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Natural Resources and Economic Growth: A Nordic Perspective on the Dutch Disease

by Thorvaldur Gylfason*

Contents

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* Research Professor of Economics, University of Iceland; Research Associate, SNS–Center for Business and Policy Studies, Stockholm; and Research Fellow, CEPR. This paper was prepared for a UNU/WIDER research project on *Resource Abundance and Economic Development: Improving the Performance of Resource-Rich Countries*. Earlier versions of the paper were presented at a project meeting on *Environmental, Export and Human Development Problems in Natural Resource-Based Growth Models* held at the World Institute for Development Economics Research (WIDER) in Helsinki 2-3 July 1999 as well as at a conference on *Macroeconomic Policy: Small Open Economies in an Era of Global Integration* organized by the Institute of Economic Studies at the University of Iceland and held at the Central Bank of Iceland in Reykjavík 28-29 May 1999. Richard M. Auty, Ronald Findlay, Matti Pohjola, Moshe Syrquin, and an anonymous referee provided especially useful comments and suggestions.

I. One thing is certain:

Ireland does not have the Dutch disease

The geographical focus of this paper is on the Nordic countries, Norway and Finland in particular, but let us begin elsewhere: in Ireland. According to anthropological research, including comparative analysis of human skeletons, old and new, roughly one third of the original settlers of Iceland between 874 and 930 AD seems to have stemmed from Ireland, and the remaining two thirds are thought to have arrived mainly from Norway. By oral tradition in Iceland, this close kinship is generally considered to explain at least in part some striking similarities between the populations of the three countries.

Whether it is a coincidence or not, the economic history of Ireland, Iceland, and Norway in the 20th century is quite similar in some respects, not least as regards the inward-looking, protectionist economic policies that were pursued with great fervor in favor of rural areas (or that at least was the official line) in all three countries, especially from 1930 to 1960 or thereabouts. Thereafter, however, when the European nations had begun to liberalize and urbanize their economies in earnest after the dust from the Second World War had settled, Ireland, the poorest of the three, gradually became more outward-looking and less protectionist in its policy orientation than either Iceland or Norway.

Figure 1 illustrates the point: it shows the ratio of exports of goods and services to gross domestic product (GDP) in Iceland, Ireland, and Norway from 1960 to 1997. The figure shows that the Irish economy was actually less open to trade than either of the other two in the early 1960s: in 1960, Irish exports were equivalent to 31 per cent of GDP, compared with 37 per cent in Norway and 40 per cent in Iceland. This began to change in the mid-1970s, however, after Ireland joined the European Union in 1973: since then, the Irish export ratio has more than doubled, from 36 per cent in 1973 to 76 per cent in 1997, giving Ireland the second highest such ratio in Europe (after Estonia with 77 per cent). Meanwhile, by contrast, the export ratios of Norway and

Iceland were stagnant, or worse. This matters because vigorous external trade in goods and services is almost surely an important source of economic growth over time.

How about capital flows? Here the historical record does not go as far back in time as the record of commodity trade flows, as the liberalization of capital movements in Europe and elsewhere lagged behind the liberalization of current transactions. Figure 2 shows that net foreign direct investment relative to GDP in Ireland exceeded that of Norway and Iceland throughout the 1990s, and did so for most of the period from 1974 onwards. Since the mid-1970s, net foreign direct investment has increased from less than 1 per cent of GDP in Norway and Ireland to 2½ per cent in Norway and 3½ per cent in Ireland in 1997. This development differs markedly from that in Iceland which, as a matter of policy, attracted hardly any foreign direct investment to speak of during this period.

Why is the Irish economy so much more open to the rest of the world than those of Norway or Iceland?– at least as far as trade in goods and services is concerned. It has already been suggested that Ireland's entry in 1973 into the European Union, or the Common Market as it was then called, contributed to this outcome. In this paper, though, my intention is to explore another, not unrelated, aspect of the observed trade pattern: unlike Norway and Iceland, Ireland is not dependent on natural resources to any significant extent apart from its agricultural land. Thus, it seems clear that Ireland does not have the Dutch disease. Specifically, Ireland's well-diversified, rapidly expanding export industries have not had to grapple with an unfavorable (i.e., too high) exchange rate of the punt or with excessive labor costs resulting from the ability and willingness of well-endowed natural-resource-based industries to live with a high real exchange rate and pay high wages, or high interest rates for that matter. Moreover, having had deficits in the current account of its balance of payments and accumulated foreign debt in the 1970s and 1980s, Ireland's current account has been consistently in surplus in the 1990s.

So, if Ireland quite clearly does not have the Dutch disease, do Iceland and

Norway? Does Finland? Is it perhaps possible that the Nordic region as a whole has suffered from the Dutch disease in some form, albeit to varying degrees? This is the main question addressed in this paper.

(Yes, but how about the country that lent its name to the Dutch disease? The Netherlands exported the equivalent of 48 per cent of its GDP in 1960. In the wake of the natural gas discoveries of the late 1950s and 1960s, the Dutch export ratio fell to 39 per cent in 1967, but then recovered, reaching a peak of 61 per cent in 1985. Thereafter, the export ratio fell again, and has hovered between 50 and 55 per cent of GDP ever since, quite a high ratio by world standards, especially in view of the medium size of the Dutch economy (almost three times that of Norway, for example). Not only that, Holland has had a surplus in the current account of its balance of payments virtually every year since 1970, with one minor exception (1978). The country that was first diagnosed with the Dutch disease clearly has recovered, long ago.)

The paper begins by offering a quick glance of the Nordic economies and of some aspects of their economic growth performance and natural resource dependence since 1970. Thereafter, we review some of the main symptoms of the Dutch disease, and then consider whether these symptoms are observable in some of the Nordic countries in view of their abundant natural resources. The experience of Iceland and its fish seems an obvious point of departure. We then discuss the less obvious case of Norway and its oil (and fish!) and, at last, to close the circle, we also review some possible linkages between forest resources and economic growth in Finland, before concluding with a summary of the main points made.

II. The Nordic countries:

A glimpse of their growth performance since 1970

If they were one nation, the 24 million inhabitants of the five Nordic countries would occupy the ninth largest national economy in the world. In 1997, the total gross national product (GNP) of Denmark, Finland, Iceland, Norway, and Sweden was US$ 678 billion, which translates into about US$ 28K per person, without purchasing-power-parity adjustment. As shown in Table 1, in 1997 the purchasing-power-parity-adjusted per capita GNP in the Nordic region ranged from US$ 19K in Finland and Sweden to US$ 24K in Norway, compared with US$ 29K in the United States. In addition to the United States, Luxembourg (34K), Singapore (29K), Switzerland (27K), Japan (24K), and Hong Kong (24K)– as well as Liechtenstein, Bermuda, and the Cayman Islands– were in 1997 the only countries that had a higher purchasing-power-parity-adjusted per capita GNP than Norway (World Bank 1999).

Table 1 here

The figures shown in Table 1 are remarkable for at least two main reasons. First, except for Norway, which has become the second largest oil exporter in the world (after Saudi Arabia), the Nordic countries no longer occupy the top rungs of the international income ladder. Since about 1970, the Nordic economies generally have grown less rapidly than those of many other industrial countries. Sweden fell from third or fourth place on the list of the world's richest countries in 1970 to twenty-fifth place in 1997, and Finland to twenty-third place, according to the World Bank's estimates of purchasing-power-parity-adjusted per capita GDP. Meanwhile, Denmark moved from sixth place to twelfth place, whereas Norway ascended from fifteenth place to tenth place, as indicated above. Since 1970, only Singapore, Hong Kong, Bermuda, and the Cayman Islands (and possibly also Kuwait) have overtaken Norway in terms of purchasing-power-parity-adjusted per capita GDP.

Secondly, and this may surprise some, the Nordic countries have grown apart from one another in the 1990s. Their living standards were approximately the same around 1990, but that is no longer the case. In 1997, for example, Norway's purchasing-power-parity-adjusted per capita GNP, the highest in the group, was 28 per cent higher than that of Sweden, the lowest, compared with a difference of less than one per cent, in Sweden's favor, in 1990.[1] Without purchasing-power-parity adjustment, the per capita income differential between Norway and Sweden in 1997 was larger, or 38 per cent.[2]

If we gauge living standards by purchasing-power-parity-adjusted GDP per hour worked, a better measure because it mirrors labor productivity, then we find a 25 per cent difference between Norway and Sweden and Denmark, a 35 per cent difference between Norway and Finland, and a difference of about 50 per cent between Norway and Iceland (Table 1, column (2)). For comparison, the purchasing-power-parity-adjusted GDP per hour worked in the United States in 1997 was US$ 31, a bit below the Norwegian figure, but above all the others. Thus, in 1997 the United States had a considerably higher income per head than Norway (US$ 29K against US$ 24K), but nonetheless a somewhat lower income per hour worked (US$ 31 against US$ 35), because Norwegians worked fewer hours per year than Americans (1407 hours per year in Norway compared with 1951 hours in America).

It is not enough, however, to look at current income flows and the hours of work necessary to sustain them in order to assess the wealth of nations and the living standards supported by that wealth. It is also necessary to view the underlying trends, including the status and movement of key macroeconomic stock variables like natural-resource endowments, including the environment,

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[1] This statement is based on figures from the World Bank (1999). Figures from the OECD convey a similar message. They show a three per cent per capita GDP differential between Norway and Finland in 1970, eight per cent in 1990, and 29 per cent in 1996.

[2] Had this comparison between the richest and the poorest member of the group been made for 1996, it would have pitted Norway against Finland, which overtook Sweden in 1997 by the World Bank figures.

and other national assets and liabilities, in order to come to grips with some of the main determinants of economic growth over time. However, many of these assets and liabilities– natural-resource endowments and social capital among them– are notoriously hard to measure.

Yet, some progress has been made in recent years. Preliminary national wealth estimates, for 1990, were published in 1995 (World Bank 1995). They were made without purchasing-power-parity adjustment and attributed a rather large share of total wealth to natural resources in four of the five Nordic countries: 29 per cent in Sweden, 30 per cent in Norway, 38 per cent in Finland, and 61 per cent in Iceland, compared with 7 per cent in Denmark. By these preliminary estimates Sweden was ranked first (with total national per capita wealth of US$ 491K), then Iceland (486K), Denmark (461K), Norway (423K), and Finland (345K). One anomaly of these estimates was that Finland and Iceland's human capital per person was estimated at a third of that of Denmark or less, which seems off the mark.

Table 2 shows the World Bank's upgraded, but still admittedly tentative, estimates of the level and composition of total purchasing-power-parity-adjusted national wealth per person in 1994 in the Nordic countries (all but Iceland, presumably because fish are excluded from the analysis, partly for lack of information and partly because poor management has driven rents to zero in so many of the world's fisheries). The estimates shown are based on an assumed discount rate of 4 per cent.

Table 2 here

The correlation between the total wealth figures in Table 2 and the income figures of Table 1 is quite close, or 0.93. The difference between the highest and lowest figures (i.e., between Norway and Finland) is 25 per cent, which is similar to the corresponding difference between the highest and lowest level of per capita GNP observed in Table 1. In each of the four countries, the estimate of total national wealth per person in Table 2 is between 12 and 14

times the level of per capita income shown in Table 1. The correlation between total wealth and GDP per hour worked (see Table 1, column (2)) is 0.76, which is a bit lower than that between wealth and per capita GNP, but still reasonably close (and statistically significant). Thus, according to these estimates, the national wealth of each of the Nordic countries is above the West-European average, but below that for North America.

Turning to the composition of total national wealth, we see in Table 2 that human capital is by far the most important component of wealth everywhere, accounting for between 56 per cent (Finland) and 72 per cent (Denmark) of total wealth. Physical capital accounts for a fourth to a third of total wealth. The share of natural capital is accordingly small everywhere, ranging from 4 per cent in Denmark to 10 per cent in Norway. Natural resources account for a considerably larger share of national wealth in the Nordic countries than in Western Europe and North America on average (with the sole exception that the Danish figure in column (4) of Table 2 is below the North-American one).

Therefore, the Nordic countries can be characterized as abundant in natural resources. Moreover, this abundance is fairly concentrated. Norway's oil and natural gas account for two thirds of its natural capital compared with just 11 per cent in Denmark (whose agricultural land accounts for two thirds of its relatively small natural wealth). In Finland and Sweden, forests constitute about two thirds of natural capital. Hence, the natural capital of Norway, Finland, and Sweden is quite heavily concentrated in a single industry– oil and gas in Norway and forests in Finland and Sweden. Notice also that social capital could not be included in Table 2 because no numerical estimates of it exist. By social capital is meant a society's infrastructure and institutions in a broad sense: its culture, law, system of justice, rules and customs, and so on (see Woolcock 1998).

Unlike natural capital that cannot be accumulated, but only managed and maintained, physical and human capital accumulation requires investment in machinery, equipment, and education. Let us now take a look at each of these in turn and relate them to economic growth performance and prospects.

Table 3 reviews some indicators of investment, education, external trade, and economic growth in the five Nordic countries. High-quality investment clearly is good for growth at least in the medium term, and perhaps even in the long run. The distinction between the medium run and the long run refers to the difference between exogenous and endogenous economic growth. The neoclassical growth model implies that investment and various other factors will affect the rate of growth of per capita output only as long as it takes the economy to adjust from one steady-state growth path to another, a period which in practice, however, may be a matter of decades, even if the growth rate depends solely on technological progress, and thus is exogenous, in the long run. Various endogenous growth models go further and make it possible for investment and other factors to influence growth even in the long run. The same argument applies to education and external trade and, in fact, to any significant contribution to increased efficiency. Both education and trade lift the level of output that can be produced from given inputs through increased efficiency. They are thus equivalent to an improvement in technology: they raise the level of income per capita, at least until all opportunities have been exploited in full, and perhaps also its rate of growth in the long run (see, e.g., Rivera-Batiz and Romer 1991). In models of exogenous growth, the effects of education, trade, and other sources of increased efficiency on growth are temporary: they peter out over time (see, e.g., Mankiw *et al*. 1992). In models of endogenous growth, however, they provide a permanent boost to growth (see, e.g., Romer 1986). In what follows, the reader is free to view the dependence of economic growth on investment, education, and external trade among other things either as a long-term property of endogenous growth or, if you prefer, as a medium-term property of exogenous growth. The argument holds either way.

Table 3 here

Investment. First, Table 3 shows the ratio of gross domestic investment to

GDP on average in 1960-1996 as well as in the final year, 1996. A comparison of columns (1) and (2) indicates that investment in 1996 was well below its historical average and also below the world average in all five countries.[3] The correlation between average investment in column (1) and physical capital per person (found by multiplying columns (1) and (3) of Table 2) is almost perfect (the correlation coefficient is just a touch below 1). The declining trend of investment need not be a matter of grave concern, however, because Nordic investment generally seems to have been of fairly high quality, despite the bad banking that helped trigger the acute financial crises of the 1990s. Rapid growth despite relatively little investment would be a clear sign of efficiency, but sluggish growth with slow investment is not. More saving and more and better investment would clearly be good for growth.

