result (for reasons to be discussed below), and nothing else changes, the time will eventually come when the nation is actually worse off with its natural resources than if it lacked them. Figure 1 shows two schedules that depict this problem. The straight line ABCD shows a steady economic growth from one year to the next. The schedule ABECF shows, on the other hand, what happens when new natural wealth is discovered at point B. There production surges upwards, but after this it grows more slowly than before.[7] At the intersection point of the two lines, point C, the stage has been reached where the natural wealth begins to reduce the nation's standard of living. Natural resources may thus be a mixed blessing: they make nations rich, yes, for a while, but they tend to do so at the expense of economic growth in the long run, or at least over an extended period. The examples of oil reserves and fishing banks are chosen deliberately because there is no discernible empirical evidence that there is any significant difference between renewable and non-renewable resources in this respect.

Table 2 shows figures for 85 countries, which have been classified according to their size (population), natural wealth (arable land per capita[8]) and type of natural wealth (oil, minerals, and other, including fish and agricultural products). This division is certainly not the only one possible, but applying other rules of classification generally leads to the same conclusion.[9]

Table 2. Natural wealth and economic growth, 1970-1993

Natural wealth	Number of countries	Arable land (hectares per capita)	Per capita economic growth 1970-1993 (% per year)
Little natural wealth	20	0.16	2.7
Large countries	7	0.15	3.7
Small countries	13	0.16	2.1
Extensive natural wealth	65	0.56	0.6
Large countries	10	0.56	1.3
Small countries	55	0.56	0.5
Oil	8	0.44	0.8
Minerals	16	0.66	-0.2
Other	31	0.57	0.7
Total	85	0.48	1.1

Source: Auty (1997).

in output per worker due to their location, relative to the median country of Mozambique."

[7] Rodriguez and Sachs (1999) go further: they show that it can be optimal for resource-rich countries to overshoot their long-run equilibrium growth path and to live beyond their means for a while, even if that means having negative economic growth during the transition back to the steady state.

[8] Other measurements of natural wealth could also be considered, such as (a) the share of raw material exports in total exports or GDP (Sachs and Warner, 1995) and (b) the share of manpower engaged in primary production (Gylfason, Herbertsson, and Zoega, 1999). Regarding the use of per capita arable land as a measure of natural wealth, see Wood and Berge (1997) who argue that an inverse relationship between natural wealth and economic growth in the long term is for the most part independent of which of these definitions of natural wealth is used.

[9] For example, Gylfason (1999) shows that economic growth and total exports are inversely related to raw-material exports in a sample of 105 countries from 1985 to 1994.

Table 2 shows that in those countries with fairly limited natural wealth economic growth was much more rapid during 1970-1993 than it was in other countries where nature is more bountiful. Notice that in each of these two groups economic growth is greater in the larger (i.e., more populous) countries than in the smaller ones. This could be an indication that small economies with small domestic markets generally grow more slowly than others unless they take care to compensate for the inefficiency of small scale at home through increasing their foreign trade. Notice also that in all three raw-material groups economic growth is less than the global average.

And finally, notice how numerous the small, resource-rich countries are: 55 of the total of 85 included in the sample. Among these small resource-rich countries, the sub-Saharan African countries have fared least well, partly because most of them have failed to diversify their economies and by so doing reduce their overwhelming dependence upon a narrow and stagnant selection of raw-material exports and make room for other industrial pursuits with better growth prospects. Many African countries export agricultural products (the "other" referred to in Table 1), but experience seems to show that even the most efficient agriculture in resource-rich countries has considerably less potential for growth than manufacturing in resource-poor countries (Auty, 1998). The situation is aggravated by pursuing poor economic policies, for instance, in the form of export councils and marketing boards, which were used originally by colonial overlords and subsequently by domestic authorities throughout most of the continent to tax farmers in an especially unfavourable manner, i.e., by purchasing their products at fixed prices far below world market prices and thus sapping agriculture and the economy as a whole (Schuknecht, 1999). Moderate and benign taxation rather than widespread distortion of domestic price formation would have brought better results.

Resource-rich countries in South America have done relatively better than most African countries, in part because there popular education is superior to that of most parts of Africa and price formation there has generally corresponded more closely to the world market situation, even though the South American countries have also raised some damaging barriers to foreign trade. In East Asia, the countries with few raw materials (Hong Kong, Singapore, South Korea, and Taiwan) have done even better than the resource-rich ones (Malaysia and Thailand).

Of this entire group there are only four resource-rich countries which managed to achieve (a) long-term investment exceeding 25% of GDP on average in 1965-1998, equal to that of various successful industrial states lacking raw materials,[10] and (b) per capita economic growth exceeding 4% per year on average during the same period (Table 3). These countries are Botswana, Indonesia, Malaysia, and Thailand.[11] The three Asian countries achieved this success[12] by diversifying their

[10] By comparison, investment averaged 21% of GDP in the world's high-income countries in 1998 and 22% in the world as a whole.

[11] Norway is not in the select group because, even if investment averaged 27% of GDP in 1965-1998, per capita GNP growth in Norway was "only" 3% a year on average in this period. (Iceland does not either make it into the group, with investment at 24% of GDP on average and per capita growth below 3% per year in 1965-1998.)

economies and by industrialising; Botswana, without doing so.

Table 3. Four resource-rich countries: Investment and economic growth, 1970-1997

Country	Investment (% of GDP, 1965-1998)	Growth of per capita GNP (%, 1965-1998)
Botswana	27	7.7
Indonesia	26	4.7
Malaysia	28	4.1
Thailand	29	5.0

Source: World Bank (2000).

Although the three Asian countries, especially Indonesia, have recently experienced serious difficulties in the wake of the financial crisis in the Far East and elsewhere 1997-1998, these difficulties seem likely to be temporary (and in any case unconnected with the industrialisation and economic reforms upon which it rests) and they seem unlikely to destroy the forces behind the substantial economic growth there since 1965. Botswana holds the world record for per capita economic growth since 1965, and has had one of the highest ratios of government expenditure on education to GDP in the world in the 1990s. Moreover, Botswana has earned a reputation for prudent economic policies as well as an honest public administration; it is less corrupt than any other African country according to the corruption perceptions index discussed before. Per capita economic growth has, however, slowed considerably since 1990. Average life expectancy in the country has dropped from 60 to 50 years in the space of only a few years due to AIDS and is heading for 40 years.

The numbers above are naturally not sufficient evidence of a negative influence of primary production on economic growth because growth also depends on a host of other factors and these need to be taken into consideration as well. In 1965, at the beginning of the comparison period, for instance, most of the resource-rich countries had higher per capita incomes than the other countries, so it is perhaps only natural that their subsequent growth would have been slower. Moreover, it is conceivable that exporting raw materials affects other economic variables (such as total exports, inflation, or income distribution) and that it is these effects which indirectly reduce economic growth and not the primary production itself. Substantial exports invite, for instance, sizeable imports – not only of goods, services, and capital, but also of ideas, technology, and knowledge – thus as a rule stimulating economic growth either directly or indirectly. Open economies thus generally grow faster than closed ones, *ceteris paribus* (Easterly, 2000).

To come to the bottom of this requires multivariate regression analysis, seeking to link long-run economic growth performance in a group of countries to various simultaneous variables.

[12] A broader measure of economic success – including the absence of corruption, for instance – would put Indonesia in less favourable light. Moreover, Indonesia has weathered the crash of 1997-1998 much less well than either Malaysia or

Regression analysis of cross-sectional data and time series appears to confirm that primary production substantially reduces economic growth across countries and over time, even if initial per capita income, inflation, and other parameters are kept constant.[13] A typical result of such investigations is as follows: When the proportion of primary exports in a country's total exports increases by 25 percentage points (e.g., from 25% to 50%), per capita economic growth is reduced in the long term by 0.5% to 1% per annum, as a rule, and the total export share (i.e., the ratio of exports of goods and services to GDP) decreases at the same time by 6 percentage points (Sachs and Warner, 1995, 1999; Gylfason and Herbertsson, 1996; Gylfason, 1999; Gylfason, Herbertsson, and Zoega, 1999).

These effects are substantial and give rise to some difficult questions: How can it be that nature's bounty is to such scant economic advantage? Is this merely a coincidence? Or are there possibly some systemic or endogenous forces at work here which are causing this result? Is man's contest with the forces of nature taking a new direction?

The remainder of this section will discuss four possible principal explanations as to why resource-based production can impede economic growth in the long run. These explanations will be dealt with under the following headings: (a) the Dutch disease, (b) education, (c) rent seeking, and (d) economic policy. These partly structural, partly political explanations can be derived either from the theory of endogenous growth in the long run or from the neoclassical theory of medium-term growth; which interpretation prevails does not matter much for our purposes. Empirical growth research at the World Bank in the 1970s and 1980s (e.g., Chenery and Syrquin, 1975; Chenery, Robinson, and Syrquin, 1986) did not specifically address this issue. It was not until after 1990 that efforts began to be directed at discovering and analysing the long-run relationship between resource-based production and economic growth (Ranis, 1991; Matsuyama, 1992). The timing is no coincidence: it is connected with the endogenous-growth revolution which did not begin to bear empirical fruit until after 1990. Satisfactory theoretical and statistical discussion of the contribution of resource-based production to economic growth was in fact impossible until growth theory itself had undergone the necessary transformation. Economic historians had, it is true, investigated the relationship between primary production and economic development in many areas of the world over long periods, but their explanations and methodology were not accepted by mainstream growth theorists until after the endogenous-growth revolution of the mid-1980s. Facts are not enough: we also need models that fit the facts.