Education. Next, Table 3 shows that the Nordic countries' commitment to tertiary education as well as to education in general is, with one exception, well above the world average (columns (3) and (4)). There are signs, however, at least in Iceland and Sweden, that excessive wage compression in centralized labor markets and blunted incentives due to various tax wedges and welfare policies have reduced the demand for higher education (column (5)). Specifically, some young people seem to have lost interest in acquiring a higher education because they are not convinced that education pays (see, e.g., Gylfason *et al.* 1997, Ch. 5). To make matters worse, public authorities, like many teachers, students, and parents, have been on guard against if not directly opposed to various proposals for diversifying and strengthening the education system by, for example, supporting private schools and universities to compete with public ones and by allowing efficient, market-friendly methods of resource allocation (e.g., tuition fees and flexible pay) within the education system in order to promote quality. Health care in the Nordic countries suffers similarly from insufficient competition, diversity, and efficiency. The problem seems to be that public authorities have been

[3] A similar trend appears in the industrial countries as a whole, but the pattern is more pronounced in the Nordic countries.

unwilling to share their historical responsibility for the provision of education and health care with the private sector, and have preferred to rely in part on what is essentially central planning instead. Insufficient efficiency in two of the most important areas of the public sector tends to impede economic growth, other things being equal, by the basic principle that everything that hampers efficiency is also inimical to economic growth.

Trade. At last, Table 3 shows the ratio of exports of goods and services to GDP on average in 1960-1996 as well as in the final year, 1996. A comparison of columns (6) and (7) in the table shows that exports in 1996 were above their historical average in all five countries, less so, however, proportionately speaking, in Denmark, Iceland, and Norway than in the world as a whole, but more so in Finland and Sweden. Yet, as recently as 1992, following the collapse of Finland's important export market in the former Soviet Union, the Finnish export ratio was only 22 per cent, far below its long-term average. A year later, in 1993, the Swedish export ratio dropped down to 28 per cent, its historical average, after the Swedish economy took a deep dive in 1991-1993. Table 3 also shows that, in 1996, the export ratio was at or above the world average in four of the five countries, but that comparison is flawed because it does not take the small size of the Nordic economies individually into account. This makes a difference because small countries are more dependent than larger ones on external trade to extend their home markets beyond their national borders.

Therefore, our comparison of export shares should pit the Nordic countries, all of which have a population of less than nine million, with less than five million per country on average, against other small countries– say, all countries with a population of ten million or less. There are 65 such countries that report their export ratios to the World Bank, and their average export ratio in 1996 was 42 per cent. Column (7) of Table 3 shows that none of the Nordic countries matches that, even if Norway and Sweden come close. Small countries that neglect to make up for the small size of their home markets through judicious specialization and vigorous trade in world markets

may expect to have to pay for this neglect through slower economic growth than would otherwise be available to them in the long run.

In Norway and Iceland, in particular, foreign trade has been stagnant, or worse, for decades, as we saw already in Figure 1. This means that the rapid expansion of oil exports from Norway since the mid-1970s has crowded out non-oil exports krone for krone. Iceland is an even clearer case: there, the export ratio has hovered around a third at least since 1945, an extremely low ratio in a country with only 275,000 inhabitants.[4] No other industrial countries have experienced declining or stagnant export ratios in the post-war period. True, the external trade of Australia and New Zealand was stagnant in the years following the Second World War, but this is no longer the case. Even so, their export ratios remain quite low: in 1996 they were 20 per cent (Australia, with a population of 18 million) and 29 per cent (New Zealand, less than 4 million). For comparison, the unweighted world average export ratio rose from 25 per cent in 1960 (not shown in Table 3) to 36 per cent in 1996, reflecting partly, it is true, the increase in the number of small countries since 1960, but partly also increased openness to international trade.

Figure 3 shows the ratio of the export of goods and services to GDP in the Nordic countries year by year from 1960 to 1997. The figure shows that the Norwegian and Danish export ratios have remained virtually unchanged over this 38-year period, while the Icelandic export ratio has actually declined, as said before. Only in Finland and Sweden has the export share increased significantly, in Finland from 22 per cent in 1960 to 38 per cent in 1997 and in Sweden from 23 per cent to 40 per cent in the same period. Why have the Nordic countries' exports in general been so sluggish?– at least when compared with some other small open economies like Ireland (recall Figure 1). And why have their exports developed so differently?

One can think of at least two possible reasons for the relatively weak export performance of the Nordic countries. The first has to do with inflation.

The Nordic countries have a history of somewhat higher inflation than, say, the member countries of the European Union. Given the fixed exchange rate regime in operation in the Nordic countries for most of the period under consideration, this means that the real exchange rates of the Nordic currencies have been somewhat higher than they otherwise would have been, and this overvaluation, one would presume, has hurt exports. Inflation can have real effects at least as long as nominal exchange rates do not adjust fully and instantaneously to changes in domestic or foreign prices.

The following numerical example illustrates the point. Suppose the real exchange rate index R is initially 100 and the inflation rate is 5 per cent per year at home and zero in the rest of the world, so that R gradually decreases to 100 / 1.05 = 95.2 at the end of the year. Suppose, moreover, that the nominal exchange rate adjusts fully to prices with a one-year lag, restoring R to 100 at the beginning of next year. This means that the average value of R over the year is (100 + 95.2) / 2 = 97.62. Now suppose inflation increases to 10 per cent, so that R gradually drops to 100 / 1.1 = 90.9 at year's end. The average value of R over the year is now (100 + 90.9) / 2 = 95.45.

Therefore, the real exchange rate is inversely related to the rate of inflation as long as the adjustment of the nominal exchange rate to prices is not full and instantaneous.[5] By driving real exchange rates too high above their long-run equilibrium levels, periodically or permanently, and possibly also through other channels, inflation thus seems to discourage the export of goods and services across countries (Gylfason 1999a). This helps explain the perceived need for repeated devaluation in Finland, Norway, and Sweden in the 1970s and 1980s, for instance. This phenomenon was also much in evidence in Iceland from 1960 at least until the mid-1990s. This is indeed one of the main symptoms of the Dutch disease, as it has been described in the literature (see

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[4] For comparison, the average export share of thirty countries with fewer than two million people, all such countries reporting export ratios to the World Bank, was 50 per cent in 1995.

[5] A similar argument applies to the relationship between inflation and the real wage as long as nominal wages are less than fully indexed to prices. See Williamson (1985).

Corden (1984) and Wijnbergen (1984).

A second possible explanation for sluggish export performance and for the different trends observed in different countries is also closely related to the Dutch disease, and has to do with primary exports. Figure 4 shows the evolution of primary (i.e., non-manufacturing) exports relative to merchandise exports in the five Nordic countries since 1963. The figure shows that Finland and Sweden, whose total exports have increased most rapidly (Figure 3 and Table 3), are the two countries in the Nordic group whose dependence on primary exports has been the least since the early 1960s, having gradually declined below 20 per cent of total merchandise exports as manufacturing exports expanded. Denmark, despite having become self-sufficient in natural gas since the 1970s, has seen its primary-export share decrease by nearly a third, from 60 per cent in 1963 to less than 40 per cent in 1997.

Norway, by contrast, due to its spectacular oil discoveries since the mid-1970s, has seen its primary export share increase from about 50 per cent in 1963 to almost 80 per cent in 1997. Iceland is an even more clear-cut case: its primary export share has fallen, yes, but from almost 100 per cent in 1963 to only a little less than 90 per cent in 1997. Even so, exports of fish account for a bit more than a half of total exports of goods and services and about one sixth of Iceland's GDP. The almost 90 per cent share of primary exports in merchandise exports from Iceland includes aluminium and ferro-silicon exports, which account for about 10 per cent of the total. If Figure 4 showed primary exports relative to total exports of goods and services rather than just merchandise exports, all the curves would lie lower in the graph, but the general pattern displayed would be similar.

Why all this fuzz about exports? Of the three pillars of economic growth stressed above, i.e., investment, education, and trade, the last is perhaps the least obvious. Exports and related variables have not figured prominently– in fact, hardly at all– among the many significant determinants of economic growth suggested by recent econometric research (Barro and Sala-i-Martin

1995, Ch. 12). But this is hardly surprising because, at least within an endogenous-growth framework, trade and growth are jointly determined. This means that some of the variables that have been found to affect economic growth across countries and over time may actually do so in part through exports. Take inflation, for example. One of the reasons why inflation seems to impede economic growth is that inflation hurts exports and thereby also imports, not only of goods, services, and capital, but also of ideas, information, innovation, and know-how (Gylfason and Herbertsson 1996). Similarly, one of the reasons why education is good for growth may well be that a well-educated work force is generally better placed to find foreign markets for domestic output, hence amplifying through the static and dynamic gains from trade the direct effects of education on growth.

Foreign trade, like virtually all other sources of increased efficiency, is a likely source of economic growth, directly and indirectly. Even if trade does not often show up as a significant determinant of growth in empirical cross-country or panel studies, a few recent studies have reported that some indicators of openness to trade have proved significantly correlated with growth (see, e.g., Sachs and Warner 1995a and Edwards 1998). Indeed, despite scant concrete econometric evidence, the crux of the case for the ongoing deepening and widening of European integration rests on the reasonable belief that trade is good– perhaps even a prerequisite– for peace, prosperity, and the progress of wealth, that is, economic growth. But this does not mean that *all* trade is equally good for growth. For example, high-tech trade seems more likely to encourage economic growth through technological spill-overs than low-tech, labor-intensive trade. If Singapore, for whatever reason, had chosen to specialize in agriculture and fisheries rather than in manufacturing and especially services, its trade and growth performance over the years would almost surely have been less spectacular.

Economic growth. Taken together, and given that investment, education, and exports are important pillars of economic growth around the world, the figures reviewed in Table 3 do not seem to suggest a particularly growth-

friendly environment in the Nordic region. Only Norway and Denmark grew more rapidly than the world economy at large in 1980-1996 (column (8)). Economic growth in Iceland and Sweden was especially weak in this period, partly because of severe economic downturns in the early 1990s, it is true, but partly also for other reasons some of which will be discussed in subsequent sections.

The rest of the paper discusses some of the channels through which and the potential extent to which economic growth in the Nordic countries may have been affected by their abundant natural resources. There are several possibilities to ponder in this context. In earlier work, the share of natural resources in national wealth and the share of primary production in the labor force have been shown to be inversely related to investment, education, and exports among other things, and thereby also to economic growth across countries (Gylfason 1999b, 1999c).[6] Here the aim is to explore the linkages between primary exports and total exports, investment, education, and growth with a view to the Nordic countries, Norway and Finland in particular. The discussion will be organized by theme rather than by country.

[6] See also Sachs (1999), Sachs and Warner (1995b, 1999), and Gylfason, Herbertsson, and Zoega (1999).

III. Selected symptoms: Diagnosing the Dutch disease

What, then, are the main symptoms of the Dutch disease?

Most authors have emphasized the two closely related symptoms that were mentioned in the preceding section, among several others:[7] (a) an overvalued currency that impedes non-primary (i.e., manufacturing and service) exports and perhaps total exports as well, thereby weakening the current account of the balance of payments, other things being equal, and (b) heavy dependence on natural resources and, accordingly, on primary production and exports, which, in times of resource booms, is viewed as the root cause of the real overvaluation of the currency.

There is some evidence, however, that natural resource abundance and the preponderance of primary production that goes along with it tends to be associated not only with sluggish non-primary exports and perhaps also total exports as well– and, therefore, also ultimately imports– across countries, but also with slow investment and deficient education, among other things, and thereby also with slow economic growth. Let us now review each of these in turn with one eye on the Nordic countries.

A. Trade

As was alluded to in the preceding section, export shares may not be a good indicator of openness to trade, because small economies are more dependent on foreign trade than large ones. Therefore, a small country exporting and importing the equivalent of, say, a third of its output can be said to be less open to trade than a large country with the same export and import ratio. Before proceeding to use export propensities as a measure of openness to trade in goods and services in the Nordic countries, we must check whether this general observation applies to them.

Exports. Figure 5 shows a scatterplot of the ratio of exports to GDP on the vertical axis and the logarithm of the population (in thousands) on the

[7] See, for example, Corden and Neary (1982), Wijnbergen (1984), Neary and Wijnbergen (1986), Gelb (1988), Matsuyama (1992), and Auty (1995).

horizontal axis, both measured as averages over the years 1960-1997. Each dot in the diagram represents a single country. We see a clear and highly significant negative relationship between the export propensity and population. The slope of the regression line means that each doubling of the population from one place to another reduces the export ratio by 4 points (because ln(2) times 6.0 equals 4). The regression is based on the largest possible sample, 174 countries. The four "large" Nordic countries lie remarkably close to the regression line. This may be taken to mean that their export shares are reasonable indicators of their openness. Furthermore, this means that, contrary to common belief, the Nordic countries are, in fact, not particularly open to trade: they are just about average by Figure 5, in the sense that they export about as much of their output as their size commands. Iceland is an outlier, however, for its actual average export ratio from 1960 to 1997 is 17 percentage points below the value predicted by the regression: countries with the same size of population exported 53 per cent of their GDP on average compared with Iceland's 36 per cent.

In what follows (Figures 6-17), the average share of primary exports in merchandise exports (i.e., in exports of goods) from 1963 to 1997 will be used as a proxy for natural resource abundance. Other measures, such as the share of natural capital in national wealth (recall Table 2) or the proportion of manpower employed in primary production, could be used to convey the same story.[8] 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.[9]

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[8] See Gylfason (1999b) for a series of scatterplots with various measures of trade, investment, education, and other potential determinants of growth on one axis and the share of natural capital in national wealth in 1994 as a proxy for natural resource abundance on the other. An earlier version of the same paper, published in Icelandic (Gylfason 1999c), used the average proportion of manpower employed in primary production in 1965-1992 as a proxy for natural resource abundance. In every case, the results obtained with the two different measures of natural resource abundance and their interpretation are virtually the same.

[9] 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,

There are two main ways in which the Dutch disease can manifest itself through exports: (a) by making the composition of exports less favorable to economic growth and (b) by reducing total exports and growth. Even if total exports are unaffected by a natural resource boom, and even if they increase in its wake, the real appreciation of the currency that ensues may hurt just the kind of high-tech capital-intensive or high-skill labor-intensive manufacturing and service exports that are particularly conducive to rapid growth. The more intriguing case, however, is the one where a boom in primary exports reduces non-primary exports krone for krone, as in Norway (recall Figures 3-4), or worse.

Figure 6 shows the cross-sectional relationship between exports of goods and services relative to GDP and the ratio of primary exports to merchandise exports in 158 countries[10] on average over the period 1960-1997. *A priori*, one might expect the correlation to be positive on the grounds that resource-rich countries experience primary export booms at regular intervals through new discoveries and so on, and thus have higher export ratios than resource-deficient countries as long as non-primary exports are less than fully crowded out, *ceteris paribus*. The absence of a correlation might be viewed as a sign of full crowding out. Figure 6, however, displays a negative correlation between primary exports and total exports across countries, but the relationship is

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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 cross section, also over time). Wood and Berge (1997) prefer to use per capita arable land, but argue that an inverse relationship between natural wealth and economic growth in the long run is largely independent of which definition of natural wealth is used.

[10] This is the number of countries for which the necessary statistics are available from the World Bank (1999). No outliers are excluded. In the figures to follow (Figures 7-17), the number of countries included is likewise the maximum number of countries for which the necessary information is available from the World Bank, unless otherwise indicated (see footnotes 17 and 20). In a majority of cases, the country averages span a shorter period, beginning after 1960 or not including 1997 or other years.

marginally insignificant (t = 1.6); the correlation is only -0.12.[11] For what it is worth, the slope of the regression line means that a ten-point increase in the primary export share from one country to another is accompanied by a decrease in the export ratio by one percentage point. The elasticity of the export ratio with respect to the primary export share, evaluated at the sample means of the two variables, is -0.21. But even if all the Nordic countries are quite close to the regression line, Figure 6 does not provide any general indication that their export propensities are directly affected by their primary exports. This, however, does not exclude the possibility that primary exports may influence other variables which, in their turn, are discernibly related to export performance. And notice, moreover, that the country whose exports are most heavily dependent on its natural resources (Iceland) is clearly the least open to trade (recall Figure 5).

Weak though it is, the relationship shown in Figure 6 may stem from the tendency of natural-resource-related booms to lift currency rates and real wages, thus reducing exports, other things being equal, but exports depend on other factors as well. At any rate, there is no evidence of a positive relationship between primary exports and total exports. A simple correlation does not entail causation, however. It is conceivable that increased openness reduces the need for primary exports rather than or as well as the other way round. It is also possible that primary exports and total exports respond to third factors in ways that generate the pattern observed in Figure 6.

Moreover, the figure does not capture the changes that have taken place in each country during the period. Take Singapore, an outlier at the top of the graph with an average export ratio of more than 160 per cent and an average share of primary exports in merchandise exports of about 50 per cent. Singapore's export ratio has risen steadily over the period under review, while the share of primary exports in merchandise exports has declined. Therefore, it seems possible that a panel combining the cross-sectional and

[11] The correlation is, by definition, equal to the square root of R^2. The significance of the correlation is established by a t-test of the significance of the slope of the

time-series properties of the data might perhaps yield a stronger relationship, perhaps not. When the sample was split in two with each country represented by two pairs of averages, one for 1960-1978 and another for 1979-1997, the regression through the resulting data panel turned out to be virtually identical to the one shown in Figure 6.

It needs to be emphasized that no conclusions are being drawn here as to cause and effect but simply of a visible, albeit weak, relationship between two variables. Figure 6 is thus only intended to display the raw data in two-dimensional space in such a way that the description accord reasonably well with the results of a multivariate regression analysis, where an attempt was made to distinguish cause from effect (Gylfason 1999a). It is also advisable to keep another qualification in mind: Figure 6 covers a large and diverse group of countries at different stages of development as is customary in empirical growth research. This custom stems from the fact that the data for the high-income countries, if they were removed from the sample and scrutinized separately, generally do not give rise to significant conclusions about the determinants of economic growth across countries, presumably because the high-income countries are in many ways so similar to one another and because there are simply not enough of them. There is a need to find ways to study economic growth across rich and poor countries separately, even if the sources of economic growth seem to have much in common across countries regardless of their stage of development. The same disclaimers apply to Figures 7-17 below.

One more thing before we continue. How good a measure is the primary export share (i.e., the ratio of primary exports to merchandise exports) of natural resource abundance? How closely, in particular, is the primary export share correlated with the World Bank's estimates of the share of natural capital in national wealth?– shown for the Nordic countries in Table 2. Figure 7 shows a cross-sectional scatterplot of the two measures for the 89 countries for which the World Bank has data on both. The correlation between the two

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regression line through the scatterplot.

is 0.53, which is fairly close and statistically significant (t = 5.9). Because there are almost twice as many observations available on primary export shares as on natural capital (158 observations in Figure 6 against 89 in Figure 7), the primary export share will be used as a measure of natural resource abundance in what follows.

The current account. In so far as natural resource dependence tends to reduce exports through overvalued currencies in real terms, one might expect natural wealth to weaken the current account of the balance of payments, other things being equal. And even when the relationship between natural wealth and exports is weak or non-existent, one might still expect to observe an inverse relationship between primary exports and the current account across countries, for even if exports may resist an overvalued currency, imports may respond.

Figure 8 shows a scatterplot of the current account as a proportion of GDP on average 1975-1997 and the share of primary exports in merchandise exports 1963-1997 as before. The relationship is significantly negative (t = 3.5); the correlation is -0.27. The slope of the regression means that a 15-point increase in the primary export share from one place to another is associated with a decrease in the current account surplus or an increase in the deficit by one per cent of GDP, a rather strong association.[12] Notice that all the countries with current account deficits of more than 20 per cent of GDP on average in 1975-1997 are primary exporters (Bhutan, Equatorial Guinea, Guinea-Bissau, Guyana, and Nicaragua). Sweden, Finland, and Denmark are quite close to the regression line, but Norway and Iceland have registered somewhat smaller deficits over the period in question than predicted by their primary export dependence alone.

Import protection. While currency overvaluation– through inflation, for example– usually increases imports by making them cheaper, heavy natural

[12] Chenery and Syrquin (1975, p. 44) report a positive relationship between primary exports and the current account. Their result seems to indicate that, in their sample, increased primary exports are associated either with more total exports or less imports (e.g., as a result of tariff protection) or both.

resource dependence tends to generate rent-seeking behavior on the part of producers. The consequences of rent seeking can take many forms. When the government favors producers at consumers' expense, it may, for example, be tempted to offer import protection to domestic producers, among other privileges.

Figure 9 illustrates this phenomenon. It shows how import duties in 1975-1996 are linked to primary exports across 133 countries. Average duties on imports increase by one percentage point on average for each six-point increase in the share of primary exports in merchandise exports.[13] The relationship is significant in a statistical sense (t = 6.3). The correlation is 0.48. Notice that five of the six countries with import duties of more than 30 per cent in 1975-1996 have primary export shares of 90 per cent or more (Côte d'Ivoire, Myanmar, Samoa, and Somalia, and Sudan). All but two of the countries with import duties of more than 20 per cent in 1975-1996 have primary export shares of about 60 per cent or more.

Import restrictions do not merely reduce imports, however, as they are intended to do, for they also reduce exports because increased production for the domestic market under the protection of the restrictions diverts resources from export production. Both import restrictions and sluggish exports stand in the way of the opening up of the economy to foreign competition.

Not surprisingly, the four "large" Nordic countries are quite close to the horizontal axis in Figure 9, as they had already dismantled most of their import restrictions by 1975. Iceland took longer, which explains why the average tariff in Iceland in 1975-1996 was 12½ per cent; as recently as 1992, it was 11 per cent. However, the average tariff in Iceland fell rapidly thereafter, and was only 1½ per cent in 1996. All five countries now maintain an essentially liberal trade regime with one important exception: agriculture. In 1996, the cost of agricultural protection per full-time farmer equivalent was US$ 40,400 in Norway, US$ 28,500 in Iceland, and US$ 17,500 in Denmark, Finland, and Sweden as in the rest of the European Union, compared with

[13] A similar result is reported in Gylfason (1999b). See also Paldam (1997).

US$ 14,500 in the OECD countries on average (OECD 1997b). Before they entered the European Union in 1996, Finnish and Swedish consumers and taxpayers incurred much higher costs on account of their countries' farm protection policies, on a scale comparable with other EFTA countries, including Norway and Iceland. In the 1990s, food prices have fallen sharply relative to the prices of other goods and services in Finland and Sweden, mostly due to their EU membership.

B. Investment

If heavy dependence on primary exports tends to hamper trade in goods and services, then how about capital movements? Rent seekers who try– and manage!– to keep commodity imports down and out may try to do the same to prospective foreign investors, thereby possibly impeding economic growth.

Foreign investment. Figure 10 displays the relationship between the ratio of gross foreign direct investment to GDP in 1975-1997 and the primary export share in 1963-1997 in 135 countries. The correlation is -0.22. The inverse association is statistically significant (t = 2.6), but it is hardly economically significant, for the slope of the regression means that a 72-point increase in the primary export share from one place to another goes along with a reduction of the ratio of gross foreign direct investment to GDP by one percentage point.[14] All the Nordic countries except Iceland export more capital than predicted by their primary export share according to the regression shown in Figure 10.

Domestic investment. How about gross domestic investment? Primary industries, not least agriculture and fisheries in developing countries, tend to be relatively low-tech and low-skill labor-intensive,[15] so that their own

[14] For comparison, Gylfason (1999c) reports that a 23-point increase in the share of the primary sector in the labor force from one country to another is associated with a reduction in the ratio of gross foreign direct investment to GDP by one percentage point in a sample of 115 countries.

[15] But not always: the mechanization of mine excavation and of oil and gas extraction and the modernization, including computerization, of fishing vessels in recent years are two examples of increasingly high-tech primary production. High-tech, high-

investment needs as well as their encouragement of investment in other industries may be correspondingly limited. Figure 11 shows the relationship between the ratio of gross domestic investment to GDP in 1960-1997 and the primary export share in 1963-1997 in 156 countries. Again, the correlation is significantly negative (t = 2.3), even if the correlation is only -0.19. The slope of the regression line means that a 22-point increase in the primary export share from one country to another goes along with a decrease in the domestic investment ratio by one percentage point. In its turn, a decrease in domestic investment by one percent of GDP typically shaves 0.1-0.2 percentage points of the rate of growth of output per head, *ceteris paribus*. The elasticity of the investment ratio with respect to the primary export share, evaluated at the sample means of the two variables, is -0.15.

Over the years, Finland and Denmark have invested just about the amount predicted by the regression shown in Figure 11, Sweden has invested less, Norway and Iceland, more. However, average investment rates mask a declining trend in all five countries since the 1960s; recall Table 3, columns (1) and (2). In 1996, the investment rates of all five Nordic countries were well below the regression line in Figure 11; Norway was slightly below the line.

C. Education

A third possible source of an inverse relationship between natural resource abundance and economic growth has to do with education. The main idea is this: a strong emphasis on primary exports, not least agriculture in developing countries, by not calling for much highly trained manpower, tends to generate not only less investment in physical capital than otherwise, from domestic and foreign sources (Figures 10-11), but also less investment in human capital (see Gylfason, Herbertsson, and Zoega 1999).

What is the evidence?

Primary education. Figure 12 shows an inverse cross-sectional relationship between primary exports in 1963-1997 and enrolment in primary

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skill-intensive agriculture in many industrial countries is another case in point.

schools in 1980-1996 for 135 countries. The relationship is highly significant (t = 5.0); the corresponding correlation is -0.39. The slope of the regression line means that a three-point increase in the primary export share from one place to another goes along with a decrease in the primary-school enrolment rate by one percentage point. Notice that all but two of the approximately 20 countries with a primary-school enrolment rate of 50 per cent or less have a primary export share of over 80 per cent.[16] This does not matter much for the Nordic countries, however, because their primary-school enrolment rates are all clustered at or just a touch below 100 per cent. Figure 12 is included here merely for the record.

Secondary education. Figure 13 shows the relationship between primary exports in 1963-1997 and enrolment in secondary schools in 1980-1996 across 104 countries. Also this linkage is highly significant, both statistically (t = 8.4, correlation = -0.64) and economically. The regression suggests that a 1½ -point increase in the primary export share from one country to another is associated with a one-point drop in the secondary-school enrolment rate. All but two of the almost 40 countries with a secondary-school enrolment rate of 30 per cent or less have a primary export share of about 60 per cent or more. Here there is actually a discernible pattern even in the Nordic part of the picture: among the five countries, average secondary-school enrolment, which ranges from 86 per cent in Iceland to 94 per cent in Finland, is approximately inversely related to the primary export share.

Tertiary education. Figure 14 presents a scatterplot of primary exports and tertiary-school enrolment for 147 countries. Once again, the pattern is highly significant (t = 7.2); the correlation is -0.52. The regression indicates that a three-point increase in the primary export share from one country to another goes along with a one-point drop in the tertiary-school enrolment rate. When the 52 high- and upper-middle-income countries and the 95 low- and lower-middle-income countries in the sample are viewed separately (not

[16] The nine countries in the southeast corner of Figure 12 are Afghanistan, Burkina Faso, Burundi, Djibouti, Ethiopia, Guinea, Mali, Niger, and Somalia.

shown), a strong inverse correlation between primary exports and tertiary education is observed in both subgroups. However, when the 24 high-income countries and the 123 low- and middle-income countries in the sample are plotted separately (not shown), it turns out that the pattern observed in Figure 14 is confined to the latter group. Even so, we can see here again a pattern in the Nordic part of the picture: among the five countries, average tertiary-school enrolment, which ranges from 29 per cent in Iceland to 55 per cent in Finland, is approximately inversely related to the primary export share. The slope of a regression through the five Nordic observations in Figure 14 is -0.22 compared with -0.29 for the sample as a whole.

The upshot of the above argument is this. If natural resource abundance deters education, whether by reducing the demand by employers for highly trained manpower or by reducing the supply of well-educated workers because education is perceived not to pay, then this linkage may produce an inverse relationship also between primary exports and economic growth– through education. It is quite possible, however, that the causation may run the other way: that is, that the interest in the exploitation of natural resources through primary production is decreasing in the level of education. Most probably, though, as always, primary production inhibits education and conversely. Ultimately, this means that education at all levels is good for growth, and vice versa.

Of the three school-enrolment ratios, the secondary-school enrolment rate is most sensitive to variations in the primary-export share. This is noteworthy because econometric studies of economic growth across countries have shown that growth is generally more sensitive to variations in the secondary-school enrolment rate than it is to variations in either primary or tertiary education (Barro and Sala-i-Martin 1995, Ch. 12). To increase economic growth, it seems most effective to send more youngsters to secondary school, especially girls. A typical result is that an increase in the secondary school-enrolment ratio by 30 percentage points (e.g., from 50 to 80 per cent of each cohort) will increase the rate of per capita growth from one country or time to another by one

percentage point, other things being equal.

D. Economic growth

Let us now wrap up the argument by viewing the cross-sectional relationship between primary exports and economic growth since the 1960s. It has been argued thus far that a high share of primary exports in merchandise exports, which is our measure of natural resource abundance, may hamper trade, investment, and education and thereby also economic growth in the long run. If this hypothesis is correct, we would expect to be able to observe an inverse relationship between primary exports and economic growth across countries, provided that the partial negative correlation between resources and growth is not obscured by other factors.