Thailand.

[13] In this context there is no need to concern ourselves extensively with the danger of confusing causes with consequences, since nature's bounty is an exogenous variable and is thus not conditioned by economic growth. This does not, however, preclude that the *exploitation* of natural resources cannot be to a certain extent an endogenous variable, i.e., to the extent that lower growth can result in greater exploitation.

A. The Dutch Disease

After natural gas was discovered in the Netherlands in the late 1950s and early 1960s and gas exports increased substantially as a result, the real exchange rate of the guilder rose in tandem, making things more difficult for other export industries. This phenomenon has since been called the "Dutch disease," although it is actually neither Dutch nor a disease in the usual meaning of the word (Corden, 1984; Neary and Wijnbergen, 1986; Gelb, 1988). Nor does it require an actual appreciation of the currency, for it can occur, for instance, if the primary sector turns a good profit and raises the wages it pays to its workers, so that other sectors can no longer easily compete for labour (or capital, for that matter). Thus the Dutch disease can turn up even in countries which lack their own currencies, such as the Faroes and Greenland, both of which use the Danish krone (Paldam, 1994, 1997).

Increased export generally results in an increase in the real exchange rate.[14] Recurrent export booms and busts tend, moreover, to increase exchange rate volatility (Gylfason, Herbertsson and Zoega, 1999; Herbertsson, Skuladottir and Zoega, 1999), hurting foreign trade and investment as time passes. It is the nature of raw-material exports to surge upwards now and again, to a greater extent than other exports, when new resources are discovered and developed, so that, unless domestic demand is shielded from the surge in exports, the real exchange rate increases.[15] Thus an abundance of natural resources may result in the real exchange rate being "too high." This is not always easy to prove, however, because of the counterfactual thought experiment required. For this reason empirical support has to be sought from indirect measurements.

Suppose now that domestic demand, for some reason, is not shielded from a resource boom. This seems to be the rule rather than the exception in resource-rich countries: at least a good part of the earnings generated in the primary sector are channelled into the domestic economy through increased consumption, investment, or government spending.[16] How does the national economy as a whole then respond to the prosperity of primary production and the resulting rise in the real exchange rate, which weakens other sectors? Imagine for a moment that other exports decreased correspondingly in value, so that total exports remained unchanged.[17] Would economic growth also

[14] This is simply because an increase in the supply of foreign exchange from increased export (or from any other source, for that matter) tends to drive down the relative price of foreign exchange, which means that the domestic currency appreciates in real terms.

[15] Primary exports are also prone to adverse shocks which now and then invite a devaluation of the currency: the economic history of Iceland, to name but one case in point, contains plenty of examples of this phenomenon.

[16] The alternative would be to stash away all the revenue generated by the resource boom by accumulating foreign assets abroad and admitting the returns on the assets, with or without a principal component, into the domestic income stream only gradually over an extended period of time in order to minimise the macroeconomic and structural consequences of the boom. This is the rationale behind the Norwegian Government Petroleum Fund.

[17] In Norway, whose oil exports have become second only to those of Saudi-Arabia, total exports have been stagnant relative to GDP since before oil production began. With all its fish, Iceland is another case in point, with exports having hovered around one-third of GDP since 1945 (or 1870, for that matter). Of all industrial countries, only Iceland and Norway have experienced such stagnation of exports in recent decades. Both Australia and New Zealand were for a long time characterised by stagnant exports following the end of World War II. These resource-rich countries are still relatively closed for foreign trade for such small (in terms of population) countries. In 1998 the share of exports in GDP in Australia was 21% (population 18 million) and 29% in New Zealand (4 million).

be unchanged? – other things being equal. Not necessarily, because growth does not only depend upon the volume of exports (as well as many other factors), but also on the composition of these exports. Different types of exports can affect economic growth in different ways – some encouraging it while others discourage it. Export of raw materials appears to stimulate the economy less than do various types of exports of manufactured goods and services. By skewing the composition of exports away from manufacturing that tends to be especially conducive to technological progress and innovation (Kaldor, 1966), the Dutch disease thus hampers economic growth. The principal reason for this is probably linked to the educational difference between different industries, leading to different rates of "learning by doing" and hence to different rates of growth, which we will come back to in a moment.[18]

This is, however, not the whole story. Experience seems to indicate that an increase in primary exports, for example, in the wake of a new oil discovery, results in a decrease in total exports. This means that other exports (manufactured products, services, etc.) are reduced to a greater extent than corresponds to the initial increase in raw-material exports. This relationship holds whether the size of the primary sector is measured by (a) the share of primary exports in total merchandise exports, (b) the average proportion of the labour force employed in primary production, or (c) the share of natural capital in national wealth, as in Table 1, column (4).[19]

In what follows (Figures 2-10), the average share of the primary sector in the labour force from 1965 to 1990 will be used as a proxy for natural-resource abundance. The primary sector includes agriculture, hunting, forestry, and fishing, but not mining and other extraction industries.[20] Alternatively, the average share of primary exports in total exports or the share of natural capital in national wealth could be used to convey the same story (Gylfason, 2000a, 2000b). In every case, the results obtained with the three different measures of natural-resource abundance, and their interpretation, are virtually the same.[21] Similarly, in econometric studies of the effects of natural wealth on economic growth across countries and time, several different measures of natural-resource abundance have given essentially similar results.[22]

Figure 2 shows the correlation between the average ratio of exports of goods and services to GDP from 1965 to 1998 and the share of the primary sector in the labour force. It includes 162

[18] This is probably not the only reason, however, at least not as far as agriculture is concerned. Because technology progresses more rapidly than the demand for food, world market prices for most farm products have declined in real terms over time. This helps explain the limited growth potential of agriculture around the world.

[19] See references in footnote 8.

[20] Very similar results obtain when the initial rather than the average primary-labour share is used.

[21] The correlation between the primary-labour share and the share of natural capital in national wealth in the sample under study is 0.59 and the correlation between the primary-labour share and the share of primary exports in total exports is 0.51.

[22] In the study that launched the new econometric literature on natural resources and economic growth, Sachs and Warner (1995b) use the ratio of primary exports to GDP, as do Gylfason and Herbertsson (1996). Gylfason (1999a) uses the share of primary exports in merchandise exports. Gylfason, Herbertsson, and Zoega (1999) use both the share of primary exports in total exports of goods and services and the share of primary production in the labor force. Even if these studies use these different measures of natural-resource abundance, they all conclude that increased natural wealth reduces economic growth across countries (and, in the case of Gylfason and Herbertsson (1996), based on panel data rather than a

countries.[23] Each point in the figure represents a single country. The regression line running through the scatterplot shows that the correlation is negative and statistically significant:[24] when the natural-capital share increases by three percentage points from one place to another, the export ratio drops by one percentage point. Similar results obtain when openness is measured by the sum of exports and imports rather than just exports relative to GDP, and also when the export or trade ratio is corrected for country size (i.e., population) to reflect the fact that large countries are less dependent on exports than small ones (not shown). Moreover, when the export ratio is purged of that part which is caused by initial income per head – obtained from a regression of the export ratio during 1965-1998 on initial GNP per capita (i.e., in 1965) as well as the primary-labour share – in order to make sure that the inverse relationship between the export ratio and the primary-labour share in Figure 2 is not simply a sign of an inverse correlation between the export ratio and initial income, the results remain essentially unchanged.[25] So, this is the Dutch disease in a nutshell. And insofar as exports are good for growth, not only in and of themselves, but also because they facilitate imports of goods and services, labour and capital, ideas and know-how, the Dutch disease may thus be an impediment to rapid economic growth.

It needs to be emphasized that no conclusions are being drawn here as to cause and effect. Figure 2 is only intended to display the data in such a way that the description accord with the results of multivariate regression analyses that can help account for more potential determinants of exports (Gylfason, 1999), and where the attempt was made to distinguish cause from effect. The same disclaimer applies to all the figures that follow. Even so, the study of bivariate cross-sectional relationships has many shortcomings. For one thing, such studies bypass the diversity of individual country experiences. For another, they do not account for economic developments over time, as panel studies are designed to do.

Figure 3 shows the correlation between the average share of domestic investment in GDP from 1965 to 1998 and the primary-labour share in 160 countries.[26] The correlation is significantly negative. When the investment ratio is purged of that part which is caused by initial income per head, R^2 rises from 0.10 to 0.48 and the slope of the regression (not shown) increases in absolute value from -0.07 to -0.19. Thus, when the primary-labour share increases by five percentage points from one country to another, for given initial income, the investment share drops by nearly one percentage point. Gylfason and Zoega (2001) document this relationship in detail by showing how

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cross section, also over time).