Figure 15 shows the cross-sectional relationship between the average annual rate of growth of per capita GNP from 1960 to 1997 and primary exports in 1963-1997 in 147 countries.[17] The slope of the regression line is significantly negative (t = 7.2); the correlation is -0.30. The slope of the regression indicates that a 40-point increase in the primary export share from one country to another is associated with a reduction in per capita growth by one percentage point. This is not a small effect (if it is an effect, that is, as opposed to a mere correlation), because per capita growth rates move in a narrow range compared with primary export shares.

What happens, you may wonder, if the poor countries, many of which depend heavily on primary exports and grow slowly, are removed from the sample? Figure 16 displays the pattern of primary exports and economic growth in the 57 high- and upper-middle-income countries that remain in the sample when the low- and lower-middle-income countries, 90 in number, have been removed. The pattern remains roughly the same as in Figure 15. Clearly, the inverse relationship between primary exports and economic

[17] Three countries were removed from the sample because of problems with their recorded (incredibly high!) growth rates: Equatorial Guinea, Dominica, and St. Vincent and the Grenadines.

growth is not confined to poor countries.[18] Moreover, if the 26 high-income countries and the 121 low- and middle-income countries in the sample are plotted separately (not shown), a roughly similar pattern is observed in both groups, even if it is statistically significant only in the far more numerous developing countries, but even so the correlation is the same in both cases, or -0.20. There are not enough high-income countries for us to be able to ascertain the statistical significance of the cross-sectional pattern within that group per se.

The pattern shown in Figures 15-16 comes fairly close the quantitative results obtained from several recent multivariate regression analyses of economic growth patterns across countries. A representative result from cross-sectional and panel studies is that an increase in the primary export share by 25-30 percentage points (e.g., from 50 per cent of merchandise exports to 75 or 80 per cent) reduces the rate of per capita growth from one country or period to another by one percentage point, other things being equal. Similar results obtain when natural resource abundance is measured by the share of primary production in the labor force. [19]

Figure 17 tells essentially the same story, except here we have on the vertical axis the average annual rate of growth of per capita GNP in 150 countries over a shorter, more recent period, from 1980 to 1997.[20] The slope of the regression is virtually the same as in Figures 15-16, and it is significantly negative (with t = 3.5).

How about the Nordic countries? How do they fare in Figures 15-17? Denmark and Finland are quite close to the regression lines in all the figures. Sweden lies a bit below the lines. Even so, all things considered, it seems unlikely that the relatively low average shares of primary exports in

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[18] In Gylfason (1999b), the inverse relationship reported between the share of natural resources in national wealth and economic growth across 92 countries is statistically significant both in the 33 high- and upper-middle-income countries in the sample and in the 59 middle- and low-income countries.

[19] See Gylfason (1999a), Gylfason and Herbertsson (1996), and Gylfason, Herbertsson, and Zoega (1999).

[20] Again, Equatorial Guinea was excluded from the sample.

merchandise exports in those three countries, ranging from 22 per cent in Sweden to 45 per cent in Denmark compared with 70 per cent on average for the sample as a whole, have had much to do with their growth performance over the years. The share of natural capital in their national wealth ranges from 4 per cent to 7 per cent (see Table 2), compared with an average of 2 per cent in Western Europe, 5 per cent in North America, and 12½ per cent for the world as a whole. The natural-resource-based industries in the three countries are thus relative small compared with the world at large, even if they are large compared with those of other high-income countries.

How about Norway and Iceland? Here the plot thickens a bit. Figures 15-17 show that Norway and especially Iceland have grown more rapidly than predicted by their primary export shares alone, but this, of course, is not surprising. For one thing, economic growth obviously depends on a host of factors other than the primary export share. For another, the period covered by the figure, 1960-1997, starts a full decade and a half before Norway became a significant oil exporter, and it includes a long period when the Icelandic economy was booming following the extension, in 1976, of Iceland's fisheries jurisdiction to 200 nautical miles as well as due to relentless monetary expansion, high inflation, and associated overheating of the economy as well as excessive foreign borrowing, all of which were conducive to growth for a while. We shall have more to say about Iceland and Norway as well as Finland in the next section.

IV. Individual countries: A few scattered comments

This section offers a few brief remarks on Iceland, Norway, and Finland. To present the conclusion up front, it is that (a) Iceland carries a clear case of the Dutch disease, (b) Norway shows certain symptoms, and (c) Finland, like Sweden and Denmark, seems mostly clean, yet not without reservation.

A. Iceland

In many ways, the story of Iceland in the 20th century has been one of a smashing success in the economic arena: literally, of a rise from rags to riches. When we attained home rule from Denmark in 1904, we were among the poorest nations of Europe: our GNP per person was in the neighborhood of US$ 2K in today's money, which is comparable to the current level of per capita incomes in the richest of the low-income countries, like Honduras and Zimbabwe. Since 1904, per capita GNP in Iceland has grown by about 2.6 per cent a year on average compared with 1.9 per cent in Denmark.

Iceland's economic success in this century was almost certainly abetted by the high standard of general education inherited from earlier times. Despite abject poverty through the middle ages, most Icelanders remained literate. They thrived on their old sagas, and so, in some ways, were well prepared to adopt quickly the new technology that became available to them in this century, especially after the Second World War. The mechanization of the fishing industry together with the gradual extension of the fishing limits from 3 miles in 1901 to 200 miles in 1976 was an important source of economic growth. This mechanization was made possible by a well-trained work force, and so was the harnessing of the hydroelectric and geothermal energy potential that began in earnest in the 1960s. This development coincided with the build-up of manufacturing, trade, communications, and services that now employ five sixths of the labor force. It bears repeating that the fishing industry now accounts for about one sixth or so of GDP and a little more than a half of total export earnings (i.e., from goods and services). Today, Iceland is a diversified, affluent industrial country where services are by far the most

important occupation.

Even so, the mechanization of the fishing industry seems to have been a mixed blessing. It opened the door to overfishing that, among other things, has resulted in the decline by about a third to a half in the most valuable fish stocks in Icelandic waters over the past 30-40 years. The overfishing was accompanied by excessive investment in the fishing industry. The investment boom, in turn, was fuelled by high inflation and excessive borrowing abroad, especially in the 1970s and 1980s. Figure 18 shows that our fishing fleet has increased almost eighteen-fold since 1945, while our fish catches have increased less than fourfold. Thus, fish catches per unit of capital have contracted by almost 80 per cent since 1945.

And so the rapid growth of the Icelandic economy in this century has not been without thorns. We have already seen, in Figure 1, that Iceland's export ratio has been stagnant for decades. We have also seen, in Figure 8, that its average annual current account deficit since 1975 has been equivalent to 2 per cent of GDP. As a result, the ratio of gross foreign debt to GDP has almost doubled during this period to 56 per cent at the end of 1998, which entails a debt-servicing burden of 21 per cent of export earnings from goods and services and an interest burden of 7 per cent. No industrial country has a higher debt ratio or a heavier debt-servicing burden than Iceland.[21]

B. Norway

As far as Norway is concerned, it seems likely that the rapid expansion of oil exports since the mid-1970s crowded out non-oil exports, leaving the ratio of total exports to GDP virtually unchanged since before the oil discoveries, as we saw in Figure 1.

The chief hindrances, real or imagined, that stand in the way of

[21] For comparison, in 1997 the debt ratios were 31 per cent in Argentina, 19 per cent in Brazil, and 28 per cent in Mexico, but their debt-servicing ratios, at 59 per cent, 57 per cent, and 32 per cent, respectively, were much higher than in Iceland, reflecting, among other things, those three large Latin countries' much lower ratios of exports to GDP.

Norwegian and Icelandic accession to the European Union (EU) and the Economic and Monetary Union (EMU) have to do with their primary export dependence, though not with oil. There is, for that reason, a need for Norway and Iceland to deal with their natural-resource-based obstacles to EU membership if they are to be able to weigh the benefits and costs of membership on an equal footing with other prospective and present EU and EMU members. This requires the implementation of a market-friendly, fair, and property-rights-oriented solution to the problem of how best to regulate access to, and allocate the rents from, the limited common-property natural resources of the two countries.

Take Norway first. 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 per cent to 250 per cent of GNP (Thøgersen 1994). According to Section 1-1 of the Petroleum Act of 1996, 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 in accordance with the Petroleum Taxation Act of 1975.

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 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 per cent of the total. Through its direct partnership with other licensees as well as through various taxes and fees, it is estimated that the Norwegian State has managed to absorb about 80 per cent

of the resource rent since 1980. The main revenue items are corporate tax (28 per cent[22]) and a special resource surtax (50 per cent[23]), but also royalty (8-16 per cent[24]), area fee, and carbon-dioxide tax. Thus, in 1997, revenues from petroleum activities accounted for more than a fifth of total government revenues and were equivalent to 9-10 per cent of Norway's mainland GNP, or 8-9 per cent of total GNP, including oil. The oil revenue is deposited in the Norwegian Petroleum Fund, which is being built up and invested mostly in foreign securities for the benefit of the current generation of Norwegians when they reach old age as well as for future generations. Oil exports account for about a third of total exports of goods and services from Norway. The oil industry contributes about one-sixth of Norway's GDP (in 1997).

At the same time, however, a variable proportion of each year's net oil-tax revenue is transferred from the Government 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 per cent in 1998, but is envisaged to drop to less than ten per cent in 1999 (according to the National Budget 1999).[25] 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. On the other hand, local governments (municipalities and counties), which employ over three quarters of all public-sector workers and almost one fourth of the entire labor force (see OECD 1998, Ch. 2), 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

[22] Levied on profits net of depreciation allowance.
[23] Levied on profits net of depreciation allowance minus an uplift.
[24] Levied on gross sales of oil from fields cleared for development before 1986.
[25] It remains to be seen whether, in the light of low oil prices and fiscal pressures, the transfer from the Government Petroleum Fund to the government budget can be kept below 10 per cent in 1999, as envisaged.

probably smaller than that of central government expansion, krone for krone, other things being the same. The reason is that local governments, especially in diffuse and 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.

The upshot of this brief description of Norway's method of managing its oil resources is (a) that the Norwegians are already preparing themselves with care for a (fairly distant) future without oil and (b) that "sharing the oil with foreigners" and related concerns do not arise in connection with Norway's oil wealth in the discussion of the pros and cons of potential Norwegian EU membership. Thanks to the market-oriented approach to oil-resource management as well as to the legal status of Norway's oil reserves as a taxable common-property resource, oil does not stand in the way of Norway's entry into the EU, if this is where the Norwegian people want to go at the end of the day. In keeping with the tax treatment of the oil wealth, the taxation of Norway's hydro-power sector is now evolving in the direction of explicit rent fees or resource taxes. The main, but perhaps not particularly constructive, complaint that can be levied against the Norwegians' management of their oil wealth is that their commendable current strategy could have been adopted earlier, preferably right from the start. How costly the delay may have been, remains an open question.

The Norwegians' management of their fish resources is rather different from their handling of their oil wealth. Norway's fishing industry is actually tiny, employing, like the oil sector, less than 1 per cent of the country's labor force. Agriculture, forestry, and fishing together account for about 2 per cent of GDP, and their share is declining. Of this small share, the fisheries account for less than a half. Government subsidies to the fishing industry increased successively from the 1950s onwards until they peaked at about 70 per cent of the incomes of fishermen and boat-owners in 1981 (Hannesson 1996, pp. 23-24). Since then, however, the subsidies have been reduced in stages down to almost nothing. Even so, the government carries the cost of managing the

fisheries and of enforcing fishery regulations; this cost is considered equivalent to about 10-15 per cent of the gross value of the catch (*ibid*., p. 30). Moreover, virtually all the resource rent from the fisheries, roughly estimated at 20-25 per cent of the gross value of the catch (*ibid*., p. 29), has been allowed to dissipate through excess capacity and overmanning. This matters here because the fishing industry's vociferous protests were seemingly the single most important factor contributing to the Norwegians' rejection of EU membership in the referendum of 1994 as well as in 1972.

Part of the problem is that the Norwegian fishing industry is perceived to be much larger than it actually is. Ask ordinary people on the streets of Oslo and Bergen how much they think the fishing industry contributes to Norway's national income, and they will almost surely name figures that are far too high. This is partly because the fishing industry is quite important to individual coastal communities, even if it is unimportant in a macroeconomic sense to the Norwegian economy as a whole. A vocal fishing lobby also does its best– and they are extremely good at it!– to insure that this false perception does not fade from the public consciousness. Anyhow, it is inefficient, probably grossly inefficient, to tie regional support to particular industries, such as fisheries or agriculture (see Norman *et al.* 1991). It would be more efficient to aim subsidies or other regional-policy instruments at the regions concerned with no strings attached rather than at specific industries, and thus to allow the recipients themselves to decide whether they want to continue to fetch fish from the sea or do something else– like, for example, learn languages like English and Excel and attract tourists from abroad or what have you.

Back to Iceland. Iceland also has all of the above problems, but on a larger scale because the Icelandic fishing industry is more important locally than that of Norway (see Árnason 1995). The fishing industry in Iceland employs 11 per cent of the labor force (compared with less than one per cent in Norway), and, once again, contributes about one sixth of Iceland's GDP, like Norway's oil industry, and a bit more than a half of total exports. Since 1984,

fishing permits by law have been allocated free of charge to selected boat-owners who have, especially since 1990, for the most part been free to utilize them or sell them to the highest bidder as they please. This means that efficient (often large) firms can now buy up the quotas allocated to less efficient (often small) firms, which but of course is all very well, because this means that eventually the quotas will presumably end up in the hands of the most efficient fishing firms.[26] The idea is that, in the end, the maximum allowable catch will be brought on shore at minimum cost, thus insuring maximum efficiency.

The main problem with the individual-transferable-quota (ITQ) system, however, as it has been implemented in Iceland from its inception in 1984 to date, is that the quotas are not *sold* initially, but are given away for free. Unlike the Norwegian government, which hands out oil exploration rights at a small fee and then takes in 80 per cent of the natural-resource rent through taxes and fees (as well as through direct involvement in the oil business), the Icelandic government neither sells the fishing rights nor taxes the rent.[27] This arrangement entails not only gross inequities, but also substantial waste, for several reasons.

First, the stipulation in the Fisheries Management Law from 1984 that the fishing rights be handed out for free rather than sold to boat-owners based on their fishing experience in 1981-1983 seems likely to keep Iceland outside the EU indefinitely, because (a) giving quotas to foreigners free of charge is clearly out of the question and trading them on a barter basis, as has been done on a limited scale, is obviously inefficient and (b) selling quotas to foreigners while continuing to give them to Icelandic boat-owners for free would involve discrimination by nationality, and would thus, in principle, constitute a violation of the Treaty of Rome.[28]

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[26] In 1997, the ten fishing firms with the largest quotas had 29 per cent of the total, up from 21 per cent in 1991.

[27] In recent years, total tax payments of Icelandic fishing firms have amounted to about 0.03 per cent of Iceland's GNP. (This is not a typo.)

[28] There may, however, be some scope for granting differential access to specific fish banks by nationality on the basis of historical precedence.

Second, unrequited quota allocations to boat-owners have reduced the transparency of fiscal and monetary operations (a) by hiding substantial *de facto* government subsidies to the fishing industry, while the public sector remains in a quasi-permanent state of fiscal crisis, which has hit public-expenditure allocations to education[29] and health care especially hard (and thereby, if human capital matters for growth as it is bound to do, threatens to weaken the country's growth potential) and (b) by keeping serious structural weaknesses in the still mostly state-owned and state-operated banking system from plain view by enabling fragile fishing firms to use their quota allocations to service their debts rather than declare bankruptcy.[30]

Third, like excessive subsidies in general, especially concealed subsidies, the unrequited allocation year after year of valuable fishing rights to boat-owners who are free to turn around and sell them for large amounts of money tends to promote and perpetuate inefficiency as well as a lack of financial self-responsibility in the fishing industry. Boat-owners tend to use the money handed to them by the government to buy more and bigger boats and the like, for this is what they know best– or to squander it, as often seems to be the case with windfall gains.[31]

The ongoing rationalization of the Icelandic fishing industry would entail less waste and be more rapid if the fishing permits were sold initially (e.g., auctioned off, taxed, or allocated to all Icelanders alike in the form of shares or vouchers), as is done, for example, with oil in Alaska, and would then remain fully and freely transferable– and thus not subject to any restrictions based on, say, the nationality of would-be buyers competing on a level playing field

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[29] Recall Table 3, columns (3) and (4).

[30] From 1987 to 1997, the Icelandic banking system wrote off bad debts equivalent to about 13 per cent of the country's GDP in 1997, including a large chunk of the bad debts of fishing firms.

[31] For example, the debts of Icelandic fishing firms increased by 56 per cent during 1996, 1997, and 1998, at a time when the industry was supposed to be reducing its fleet and cutting costs (and inflation was about 2 per cent per year). The size of the fleet, measured in Icelandic krónur at constant prices, has been reduced by only ten per cent from its peak in 1989. Measured in tons, the reduction of the fleet since 1989 has been even smaller, almost insignificant.

in accordance with the Treaty of Rome. This is the most efficient, fair, and equitable way of regulating the access to the fisheries and of distributing the associated fishing rent, which is roughly estimated at around 5 per cent of the Iceland's GNP in the long run, year after year. This means that if the Icelandic government were to take in, say, 80 per cent of the rent, as is the case with Norway's oil and gas resources as said above, then the revenue from fishing fees could ultimately suffice to reduce personal and corporate income taxes in Iceland by about a third or to create conditions for an equivalent reduction of other distortionary taxes (Gylfason 1991, 1992). Better still, perhaps, the revenue from fishing fees could be deposited in an Icelandic Fisheries Fund, organized and invested along the lines of the Norwegian Petroleum Fund– in view of the somewhat paradoxical, but apparently real, possibility that renewable fish resources may be almost as susceptible to depletion as non-renewable oil resources.

One of the chief arguments against charging fishing fees in one way or another is that this would create an irresistible urge to expand the public sector. The Norwegian experience, however, does not indicate any automatic linkage between large natural-resource-based revenues and the size of the central government, even though local government has expanded. On the contrary, the Norwegian example seems to show that judicious, market-friendly management of natural resources, oil and gas in this case, is entirely feasible. The underlying principle is the same in both countries. If it applies to oil, it should also apply to fish.

Moreover, many politicians from the provinces which elect a majority of the Icelandic parliament– and where each vote cast weighs two to four times as heavily as a vote cast in the Reykjavík metropolitan area, where the majority of the country's population resides– are understandably not impressed by proposals which would give every Icelander an equal stake in the common-property resource.

The main point of this argument, however, is this. Even if the expansion of oil exports from Norway since the mid-1970s seems to have left total exports

essentially unchanged relative to GDP, the Norwegians have nonetheless been able to manage their oil resources in a way that has removed any oil-related hindrances from the road that could lead them into the EU, if that this is where they want to go at the end of the day. In view of their market-friendly management of their oil wealth, there is no economic reason why the Norwegians and also the Icelanders could not in the same manner improve the management of their fish resources so as to remove the chief remaining hindrance on their way to full membership of the EU. Once inside, they could try to persuade the rest of the membership to revamp the Common Fisheries Policy along similar lines, for such reform is sorely needed (Gylfason 1998).

C. Finland

There have been concerns in Finland that the country's considerable and long-standing dependence on its forest resources, which account for two thirds of its natural capital and about a third of its exports of goods and services, might render Finland unhappily exposed to the Dutch disease. Empirical evidence does not, however, on the whole, seem to support this view. As before, let us organize the argument around trade, investment, and education.

First, Finnish exports have expanded quite rapidly since 1960: they have, in fact, almost doubled, from 22 per cent of GDP in 1960 to 38 per cent in 1997, as we saw in Figure 3. Export growth and the willingness to participate in and contribute to European integration thus do not seem to have been held back by an overwhelming emphasis on forestry-related exports at the expense of other exports, as seems to have occurred, *pari passu*, in Norway and Iceland, but not, however, in Sweden. Even so, Finland, like Sweden, Denmark, and even Norway, is only an "average" exporter in the sense that its exports are about the same relative to GDP as they are in other countries of the same size, recall Figure 5.

Second, the Finnish forestry sector is quite high-tech-intensive and seems to have stimulated other sectors through various technological spill-overs. For example, Finland's share in forestry-related machinery and equipment in

world markets is actually larger than its share in wood, paper, and pulp.[32] Finland has a strong manufacturing sector whose share in total exports increased from 56 per cent in 1963 to 83 per cent in 1997 (Figure 4). It may also be added that NOKIA grew out of an industrial concern that was partly, albeit only to a small extent, in the forestry business before. It is almost surely no coincidence that Norway and Iceland have no world-class high-tech manufacturing firms in the same league as NOKIA, Volvo, and Bang and Olufsen, to mention just one prime example from each of the other three Nordic countries, Finland, Sweden, and Denmark.

Third, the capital intensity of forest resource products has understandably called for large investments in Finnish forestry, thereby attracting capital from other sectors.[33] This seems to have changed not only the sectoral composition of capital accumulation, but may also have helped change its total amount, for investment in Finland has fallen quite dramatically since 1960: gross fixed domestic investment amounted to 28 per cent of GDP in the early 1960s, 25 per cent on average 1960-1996, and only 16 per cent in 1996 (recall Table 3, columns (1) and (2)). This observation is in keeping with the cross-sectional evidence shown in Figure 11, where Finland lies quite close to the regression line. This type of more than full crowding out of non-primary investment is, however, unlikely to be the sole explanation for Finland's low aggregate investment because, for one thing, the timing is not right: the slump in investment in Finland coincided with the economic crisis in the 1990s and, therefore, seems likely to have other causes as well, including various structural flaws and policy problems that contributed to the crisis in addition to the collapse of Finland's important export market in the east when the Soviet Union broke down at about the same time.[34] Specifically, some observers have argued that the rapid growth of the Finnish economy from

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[32] For example, the Finnish firm Valmet is the world's leading producer of paper machines.

[33] The same is true of Sweden. See Lundborg and Leamer (1997).

[34] See Honkapohja, Koskela, and Paunio (1996), Jonung, Stymne, and Söderström (1996), and Kiander and Vartia (1996).

1960 to 1990 resulted in large measure from forestry-related, partly state-directed investment projects which kept total investment at 25-30 per cent of GDP throughout this period (Tainio, Pohjola, and Lilja 1999). When financial markets in Finland were liberalized in the late 1980s, however, and real interest rates rose, the argument goes, some of these investments proved inefficient, and total investment plunged (Figure 19). Even so, Finland has been reasonably successful in attracting foreign investment (Figure 10).

Fourth, there is no discernible sign of a lack of commitment to education in Finland, neither on the part of the public authorities nor of the people themselves. On the contrary, we saw in Table 3, column (4), that in 1995 the Finnish government spent 7.6 per cent of GNP on education compared with 4.8 per cent on average in the world as a whole.[35] Expenditure on education in Finland has increased in recent years: it was 5.3 per cent of GNP in 1980 and 5.7 per cent in 1990 (Figure 19). Even so, Finnish outlays on education lag a bit behind those of Denmark, Norway and Sweden (Table 3, columns (3) and (4)), but the differences are small.

A similar pattern is observed in the number of personal computers across countries. The Finns had 311 personal computers per thousand inhabitants in 1997 compared with 350 in Sweden, 360 in Denmark, 361 in Norway, and 407 in the United States (World Bank 1999).[36] In general, personal computer ownership is positively, albeit not very tightly, correlated with outlays on education across countries; the correlation is 0.23 (with t = 2.4) in a sample of all 99 countries for which data on both variables are available. The regression

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[35] This put Finland in 14th place among 170 countries in 1995, while Denmark landed 8th place, Norway 9th, Sweden 12th, and Iceland 76th. (For source, see footnote to Table 3.) St. Lucia, the country of birth of Sir W. Arthur Lewis, the Nobel laureate, who was the rector of the university there for a while, was in first place, and Botswana, the diamond producer, in second place. The example of Botswana shows that natural-resource-dependent developing countries do not all neglect education.

[36] A comparable figure for Iceland is not available for 1997. In 1995, the latest year for which a figure for Iceland is available, the Icelanders had 205 personal computers per 1,000 inhabitants compared with 232 in Finland, 249 in Sweden, 270 in Denmark, 273 in Norway, and 328 in the United States. The correlation between the Nordic figures on personal computers per 1,000 inhabitants and expenditure on education relative to GNP in 1995 is 0.88.

(not shown) indicates that personal computer ownership increases by about 200 per 1,000 persons for every one percentage-point rise in the ratio of government expenditure on education to GNP.

Fifth and last, forest ownership in Finland is fairly evenly distributed among the Finnish population, and has been that way for a long time. This means that forestry-related booms in the Finnish economy have not created a super-rich but small class of politically powerful rent seekers in Finland. Rather, the benefits that have emanated from the country's natural resources have been spread widely across the whole population without creating political or social tensions. There is, therefore, no discernible evidence of the recurrent economic policy failures that tend to characterize rent-seeking societies over long periods– including tendencies towards protectionism against trade and other forms of economic integration and towards thinking that natural resources are more important than human resources, and so on. True, like the fishing industry in Norway and Iceland (and, though to a much lesser extent, the oil industry in Norway), the forest industry in Finland has considerable political clout. This explains, in part, the repeated devaluation of the markka in the 1970s and 1980s, which was aimed mainly at preserving the profitability of the forest industry. Government support of the forest industry has not, however, taken the form of direct subsidies or trade restrictions.

The Dutch disease. In sum, then, Finland passes the test for the Dutch disease on at least four scores out of five: (a) its exports have grown rapidly relative to GDP since 1960, even if they are only "average" by world standards; (b) the share of primary exports in total exports has fallen sharply since 1963 as the natural-resource-based industry seems to have encouraged other industries through technological spill-overs; (c) investment has fallen sharply relative to GDP in the 1990s, true, but it does not seem reasonable to ascribe but a part of the fall directly to Finland's dependence on forest resources; (d) expenditure on education and computer ownership compare favorably with other OECD countries; and (e) the ownership of and access to the main natural resource are rather widely shared so that macroeconomically

counter-productive rent seeking is not a serious problem. It would seem that Sweden and Denmark also pass this five-pronged test.

Norway, however, passes the test only in part. Norwegian exports have been stagnant since 1960, albeit at a respectable level (Figure 3), primary exports still account for three-quarters of total exports (Figure 4), and investment has decreased over time (Figure 20 and Table 3, columns (1) and (2)). On the other hand, Norway shows no signs of having faltered in its commitment to education, on the contrary, because expenditure on education in Norway rose from 6.5 per cent of GNP in 1980 to 8.1 per cent in 1995 (Figure 20 and Table 3, column (4)), nor has the natural resource rent been allowed to fall into too few hands, as was discussed in the preceding section.

This leaves Iceland, which fails the test for the Dutch disease on all five counts: (a) stagnant exports, (b) overwhelming weight of primary exports in total exports, (c) declining investment relative to GDP since the mid-1970s (Figure 21); (d) low expenditure on education, and (e) increased concentration of the natural resource rent in too few hands on account of the government's unwillingness to spread the rent more equitably– and efficiently!– through fishing fees, which could be used, among other things, to finance increased outlays on education, which are long overdue.

V. Conclusion

It is sometimes said that, being neither Dutch nor a disease, the Dutch disease is a double misnomer. True, diseases are more often named for the doctor who diagnosed them first than for the first patient. But if, as in this case, a disease bears the name of the first patient diagnosed with it, then it seems hardly reasonable to insist that the patient remain sick for the name to stick. The fact that the Netherlands recovered fairly quickly from the Dutch disease, while some other countries have suffered much longer and continue to do so, does not by itself call for a name change.

But is it a disease? Those who do not think so seem to view it as matter of one sector benefiting partly at the expense of others, without seeing any macroeconomic damage being done, on the contrary. Those who view the Dutch disease as an ailment, on the other hand, are concerned about the potentially deleterious effects of the induced reallocation of resources between different sectors– from high-tech manufacturing and service industries to low-tech primary production, for example– on economic growth and diversification. According to this view, the empirical evidence of an inverse relationship between different measures of natural resource abundance and economic growth over long periods that has emerged in the last few years can be interpreted as a sign of the Dutch disease. Because the disease *is* the symptoms associated with it, by definition, the issue of misdiagnosis– of mistaking symptoms for the disease– does not arise.

It has been argued in this paper that natural resource abundance may retard economic growth (a) by reducing total exports and thereby, ultimately, also imports of goods, services, and capital relative to national income; (b) by reducing investment in physical capital from domestic as well as foreign sources; and (c) by reducing investment in human capital– education, that is. The first channel, through trade, does not merely involve exports and imports, in so far as it may stem from a political conflict between heavy natural resource dependence and the propensity to participate in, and benefit from, international economic integration. This may help explain why the

governments of Norway and, especially, Iceland still show no signs of wanting to join Denmark, Finland, and Sweden in the European Union, even as the Central and Eastern European countries are queuing up outside the gates. To those Norwegians and Icelanders who want their countries to be full participants in European integration, this factor alone is, perhaps, ample reason to fear that heavy natural resource dependence may be, at best, a mixed blessing in the long run.

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Table 1. Nordic living standards: A quick look

	(1) GNP per capita 1997 (PPP-adjusted, US$)	(2) GDP per hour worked 1997 (PPP-adjusted, US$)
Denmark	23,450	28
Finland	19,660	26
Iceland	22,500	23
Norway	24,260	35
Sweden	19,010	28

Sources: The World Bank on per capita GNP and GDP, and the OECD on hours worked.

Table 2. Nordic wealth: Human, physical, and natural, 1994

	(1) Total per capita national wealth (US$ thousands, PPP-adjusted)	(2) Human capital (% of total)	(3) Physical capital (% of total)	(4) Natural capital (% of total)
Denmark	295	72	24	4
Finland	241	56	37	7
Iceland	...	...	...	...
Norway	302	57	33	10
Sweden	260	68	27	6
North America	326	76	19	5
Western Europe	237	74	23	2

Source: World Bank (1997).