[23] The number of countries included in all the figures is the maximum number of countries included in World Bank (2000), unless otherwise indicated.

[24] The correlation equals by definition the square root of R^2, which can be read from the figure, and is -0.42 in this case. Its statistical significance is determined in a t-test of the significance of the slope of the regression line in the figure. The Spearman rank correlation, which is less sensitive to outliers, is also -0.42.

[25] The correlation between the primary-labour share and the logarithm of initial per capita income (i.e., in 1965), defined as purchasing-power-parity adjusted GNP per capita in 1998 divided by an appropriate growth factor, in the 105 countries for which there are data on both variables, is 0.83.

[26] Equatorial Guinea was removed from the sample because of problems with its (extremely high!) investment figures. This exclusion does not materially influence the slope of the regression line.

the link through domestic investment may account for about one-fourth of the total effect of natural-resource abundance on economic growth in a cross-sectional sample of 85 countries during 1965-1998. Although figures are not available on the sectoral breakdown of investment, it seems reasonable to conjecture that an increase in primary production is accompanied by reduced investment in sectors other than the primary sector itself, thus causing an overall reduction in investment. This inverse correlation between investment and primary production may thus also be an indication of how primary production, especially when it is vigorous, can sap other sectors.

B. Education

Primary production generally makes lower educational demands of manpower than does other production – in manufacturing, trade, and services. This applies especially to agriculture in developing countries. As a result, workers released from primary production, such as agriculture, fisheries, forestry, or mining, generally have less general education, in the form of knowledge of languages, for instance, to offer new employers in the modern sector, since the proportion of unskilled labourers is generally higher in primary production than elsewhere. This is not the case in all areas, however, since advanced technology in primary production is demanding various types of well-educated workers, as witnessed, for example, by high-tech oil-drilling operations and the computerisation of fishing vessels in recent years. Agriculture in industrial countries has also become much more mechanised in recent decades, to take another example. But, even so, in so far as the education of the labour force is less on average in primary production than in other sectors, this would appear to explain in part why extensive primary production tends to be associated with less learning by doing, fewer beneficial spillovers, and hence less rapid technological advance and economic growth. Mauro (1998) proposes a further link through which corrupt politicians try to skew government expenditure away from education.

Figure 4 shows the correlation between secondary-school enrolment on average from 1980 to 1998 and the primary-labour share in 166 countries. The figure shows that an increase in the primary-labour share by 1 percentage point from one country to another goes along with a drop in secondary-school enrolment amounting to almost 1% of each cohort. The correlation is -0.85. When the enrolment rate is purged of that part which is caused by initial income per head, the results remain essentially the same. Even so, no conclusion can be drawn here about cause and effect. The possibility that limited education may play a part in directing a major portion of manpower into primary production, where educational requirements will generally be lower than elsewhere, cannot be precluded. The opposite does, however, appear more likely to be the case: that is, that the extent of primary production is determined to a great extent by natural wealth and this is the exogenous variable. If so, school enrolment is thus determined to some extent by the educational requirements of primary production rather than the reverse. Similar results (not shown) hold for primary- and tertiary-school enrolment as well as for expenditure on education and years

of schooling (Gylfason, 2000b, 2001).

As mentioned earlier, limited exports and imports tend to reduce economic growth because without extensive international trade nations generally fail to learn enough from one another, about new and improved working methods, more efficient methods of production, marketing, technological innovations, and so on. Closed countries, such as Albania was, and Myanmar, North Korea, and Cuba still are, provide appalling examples of this. The same is true of education. Education which is low in quantity and quality not only detracts directly from the practical know-how of the work force, but also indirectly by reducing possibilities for domestic firms to make inroads into foreign markets. Students thus not only learn less at school; the work force also learns less than it might from foreign trade (learning by exporting). These are two sides of the same coin, because trade *is* education.

C. Rent seeking

Primary production generally returns rent. Natural-resource rent differs from profit (i.e., income in excess of costs) to the extent that most natural resources apart from air and water are limited, making it necessary to regulate their utilisation by restricting access to them.[27] Those to whom the owner of a resource – a public authority, enterprise, or individual – grants access to it and usage rights exceeding those of others, thus obtain an advantage in excess of the profit which they could expect under conditions of unrestricted access: this advantage is the rent from the resource. In most other forms of commercial activity high profit would lead to increasing numbers in the sector, until the profit was reduced to normal competitive margins. This generally does not happen in resource exploitation, or at least it should not happen, because restriction of access to the resource prevents an increase in the number of actors in the sector, which would only lead to increased cost if the utilisation – for example, oil exploration permits or catch quotas in fisheries – is determined in advance. Limiting access to the resource thus produces value, i.e., rent, in excess of normal profit. Rent can also be produced by other means independent of resource management. It occurs wherever production resources are fixed for longer or shorter periods, whether this is the result of nature, as is generally the case with land, or caused by public authority, as is the case in the allocation of any type of scarce resource – e.g., fishing rights.

Resource rent varies according to industrial sector. It is generally high in oil production, often around 80% of income, somewhat lower in mining, and still less, for instance, in fisheries, where it can amount to around one-third of income. This is because it is generally more expensive to catch fish at sea than to dig ore out of the earth, which in turn is more expensive than pumping oil to the surface of the land or sea.

[27] Even air and water are not unlimited resources in some areas of the world. Clean air is, for example, a scarce resource in Mexico City because of air pollution and water is similarly in scant supply near the eastern end of the Mediterranean for natural reasons, to take but two examples.

When the owner of a resource restricts access to it, the parties active in the sector concerned, or who would like a share of the action, will naturally try hard to acquire the rent. Rent seeking can take various forms, all of which deflect efforts from production and other useful pursuits (Krueger, 1974; Bhagwati, 1982; Gelb, Hillman, and Ursprung, 1996). Rent seeking can appear, for instance, when producers in the industrial sector concerned feel they must compete for the favour of those allocating access to the resource, and vice versa. This occurs wherever scarce resources are allocated at less than full price (e.g., credit and foreign currency). One of the main advantages of the market economy over planned economies with all their restrictions and rationing is the fact that the market replaces the public authorities where possible, thus relieving nations of the waste and corruption which generally follow extensive rent seeking as night follows day. For this reason, the sale of scarce resources for fair prices, for example, by public auction in a free market, is generally the most direct and effective way to avoid rent seeking and its consequences. This is one of the most telling arguments for fishing fees instead of the free allocation of fishing rights on Norwegian and Icelandic banks, as is still practised, and is comparable to the arguments for proper market determination of interest rates and exchange rates, instead of the rationing of loan capital and foreign exchange at below-market prices, controlled by public servants and politicians, which is still practised in some developing countries.

Where the state, or other public authority, owns a resource, rent seeking commonly leads to producers cultivating close relationships with the authorities, at the expense of consumers. And when producers are favoured at consumers' expense, the danger arises of the public authorities supporting domestic production of goods and services which it would be more economical to purchase at lower prices from abroad (import substitution). Thus rent seeking tends to reduce imports – through import restrictions in order to please domestic producers, for instance. Figure 5 illustrates this trend. It shows how average customs duties on imports in 1970-1998 are linked to the primary-labour share in 134 countries. Duties on imports increase by one percentage point on average for each five-to-six-point increase in the primary-labour share from one country to another. The relationship is significant. The correlation is 0.61. When the dependent variable is purged of that part which is caused by initial income per head, the results remain essentially the same. Import restrictions do not merely reduce imports, however, as intended, but may also reduce exports, because increased incentives to produce for the domestic market under the import protection may weaken the stimulus for exportation. Both import restrictions and sluggish exports hinder the opening up of the economic system, thus impeding economic growth.

Another conceivable explanation as to why resource-rich countries are generally more closed than others is the following: fearing the Dutch disease, authorities sometimes attempt to protect feeble domestic industries instead of fully opening up their economic system. In a similar vein, Tornell and Lane (1998, 2000) argue that terms-of-trade windfalls and natural-resource booms may trigger political interaction, or games, among powerful interest groups that result in current account

deficits, disproportionate fiscal redistribution, and reduced growth.

Moreover, extensive primary production also appears to reduce the inflow of foreign capital. Figure 6 shows an inverse relationship between the primary-labour share and gross foreign direct investment relative to GDP in 138 countries from 1975 to 1998. When the primary-labour share increases by 35 percentage points (e.g., from 15% to 50%) from one place to another, the ratio of foreign investment to GDP drops by nearly one percentage point. The relationship is significant; the correlation is -0.43. Once again, when the dependent variable is purged of that part which is caused by initial income per head, the results remain essentially the same. Primary production thus not only appears to reduce exports of goods and services (recall Figure 2) but also to restrict exports of equities, in part due to fear of foreign capital and the accordant inroads into domestic raw-material production.[28] Viewed from a different angle, natural-resource abundance appears to reduce foreign investment as well as domestic investment (recall Figure 3). Scant attention has been paid to this aspect of the Dutch disease, and of rent-seeking behaviour, up to now, but it appears to warrant closer inspection.