Table 3. Nordic investment, education, trade, and growth: An overview

	(1) Investment (average 1960-1996, % of GDP)	(2) Investment (1996, % of GDP)	(3) Expenditure on universities (1994, % of GDP)	(4) Expenditure on education (1995, % of GNP)	(5) Share of 17-34 year olds in tertiary education (1995, %)	(6) Exports (average 1960-1996, % of GDP)	(7) Exports (1996, % of GDP)	(8) Economic growth per capita (PPP, % per year 1980-1996)
Denmark	21	17	2.1	8.2	10.8	32	34	1.6
Finland	25	16	1.9	7.6	14.0	27	38	1.2
Iceland	24	18	1.0	5.0	8.5	35	36	0.9
Norway	27	21	2.1	8.1	12.8	38	41	2.2
Sweden	21	16	2.2	8.1	9.2	28	40	0.8
World / OECD	22	24	1.5*	4.8	10.8*	32	36	1.4

Sources: World Bank (1999) and OECD (1997a).

Note: The bottom line shows unweighted averages. An asterisk denotes an unweighted average for OECD countries. The Norwegian figure in column 3 is an estimate.

Figure 1. Iceland, Ireland, and Norway: Export shares, 1960-1997

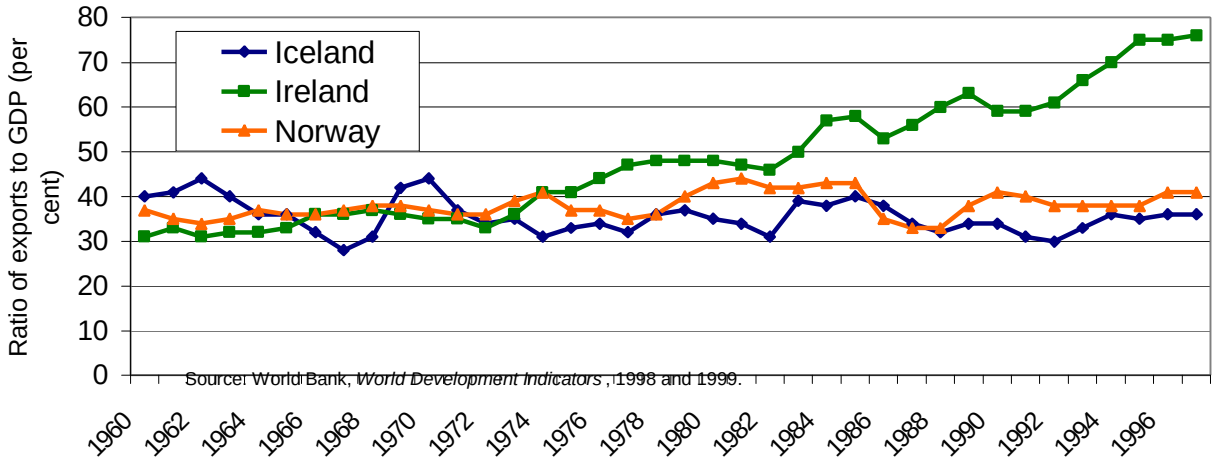

Figure 2. Iceland, Ireland, and Norway: Foreign direct investment, 1974-1997

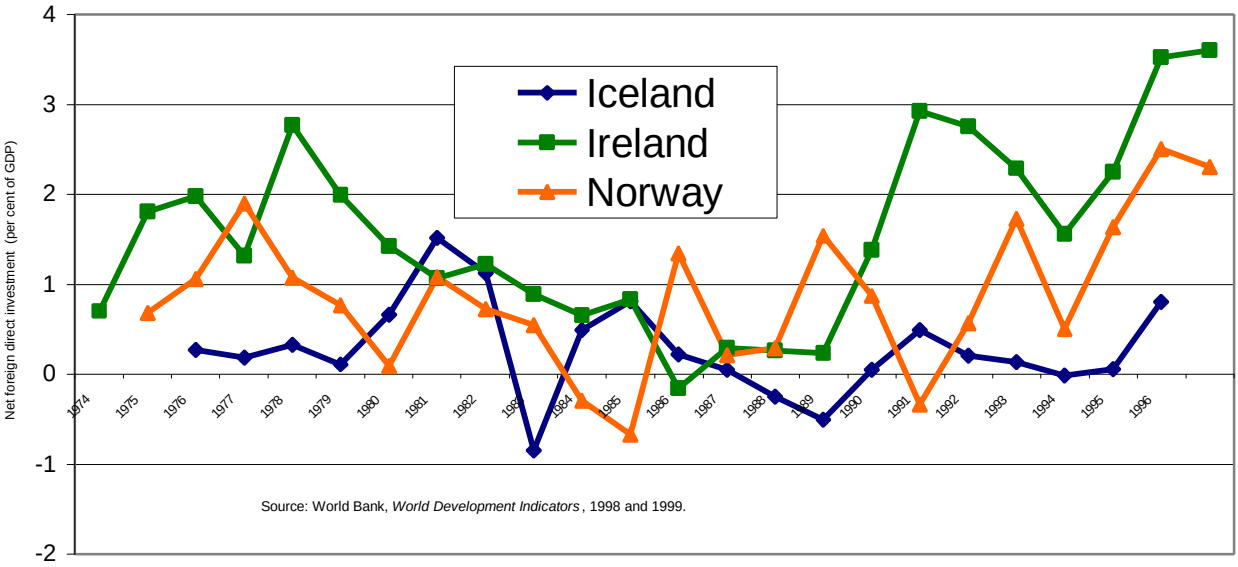

Figure 3. Nordic exports, 1960-1997

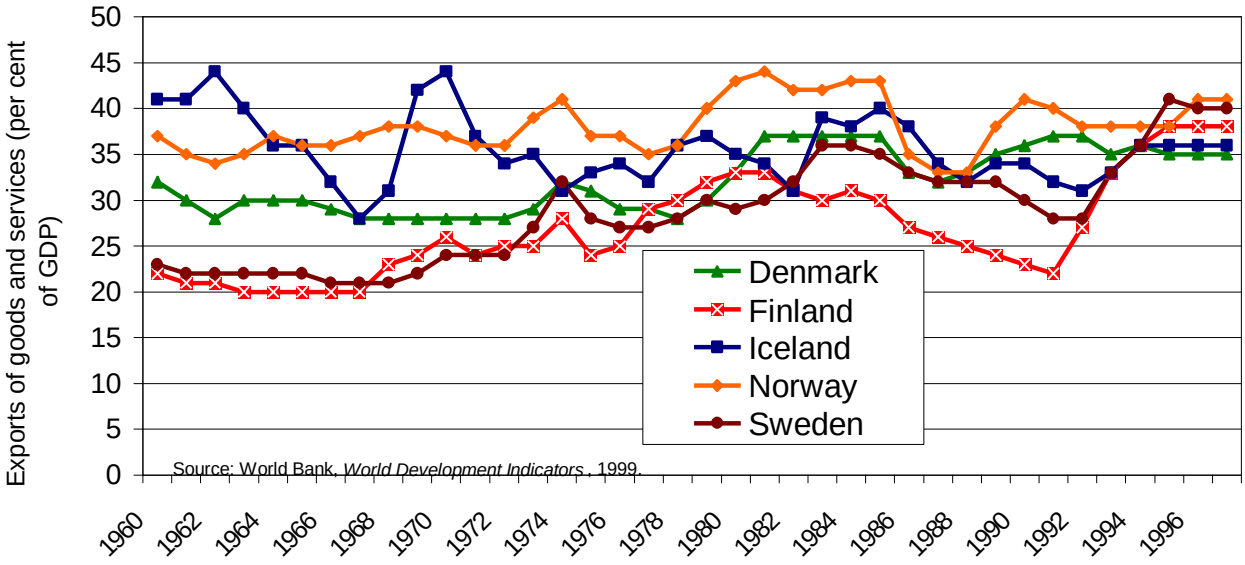

Figure 4. Nordic primary exports, 1963-1997

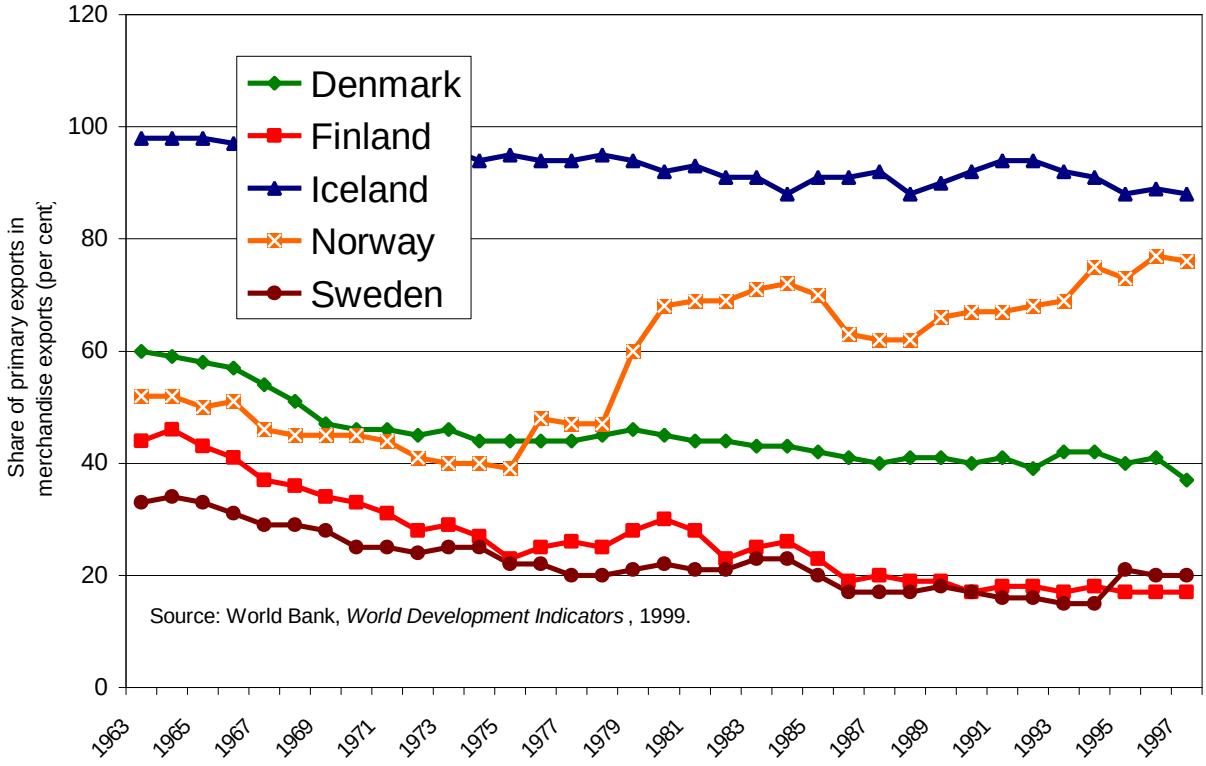

Figure 5. Exports and country size

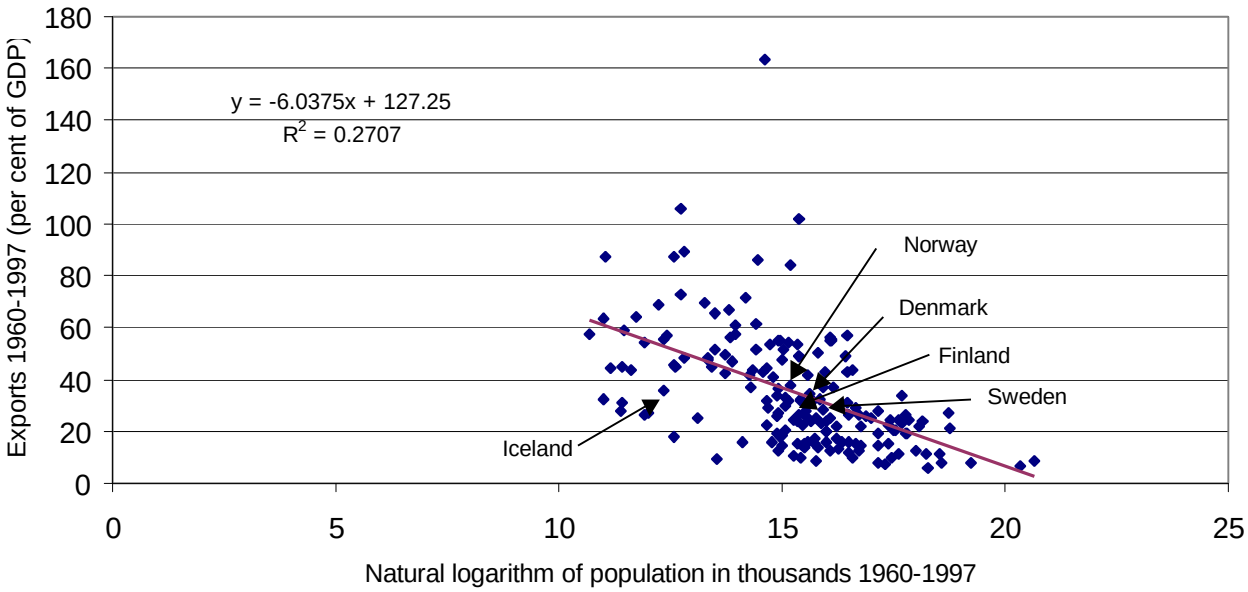

Figure 6. Primary exports and total exports

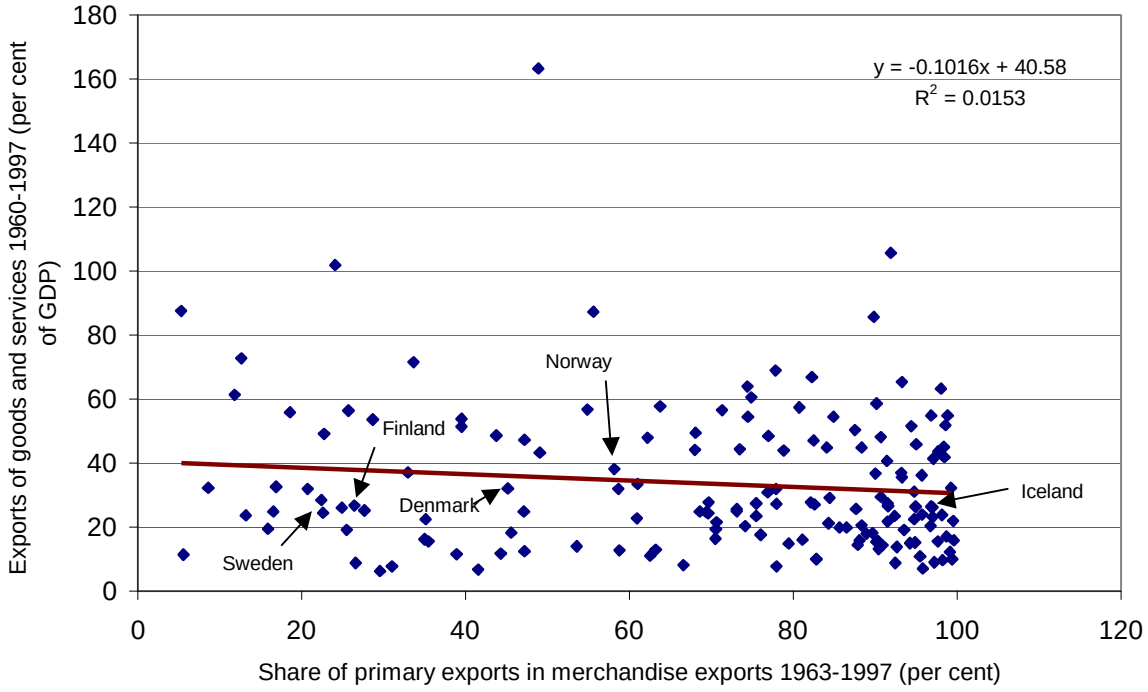

Figure 7. Natural capital and primary exports, 1963-1997

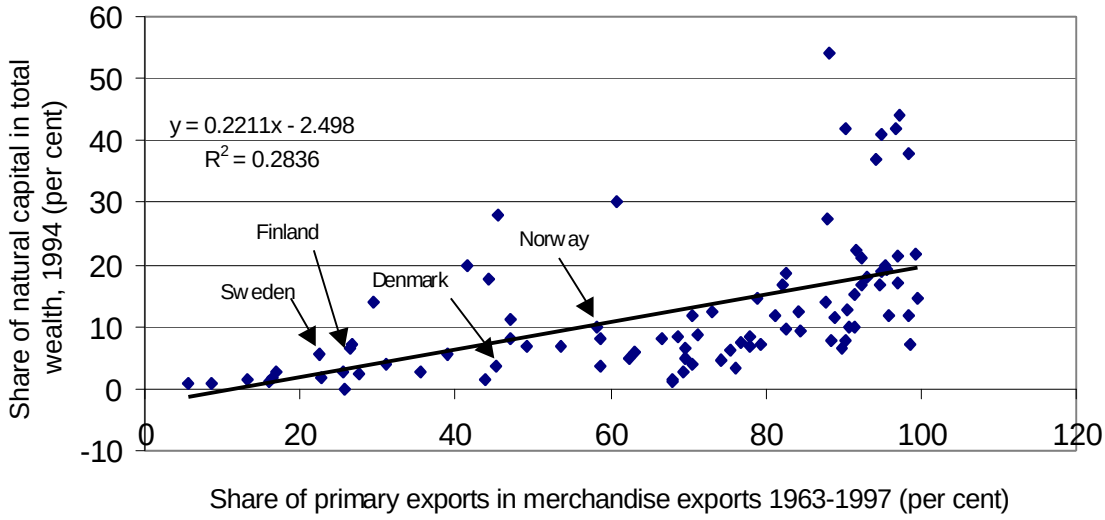

Figure 8. Primary exports and the current account

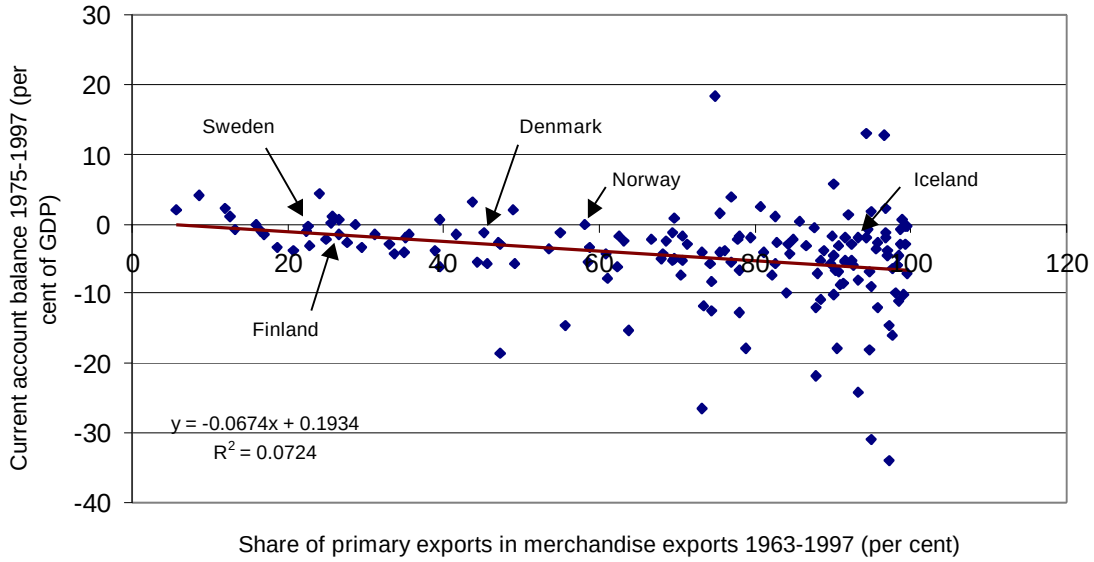

Figure 9. Primary exports and import protection

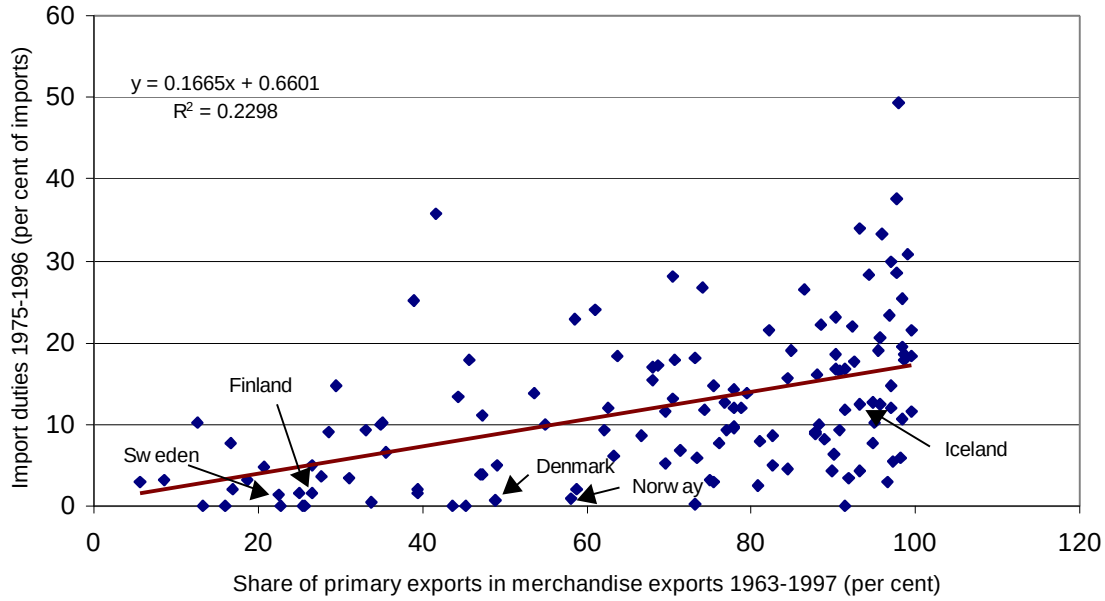

Figure 10. Primary exports and foreign investment

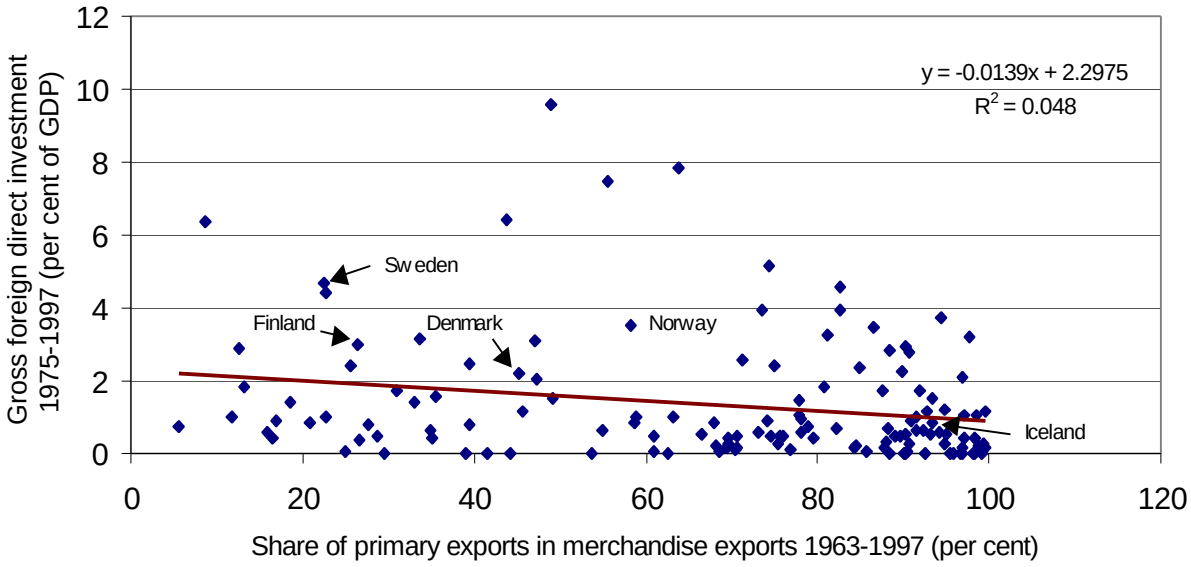

Figure 11. Primary exports and domestic investment

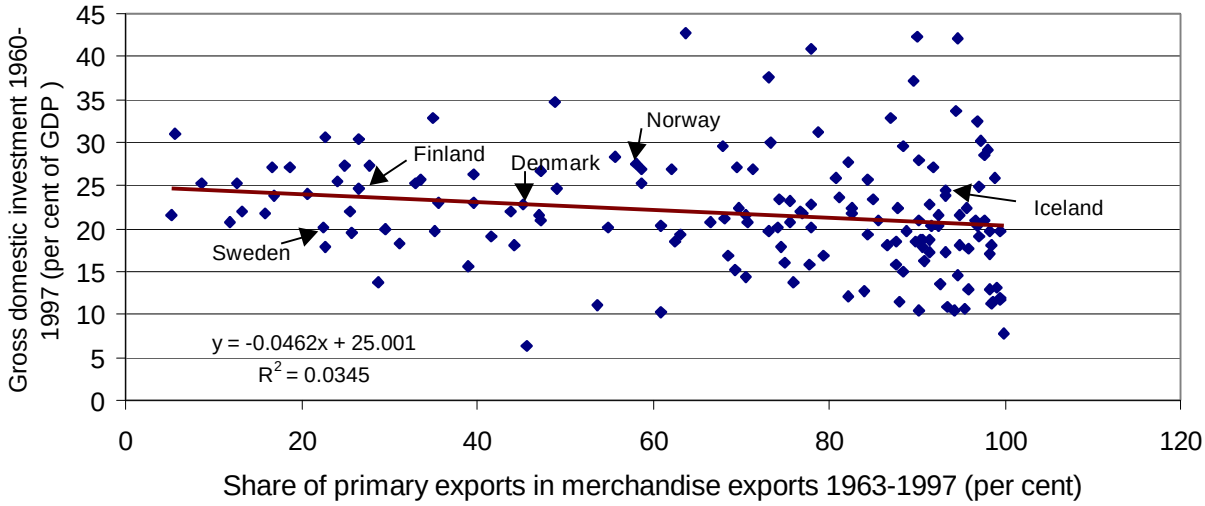