Furthermore, there is the danger that the resource rent, which flows into the hands of the main supporters of the government, which produces that rent and allocates it free of charge, may lessen both parties' interest in and understanding of the necessity of building up human capital – for example, by increasing spending by central and local governments on education, or by organisational changes to improve and strengthen the school system. Why should the recipients of the resource rent be interested in schooling and education in the name of progress? – if they have managed to line their own pockets and those of their children without acquiring an education. Thus rent seeking could partly explain why primary production tends to reduce exports (again, recall Figure 2), and also school enrolment (Figure 4).

Disposing of limited resources without payment or under normal market value and the resultant rent seeking almost always lead to waste and corruption. Take waste first. Rent acquired without payment appears to have a tendency to encourage those who receive it to use it less judiciously than they would other income. It seems as if people do not fully respect money which they acquire without actually having to work for it. The phenomenon is well known in other areas, such as the loan market: in this case people use loans which are subsidised (e.g., through inflation) less prudently than money they have to pay back at normal – and, if necessary, inflation-adjusted – rates of interest. This does not necessarily indicate that borrowers generally use other people's money less wisely than they do their own, but it would appear to be the result of dwindling respect for money whose ownership is unclear. Efficiency-based arguments against handing over rent for free are in this respect closely related to arguments against inflation for reasons of inefficiency: achieving maximum efficiency in operation and investment demands that enterprises and

[28] To point out but one example, according to Icelandic law foreign nationals may not purchase shares in Icelandic fishery enterprises.

individuals get practically nothing without paying for it, neither subsidised loan capital nor rent at no cost. A similar argument can be made against unconditional foreign aid.

Figure 7 sheds some light on this problem. The figure shows that resource-rich countries tend to accumulate foreign debt to a greater degree than other countries. When the primary-labour share increases by three percentage points from one place to another, the external debt service burden increases by almost 10% of exports. The number of countries is 108.[29] The relationship is significant; the correlation is 0.45. Once more, when the dependent variable is purged of that part which is caused by initial income, the results hold unchanged. There is also a direct, statistically significant relationship between the primary-labour share and the outstanding stock (present value) of external debt in 1998 (not shown). Although figures giving a breakdown of this debt by sector are not available, it seems fair to assume that external debt accumulation is at least as great in primary production as in other sectors, since primary production, with the exception of agriculture in developing countries, is generally rather capital intensive. High foreign debt and the accompanying debt service burden tend to reduce economic growth, at least in the case of heavily indebted public enterprises (Gylfason, Herbertsson, and Zoega, 1999), because the borrowed capital is generally not used for sufficiently profitable investment, making this just one more indication of the dampening effect of primary production on economic growth. Also, excessive indebtedness may be a sign of flawed macroeconomic policies which inhibit growth.

Now consider corruption. To the extent that primary production involves allocation of access to limited resources without payment, it is only to be expected that resource-rich countries would be more susceptible to corruption than others. What is the evidence?

In Figure 8, which covers 88 countries, the primary-labour share has been plotted along the horizontal axis (as in Figures 2-7) and the corruption perceptions index for the year 2000 along the vertical axis.[30] The index extends from 0, in countries where corruption is greatest, to 10, where corruption is practically none (as, for example, in Finland and Denmark). The picture shows a clear and statistically significant relationship: corruption, as measured by this index, increases from one country to the next in accordance with the rise in raw-material production. When the primary-labour share goes up by 16 percentage points, the corruption perceptions index drops (i.e., corruption increases) by one point. The correlation is -0.67. When the corruption index is purged of that part which is caused by initial income, the results remain unchanged. In Section I we saw that a decrease in the corruption index of two points (i.e., increased corruption) from one country to the next is associated with a reduction in per capita growth of one-half a percentage point per year on the average. Figure 8 thus suggests that an increase of 32 percentage points in the primary-labour share from one place to another tends to reduce per capita growth by one-half a percentage point

[29] Because of their extremely high external debts, Guinea-Bissau and Sudan are not included. Were these two countries included, they would not skew the picture to any great extent, however.
[30] Corruption rankings for earlier years, 1995-1999, give similar results.

per year on the average, merely by encouraging or stimulating corruption, if nothing else changes. This is no small effect – if it is an effect, that is, as opposed to a mere correlation. This is yet another possible reason why primary production appears to reduce economic growth.

One more conceivable explanation should be mentioned before we leave the question of rent seeking. Several writers have recently put forth arguments indicating that inequality of incomes and property reduces economic growth (Alesina and Rodrik, 1994). This could, for example, be caused by the resentment resulting from excessive inequality, which leads to disputes over the distribution of income, causing a regular boiling over of collective bargaining agreements, sending inflation soaring and disrupting production and the labour market – with the ensuing inefficiency these circumstances cause, in turn, impeding economic growth. This is, for instance, a familiar pattern in some parts of South America. Others have claimed that primary production tends to increase inequality (Ranis, 1991). If this is the case, then we have here yet another channel for the dampening effect of primary production on growth. It could, for instance, occur where the public links resource industries to inequality and thus opposes primary production, exports, and foreign trade in general, lending support to the political voices calling for closing the economy – with that closure stifling growth.

What do the data reveal? Figure 9, which covers 110 countries, shows that the share of the primary sector in the labour force seems to be associated with inequality of income distribution: when the primary-labour share increases by six or seven percentage points between countries, the Gini coefficient rises by one point. The relationship is significant. The correlation is 0.41. When the dependent variable is purged of that part which is caused by initial income, the results remain unchanged. One point on the Gini scale is equivalent to one-tenth of the fairly large difference between the equality of incomes in Norway, for instance, where the Gini coefficient is 26, and in Britain, where it is 36 (World Bank, 2000). For further comparison, the ratio of the income or consumption of the top quintile of the income distribution to those of the bottom quintile (the 20/20 ratio) is 3½ in Norway and 6½ in Britain (World Bank, 2000).

In sum, it can thus be concluded that primary production appears able to exert a considerable influence on income distribution – and also on economic growth, as is shown in Figure 10. This figure shows how economic growth per capita from 1965 to 1998, adjusted for initial income,[31] is inversely related to the share of the primary sector in the labour force from 1965 to 1990 in 105 countries. The relationship is significant. The correlation is -0.85. The adjustment for initial income entails a speed of convergence of about 2% a year (not shown), a common result in empirical growth research. An increase of 11 or 12 percentage points in the primary-labour share from one country to the next is associated with a decrease in per capita growth by one percentage point per

[31] The variable on the vertical axis in Figure 10 is that part of economic growth that is not explained by the country's initial stage of development, obtained from a regression of growth during 1965-1998 on (the logarithm of) initial GNP per capita (i.e., in 1965) as well as the primary-labour share.

year on average, for given initial income. However, the slope of the regression line exaggerates the impact of the primary-labour share on growth because several other potential determinants of growth (especially investment and education) have not been taken into account in the figure.

There is one thing yet to be considered. Successful rent seeking can upset the power balance in society, if the resource rent or other rent is significant from a macroeconomic point of view. Those eagerly seeking the rent, and who manage to acquire it for themselves to a significant extent, are not simply out there for the money, but also for the influence it brings. There are many examples of how they manage to acquire control of the political scene, at least temporarily – consider, for example, the political influence of oil in the Middle East and in Nigeria. This problem is often compounded by a lack of transparency in the treatment of common-property natural-resource rents which thus give an incumbency advantage to the government, undermining democratic governance. Wantchekon (2000) shows that democracy and the rule of law are inversely related to natural-resource dependence across countries and time.

This raises various questions. Democracy and a market economy ensure every citizen one vote on election day (at least where the division into electoral districts is satisfactory), but their votes at the supermarket cash register vary with their purchasing power. Thus consumers can direct production along the course of their choosing. Those wielding the greatest financial clout can, however, attempt to sway political developments to follow their own ideas and interests, for example, by supporting political parties. There is nothing to be said against this as long as the government takes steps to ensure that the rules of the game are in accordance with the public interest, for example, by prohibiting bribes and having clear and transparent rules on the fund-raising of political parties to prevent it from being possible to purchase unnatural access to government – without, however, infringing upon the right of individuals to dispose of their wealth as they wish. This can be a difficult path to follow and has proven to be a slippery one, as numerous financial scandals involving political parties bear witness. It is not generally possible, however, to prevent wealthy persons from exercising more influence on the political scene than others, if they wish to do so. One of the main strengths of a market economy is the tendency for persons to acquire wealth as a result of their own efforts and good fortune, although this is certainly not always the case. It is, on the other hand, a serious flaw of the planned economy that people primarily grow wealthy on privileges which they grant themselves or exchange with one another. Democracy and a market economy are for this reason more likely than a planned economy and autocracy to produce a meritocracy and a legitimate government in the eyes of the people. Experience of the two systems in this century is certainly indisputable in this respect, although by no means unfailing or unequivocal.

Which is important in this connection because the rent seeking society has a flaw similar to those of the planned economy – that is, that it accords extensive wealth to a select group, not on the basis of their own deserts but through free allocation of valuable benefits at the discretion of the

authorities. This wealth is then followed by still more power, and so on. This not only creates a risk of undesirable concentration of wealth and power in a few – wrong! – hands, but also a danger of closer involvement between the rent seekers and the authorities than is good for the society. Concentration of wealth and power in a few hands can pose a threat to national cohesion and to economic growth, which is generally less of a danger where individuals have grown wealthy primarily according to their deserts than where this has occurred through the free allocation of valuable benefits, such as rent, not to speak of common-property resource rent rightly claimed by the public. The demand for efficient and fair utilisation of the resource rent thus has nothing to do with antipathy towards wealth or wealthy individuals; no, it is simply a demand for efficiency, democracy, and fairness – and economic growth.

Can all of these drawbacks of rent seeking be avoided by auctioning off the rights that give rise to the rent? In order that people who have become wealthy because they deserved it would then acquire the rent instead of others who have done little or nothing to deserve it? Possibly, but not necessarily. Experience seems to indicate that countries which have arranged things so that the rent accrues to the state to a large extent, as is customary for instance in most oil-exporting countries, have by and large not done better than others as far as can be seen, since the state is no less liable to waste the resource rent than are rent seekers in the private sector. Education is still in a shambles in Nigeria, despite all the oil rent which the state has received, and per capita economic growth in the country from 1965 to 1998 was nil – 0.0% per annum on average, to be precise.[32] Any auctioning of the rent would not likely be of real use unless measures were taken to ensure that taxes – distortional taxes, in particular – were cut in return. Another way would be to divide the rent equally among the citizens by issuing vouchers. Yet another would be to have an independent, yet democratically accountable, authority collect and dispose of the resource rent. It is probably wisest, however, to make simultaneous use of a number of different ways of reaching the desired goal, in order to spread the risk and reconcile varying points of view, as has been done, for instance, in the privatisation process in some parts of Central and Eastern Europe and elsewhere in recent years.

How about Norway? Norway has charted a long-run-oriented, tax-based, and reasonably market-friendly approach to the management of its vast oil resources. Exactly how vast they are depends on oil prices, which are quite volatile: estimates of the oil wealth range from 50% to 250% of GNP. By law, the title to petroleum deposits on the Norwegian continental shelf is vested in the State. This means that, in principle, all the rent from oil and gas should accrue to the Norwegian people through their government. The State's title to these resources constitutes the legal basis for government regulation of the petroleum sector as well as for its taxation.

Exploration and production licenses are awarded for a small fee to domestic and foreign oil companies alike. Why small? Because the Norwegian government has decided to expropriate the

[32] Nigeria is not alone: per capita growth in Iran and Venezuela 1965-1998 was on average -1% per year, -2% in Libya, and -3% in Iraq and Kuwait, to take examples of five other oil exporting countries. They all follow the same pattern.

oil and gas rent through taxes and fees as well as direct involvement in the development of the resources rather than through sales or auctioning of exploration and production rights (OECD, 1999, Ch. 3). The State has a direct interest in most offshore oil and gas fields and, like other licensees, receives a corresponding proportion of production and other revenues, roughly 40% of the total. This way as well as through various taxes and fees, it is estimated that the Norwegian State has managed to absorb about 80% of the resource rent since 1980. Thus, in 1997, revenues from petroleum activities accounted for more than a fifth of total government revenues and were equivalent to 9-10% of Norway's mainland GNP, or 8-9% of total GNP, including oil. The oil revenue is deposited in the Government Petroleum Fund, which is being built up and invested mostly in foreign securities.[33]

At the same time, however, a variable proportion of each year's net oil-tax revenue is transferred from the Petroleum Fund to the fiscal budget, essentially to cover the non-oil budget deficit. The proportion of net tax revenues from petroleum thus transferred to the government budget was about one-fourth in 1997 and almost 40% in 1998, but is envisaged to drop to less than 10% in the years ahead. Even so, the Norwegians have not been tempted to expand their central government beyond reasonable limits as a result of the oil boom. Even 20 years after discovering their oil, the Norwegians continue to content themselves with smaller central government than Denmark, Finland, and especially Sweden. However, local governments (municipalities and counties), which employ over three quarters of all public-sector workers and almost one fourth of the entire labour force (OECD, 1998), have not managed to exercise similar restraint, but they do not have oil-tax revenue to fall back on except perhaps indirectly through income transfers from the central government. Besides, the social cost of local government expansion is probably smaller than that of central government expansion, krone for krone, other things being the same. The reason is that local governments, especially in sparsely populated countries such as Norway, are typically more efficient providers of public services like education and health care than the central government because of their closer proximity to their clients.

D. Economic policy

Partnerships between rent seekers and politicians for mutual benefit are not always long-lived, because they seldom produce sound economic policies.

Resource-rich countries seem to be liable to various types of economic policy failings to a greater extent than other countries. An abundance of natural resources can offer a false sense of security, a feeling that anything is possible. On the other hand, countries with no substantial natural resources may feel they have no margin for error and need to exercise care in their economic organisation and policies. When resource-rich countries start running into difficulty, they tend to

[33] In most other oil-exporting countries, as Rodriguez and Sachs (1999) point out, the oil revenues are invested at home, generating temporary consumption and production booms that will sooner or later result in declining incomes.

scarcely believe what is happening, and try to encourage growth, for instance, with domestic investment projects and foreign borrowing, causing inflation to soar, public finances and foreign debt to grow out of control, and producing, in the end, disappointing economic growth when the authorities are forced to take action to bring inflation and indebtedness under control. This is followed by a spell of stagnation, or even deterioration of the standard of living and public dissatisfaction, which set in motion forces to propel growth upwards once more, with a new surge, and the cycle repeats itself (Sachs, 1989; Auty, 1994). Economic development seesaws. During the years where economic growth is little or none, or even negative, the national wealth is depleted. This applies not only to physical capital but also to human capital and natural wealth, since in lean years the authorities are tempted to neglect education and step up utilisation of natural resources. In years when growth takes a turn for the better, both the authorities and the public tend to lose sight of long-term trends. Only belatedly do people finally realise that long-term growth is less on the average than they thought because it drops sharply now and again.

So economic development is characterised by fits and starts, caused not only by inconsistency in economic policy but also by fluctuation in raw-material prices. Prices for principal raw-material commodities are far more prone to fluctuation than are prices for other goods and services in general. Which means that resource-rich countries are subject to more variable export earnings and economic instability than are other countries. Upturns are followed by rapid growth, and sometimes by inflation as well. During downturns measures are often introduced to alleviate the problems of the export industries, sometimes including currency devaluation and foreign borrowing, with the result that inflation rages in lean years as well as years of plenty. Inflation, however, does not appear to be greater in resource-rich countries than elsewhere.

Fits and starts disrupt economic activity in a way not dissimilar to inflation, i.e., by increasing uncertainty and reducing trade and investment and, consequently, economic growth. The course of economic activity in one-basket economies is not only more irregular than in diversified systems, the former are also more sensitive to fluctuations caused by insufficient spreading of risk. When the resource-based industry encounters difficulties, due to over-exploitation, catch failure, or collapse in world market price, the blow can be a staggering one because the capacity of the economy to sustain the shock is roughly inversely proportional to the dominance of the primary sector when everything was rosy.

III. In conclusion

Great natural wealth would appear to be a mixed blessing. The experience of a great number of countries seems to indicate that extensive natural riches are accompanied by a tendency towards slower economic growth in the long run than is generally the case in countries with no major

natural resources.[34] For this inverse relationship between resource abundance and long-run growth there are a number of conceivable explanations, which have been briefly discussed here: (a) the Dutch disease, which pushes the real exchange rate or wages upwards and increases exchange-rate volatility, causing exports to decrease and slowing growth; (b) neglect of education, which may result from the fact that education demands of the workforce for primary production are generally lower than for other industries, which reduces the availability of well-trained manpower to other industries; (c) rent seeking, which distracts the interest and efforts of society from creating wealth to infertile interest pursuing; and (d) failures of economic organisation and policy, which could be the result of the false sense of security caused by abundant resources and imagined invincibility.

These explanations, and others which may be subsequently advanced, will need closer examination in the coming years, as economic research on the relationship between natural wealth and economic growth is still in its infancy. There are many aspects to be considered. Furthermore, the resource-rich countries which have been reviewed here vary so greatly from one another, for example, with regard to their stage of development and type of government, that it could be regarded as highly questionable whether all of them – from Nigeria to Norway! – should be grouped together for drawing general conclusions. Nonetheless, it would be inadvisable to ignore the indications which seem to present themselves from the experience of the resource-rich countries. A more advisable course appears to be to examine carefully the theoretical and empirical arguments, and to try to learn as much as possible from both.

[34] This evidence is summarized in Auty (forthcoming).

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Figure 1. Natural Wealth and Growth

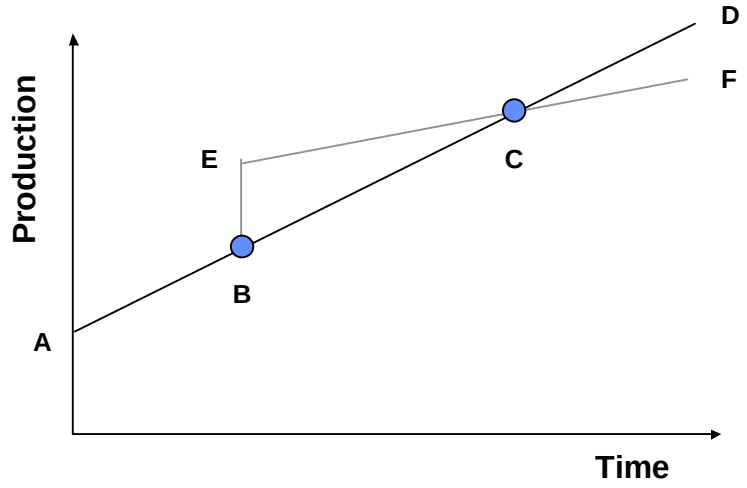


Figure 2. Exports and Natural Resources

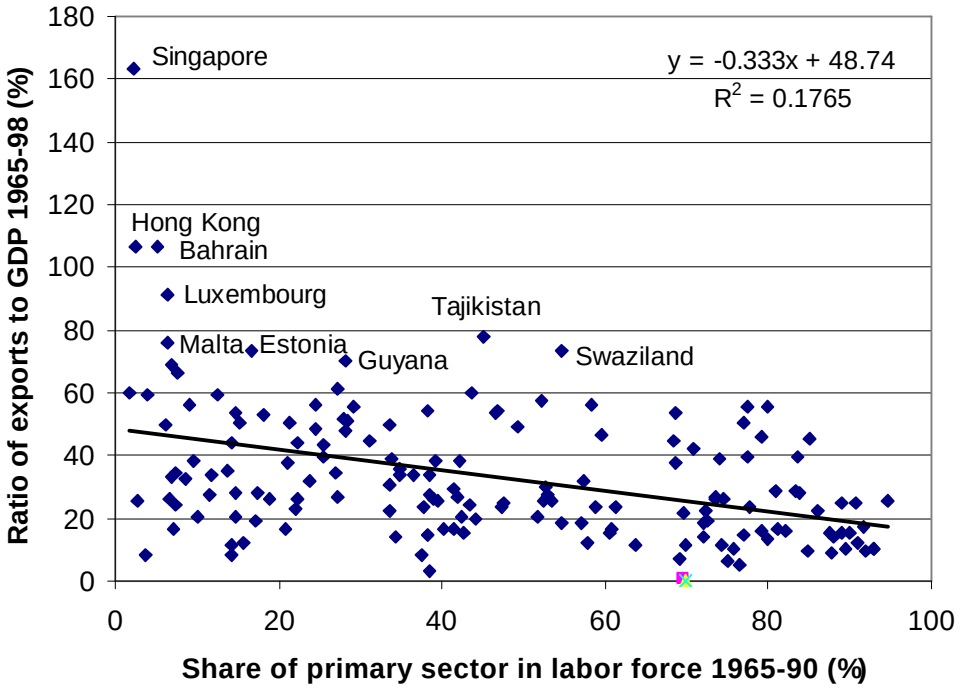


Figure 3. Domestic Investment and Natural Resources

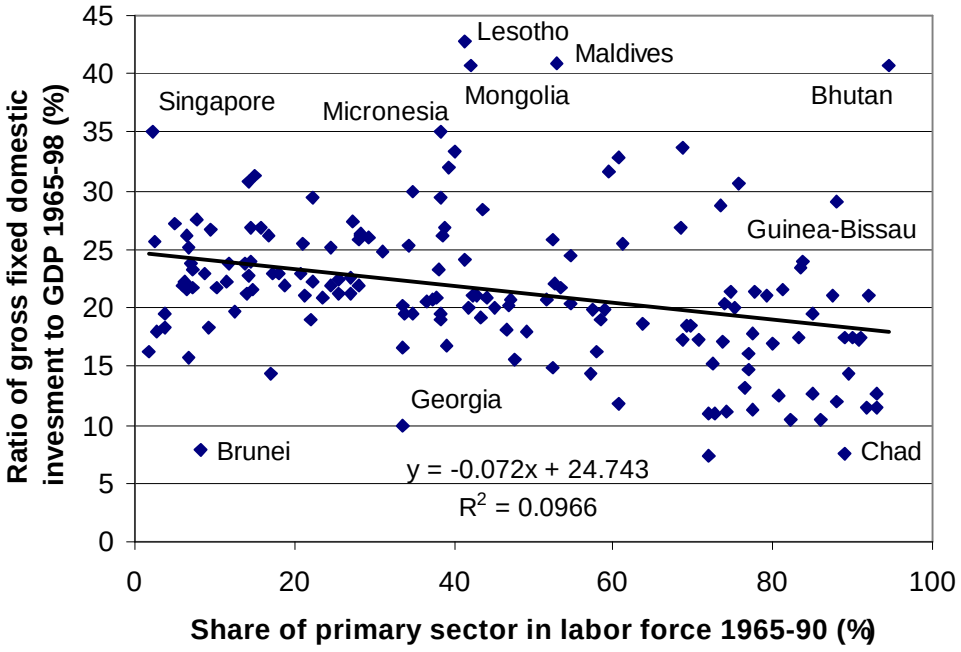
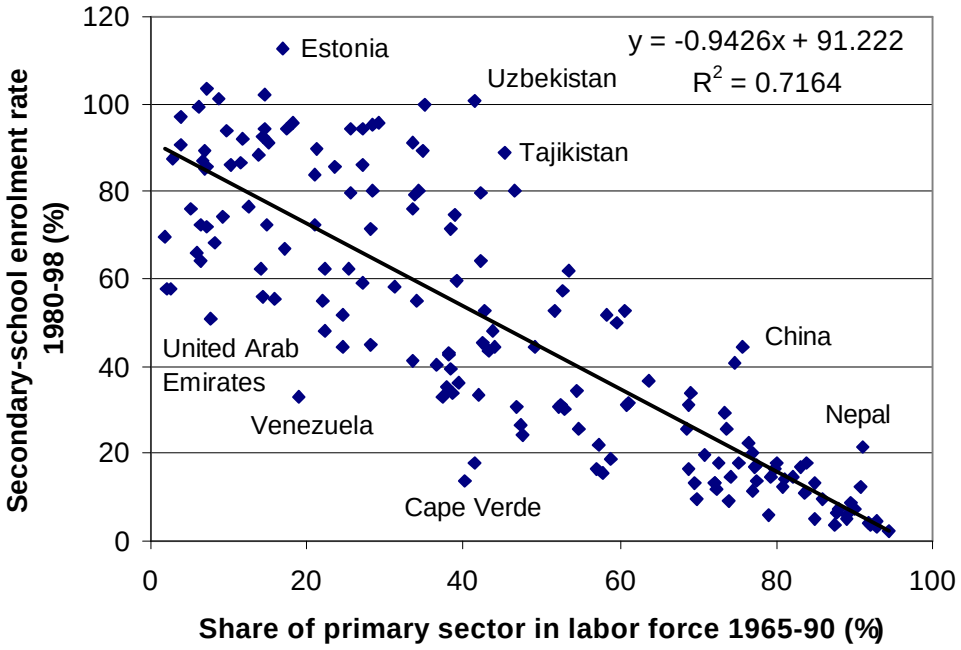


Figure 4. Secondary Education and Natural Resources



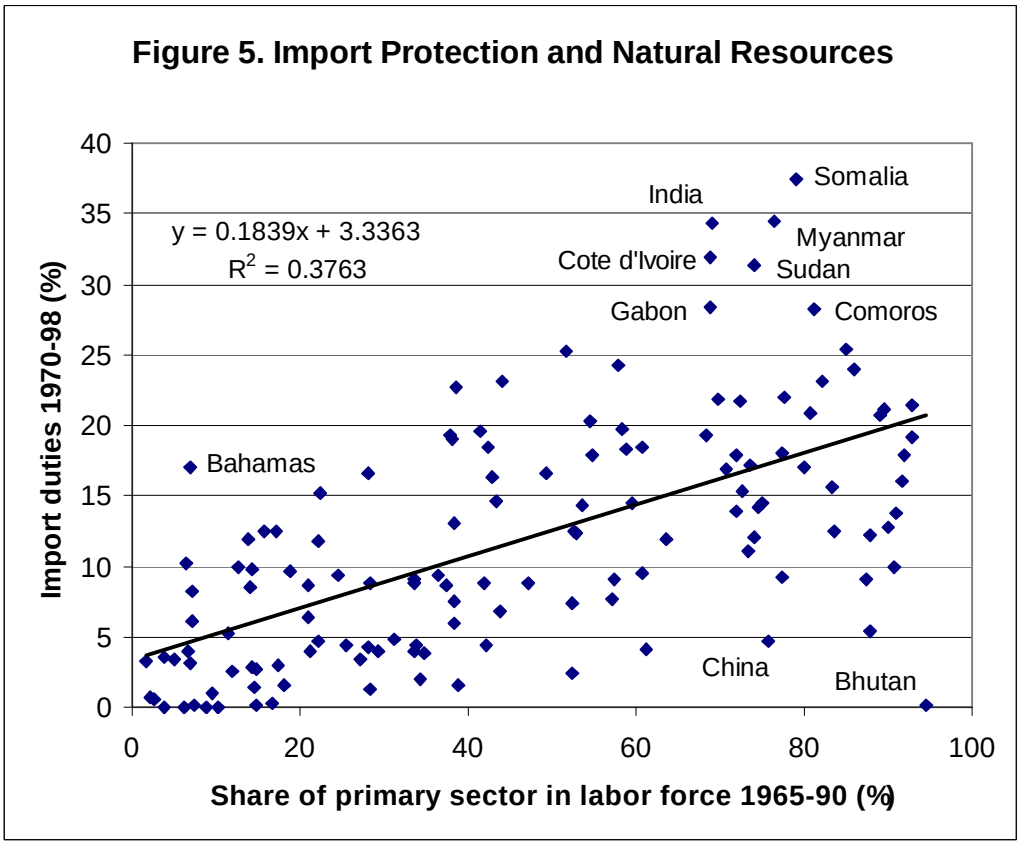


Figure 5. Import Protection and Natural Resources
Import duties 1970-98 (%)
Share of primary sector in labor force 1965-90 (%)
y = 0.1839x + 3.3363
R2 = 0.3763
Somalia
India
Myanmar
Cote d'Ivoire
Sudan
Gabon
Comoros
Bahamas
China
Bhutan
0
5
10
15
20
25
30
35
40
0
20
40
60
80
100

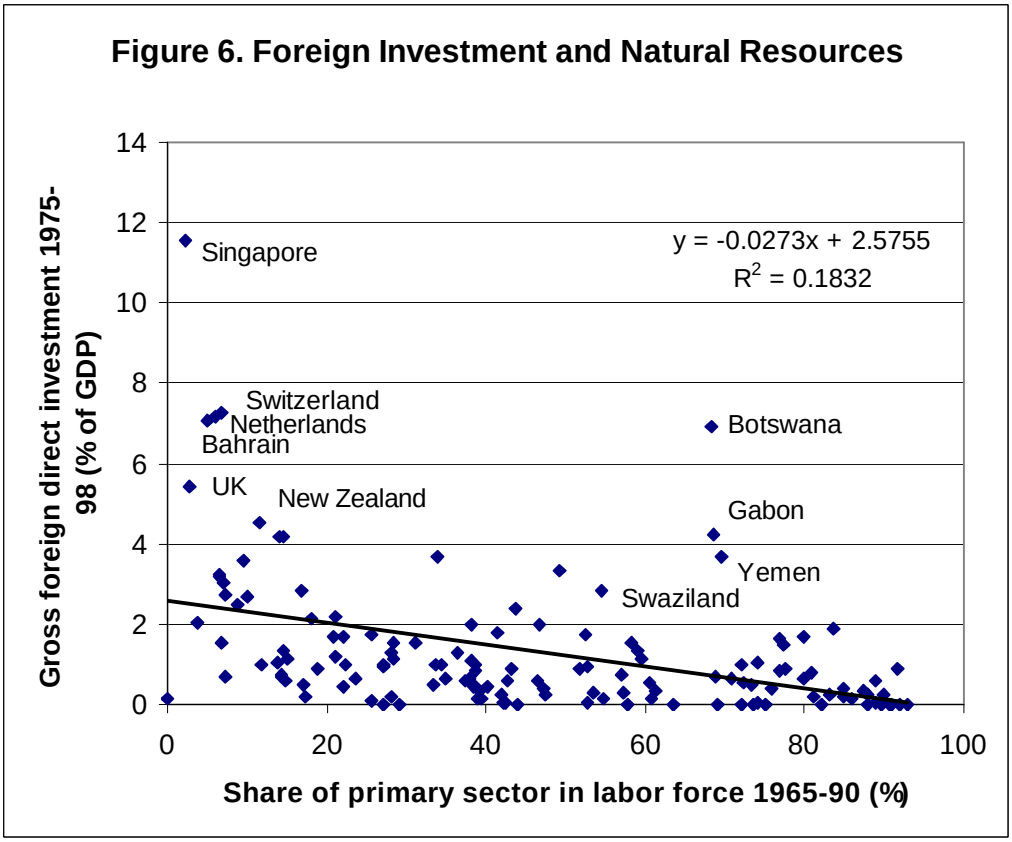


Figure 6. Foreign Investment and Natural Resources
Gross foreign direct investment 1975-98 (% of GDP)
Share of primary sector in labor force 1965-90 (%)
y = -0.0273x + 2.5755
R2 = 0.1832
Singapore
Switzerland
Netherlands
Bahrain
Botswana
UK
New Zealand
Gabon
Yemen
Swaziland
0
2
4
6
8
10
12
14
0
20
40
60
80
100

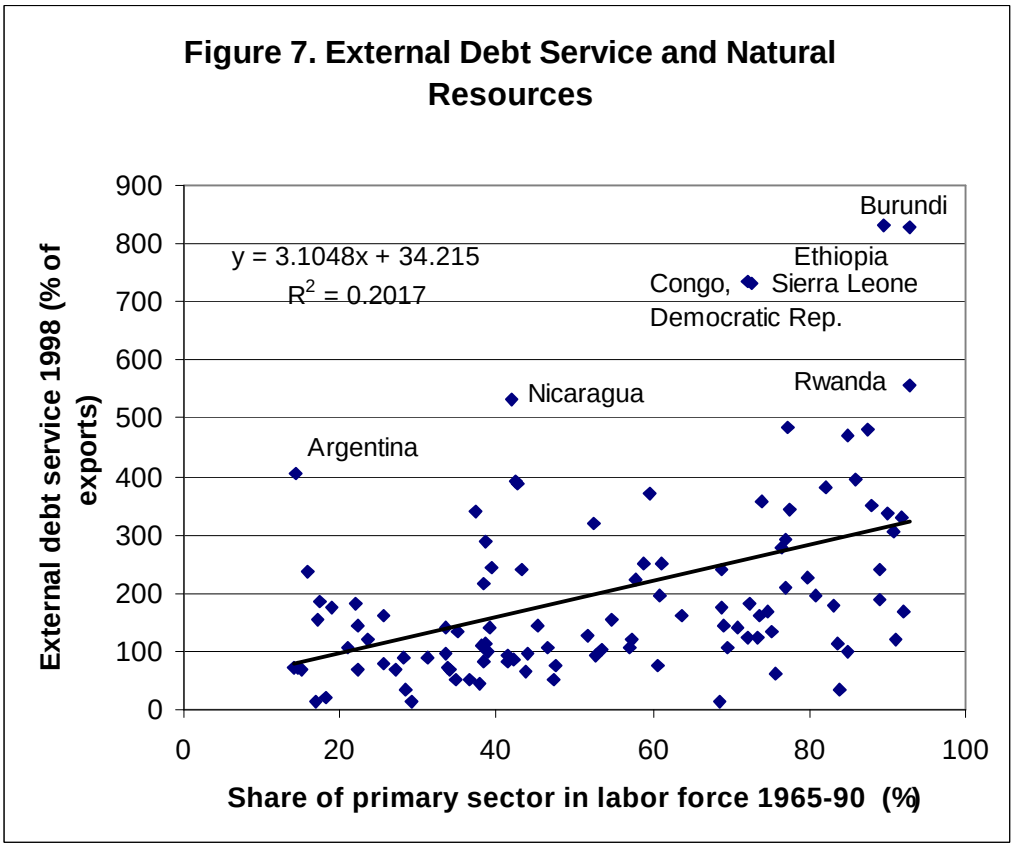


Figure 7. External Debt Service and Natural Resources
External debt service 1998 (% of exports)
900
800
700
600
500
400
300
200
100
0
y = 3.1048x + 34.215
R2 = 0.2017
Burundi
Ethiopia
Congo, Democratic Rep.
Sierra Leone
Nicaragua
Rwanda
Argentina
0
20
40
60
80
100
Share of primary sector in labor force 1965-90 (%)

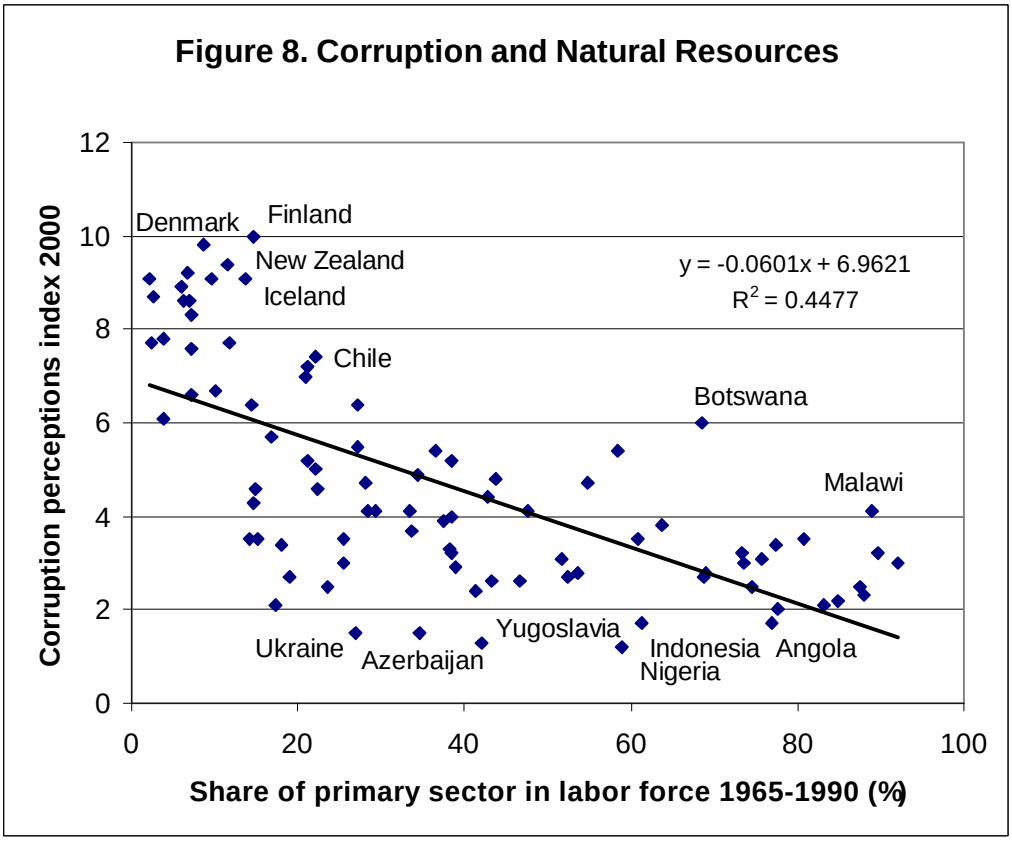


Figure 8. Corruption and Natural Resources
Corruption perceptions index 2000
12
10
8
6
4
2
0
Denmark
Finland
New Zealand
Iceland
y = -0.0601x + 6.9621
R2 = 0.4477
Chile
Botswana
Malawi
Ukraine
Azerbaijan
Yugoslavia
Indonesia
Nigeria
Angola
0
20
40
60
80
100
Share of primary sector in labor force 1965-1990 (%)

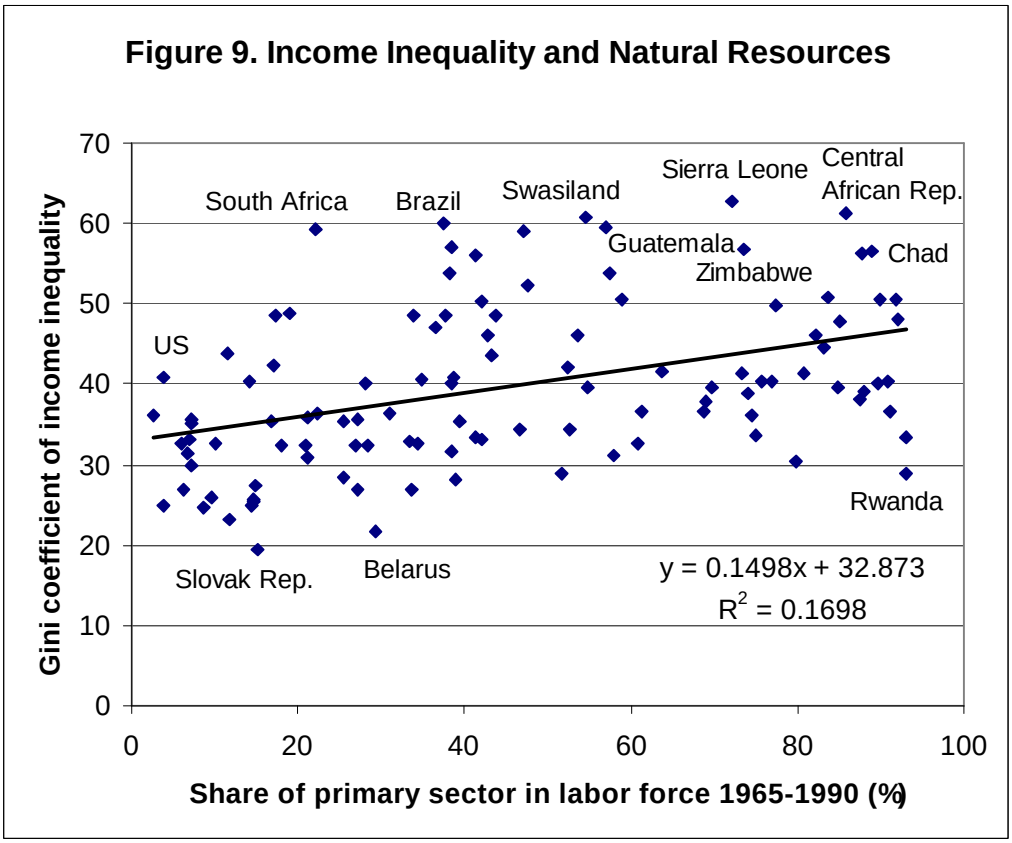


Figure 9. Income Inequality and Natural Resources
Gini coefficient of income inequality
Share of primary sector in labor force 1965-1990 (%)
South Africa
Brazil
Swasiland
Sierra Leone
Central African Rep.
Guatemala
Zimbabwe
Chad
US
Rwanda
Slovak Rep.
Belarus
y = 0.1498x + 32.873
R2 = 0.1698
0
10
20
30
40
50
60
70
0
20
40
60
80
100

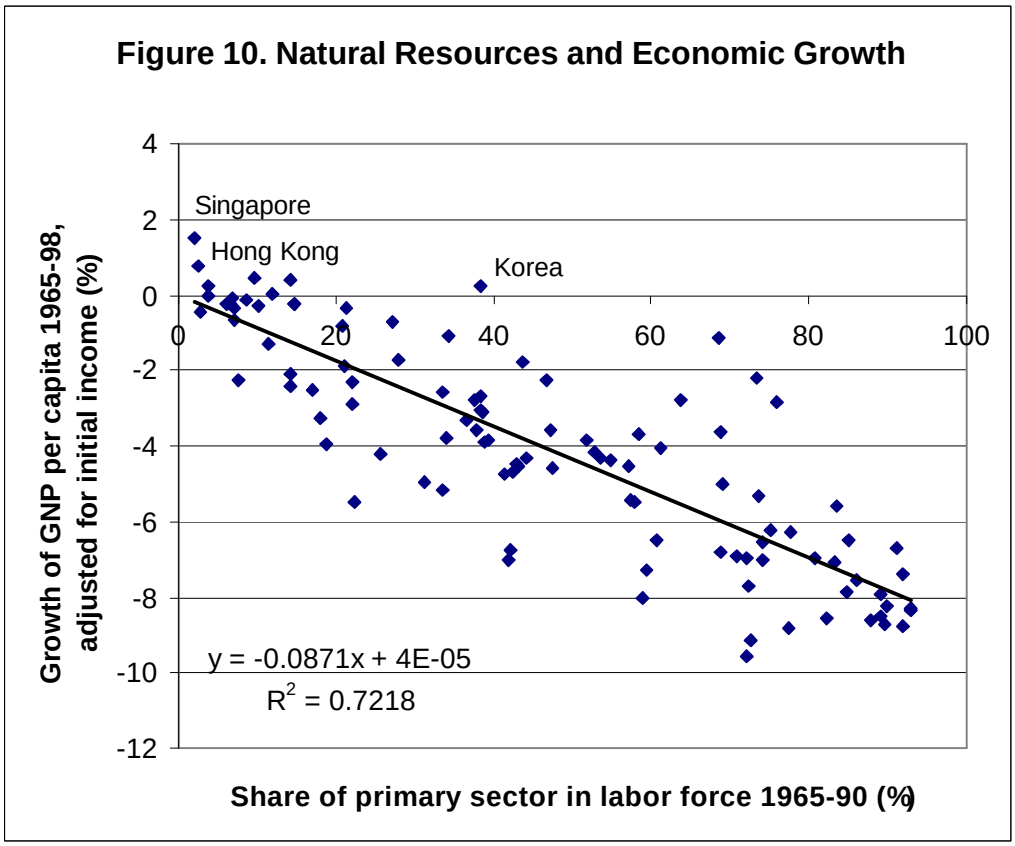


Figure 10. Natural Resources and Economic Growth
Growth of GNP per capita 1965-98, adjusted for initial income (%)
Share of primary sector in labor force 1965-90 (%)
Singapore
Hong Kong
Korea
y = -0.0871x + 4E-05
R2 = 0.7218
4
2
0
-2
-4
-6
-8
-10
-12
0
20
40
60
80
100