Figure 12. Primary exports and primary education

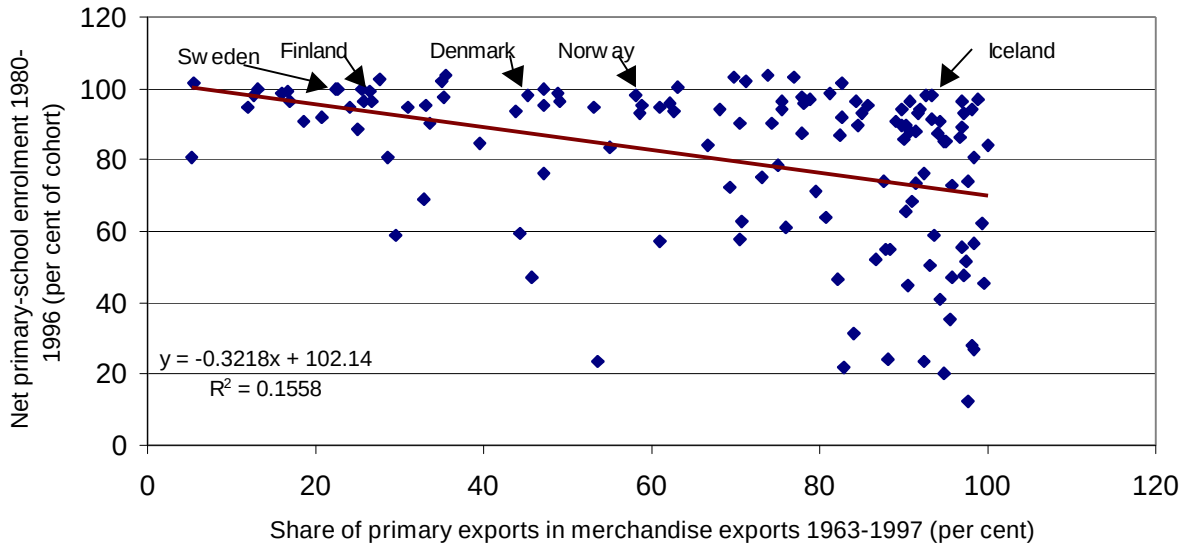

Figure 13. Primary exports and secondary education

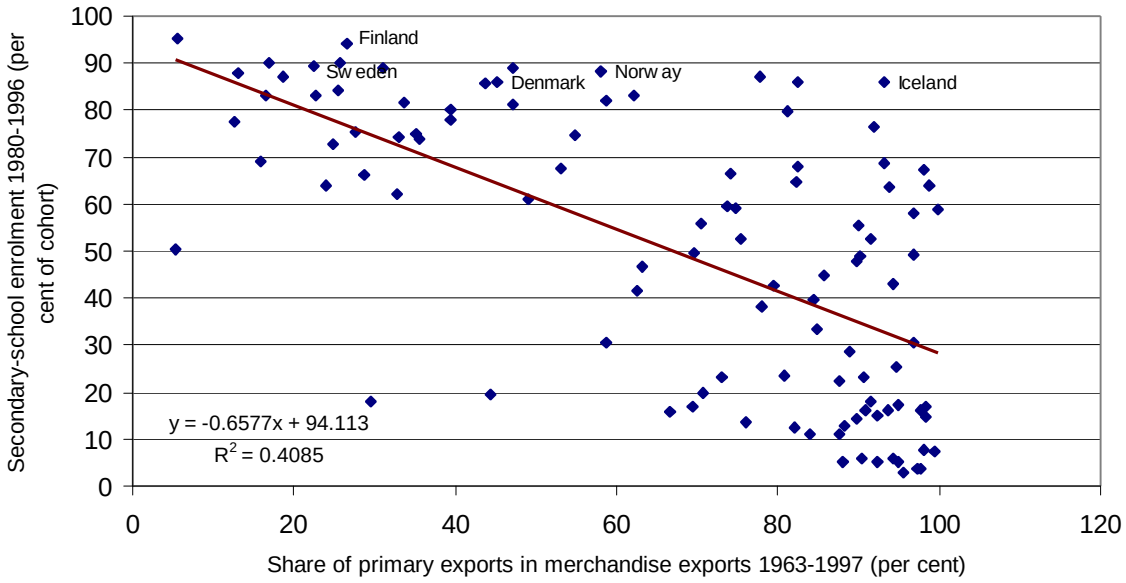

Figure 14. Primary exports and tertiary education

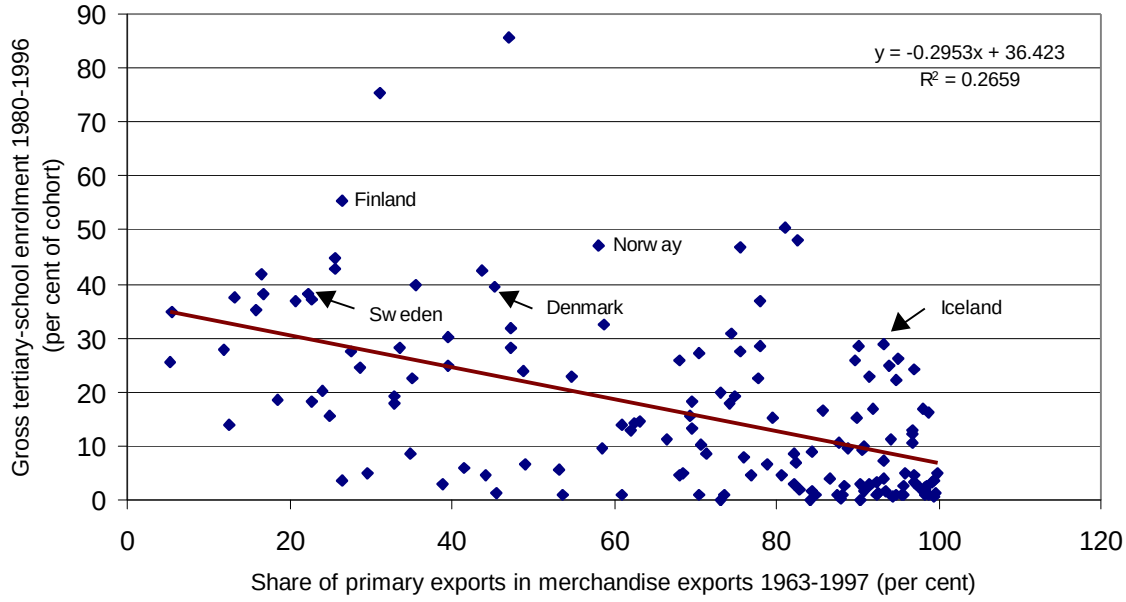

Figure 15. Primary exports and economic growth, 1960-1997

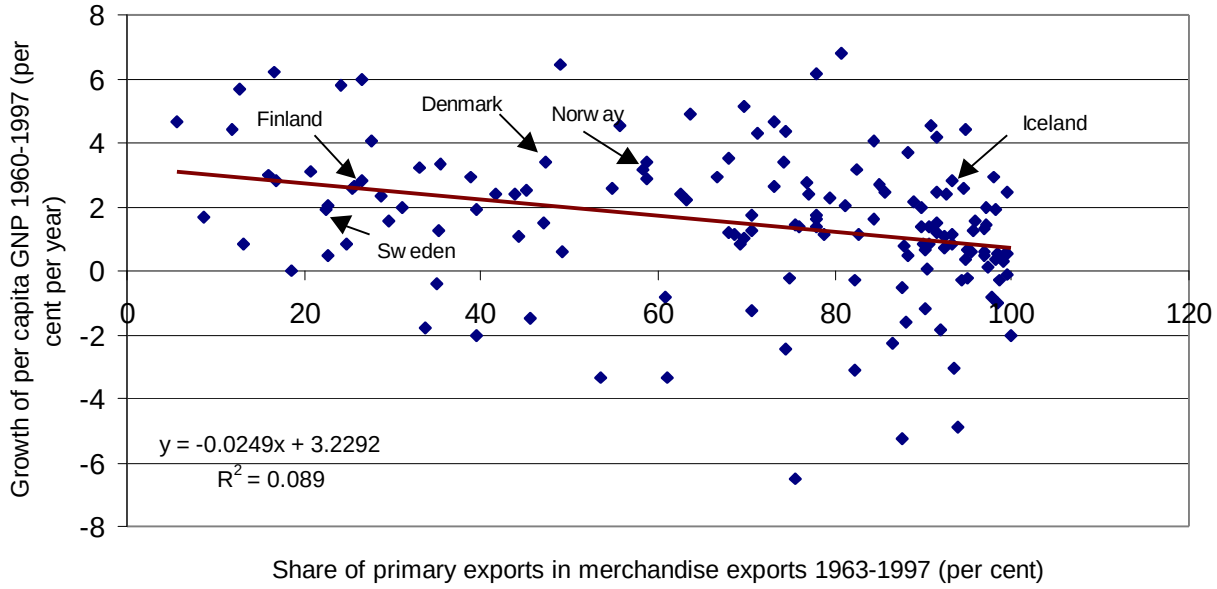

Figure 16. Primary exports and economic growth in high- and upper-middle-income countries, 1960-1997

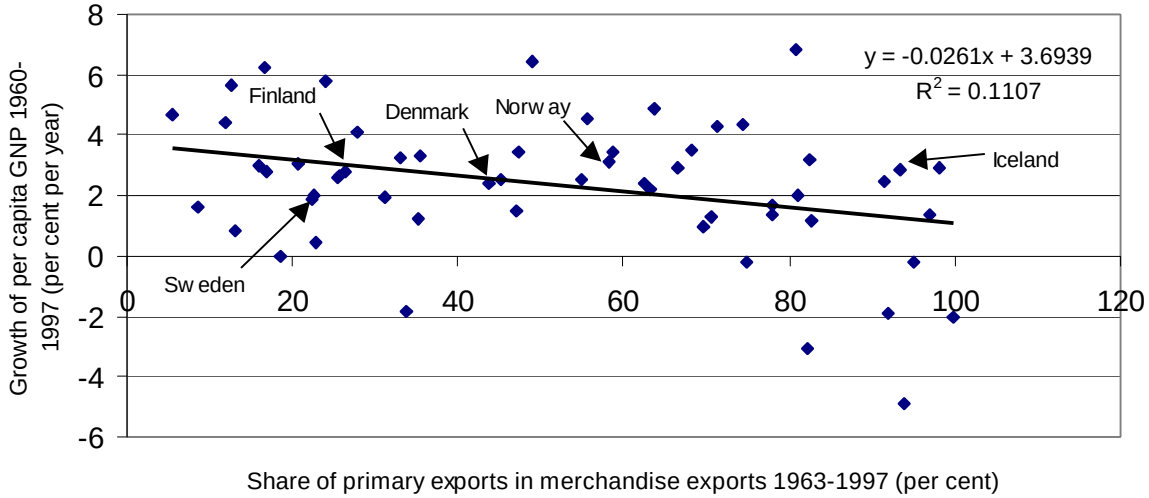

Figure 17. Primary exports and economic growth, 1980-1997

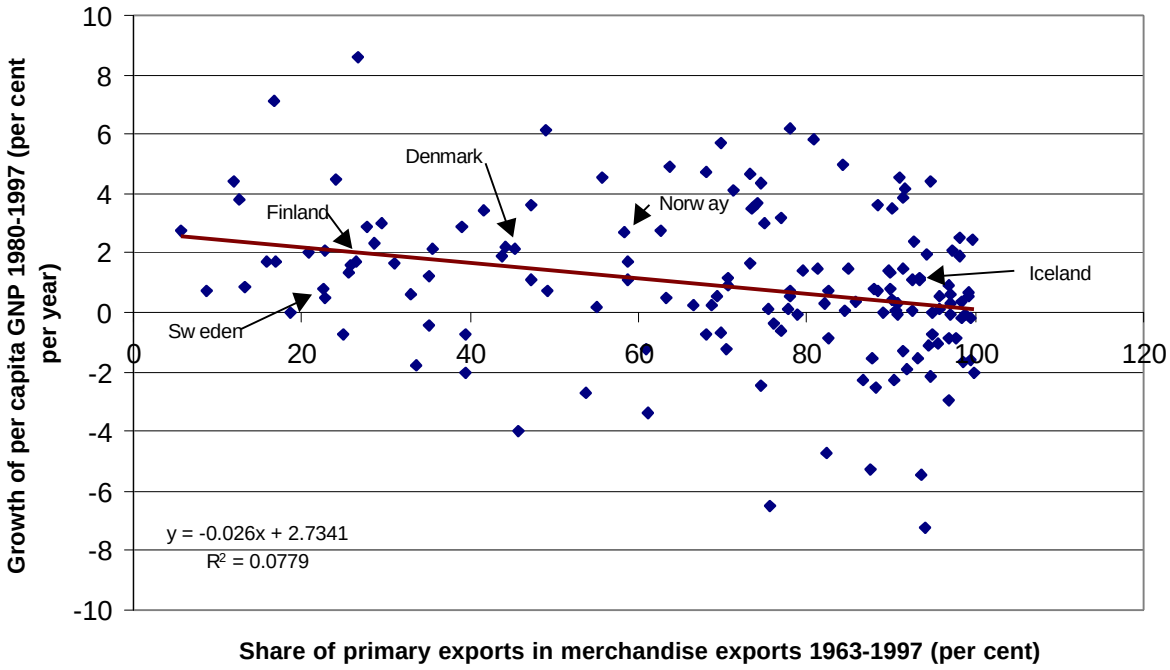

Figure 18. Iceland: Catch and fleet, 1945-1997

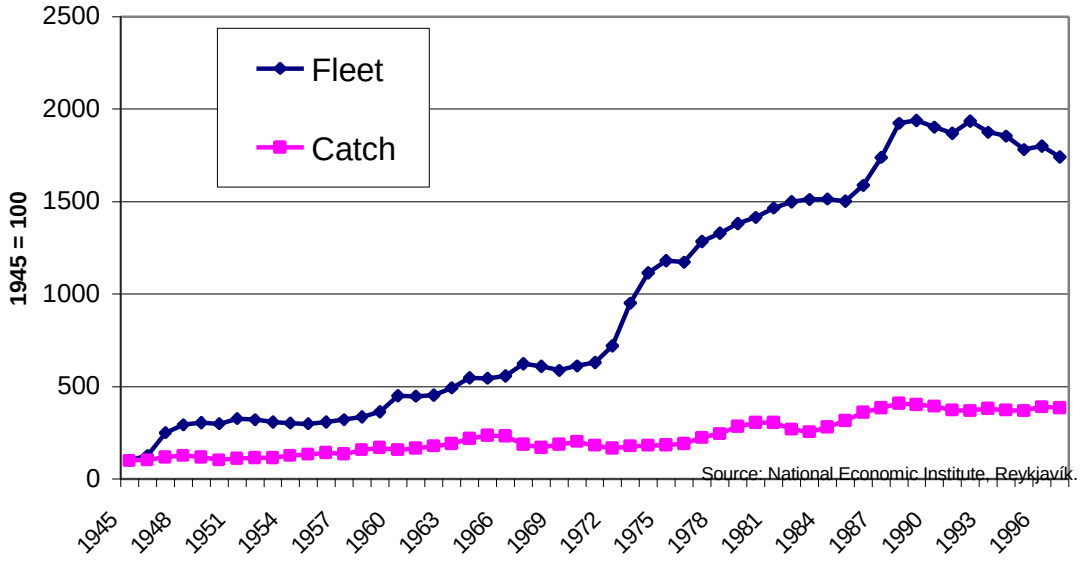

Figure 19. Finland: Primary exports, exports, investment, and education, 1960-1997

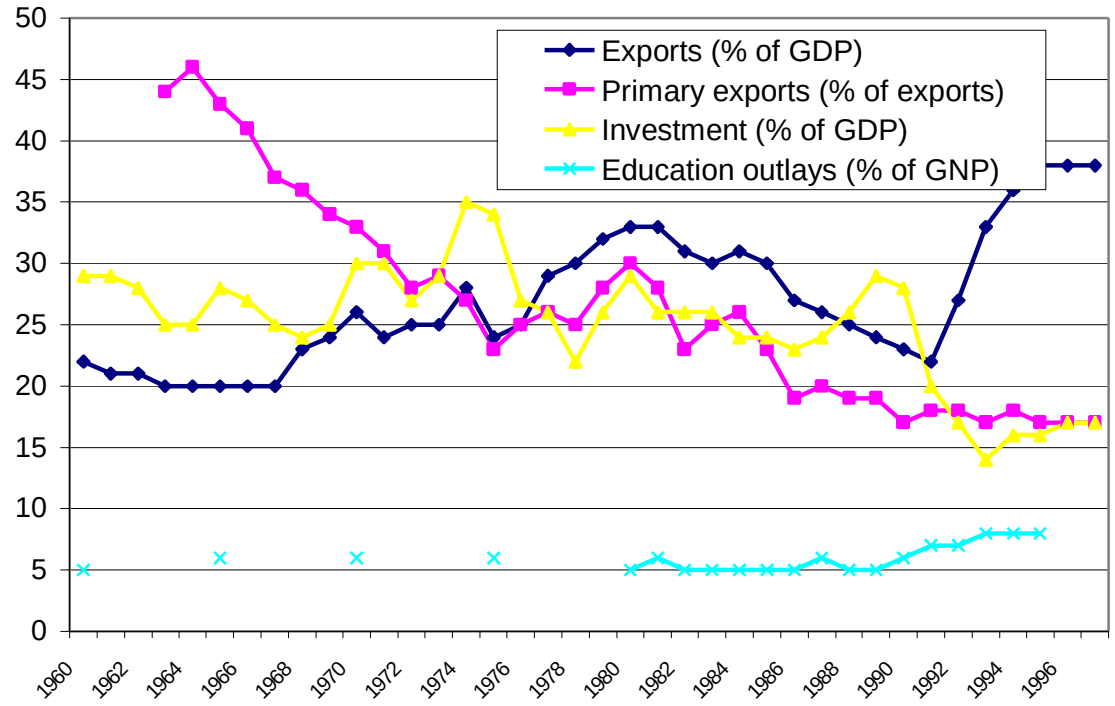

Figure 20. Norway: Primary exports, exports, investment, and education, 1960-1997

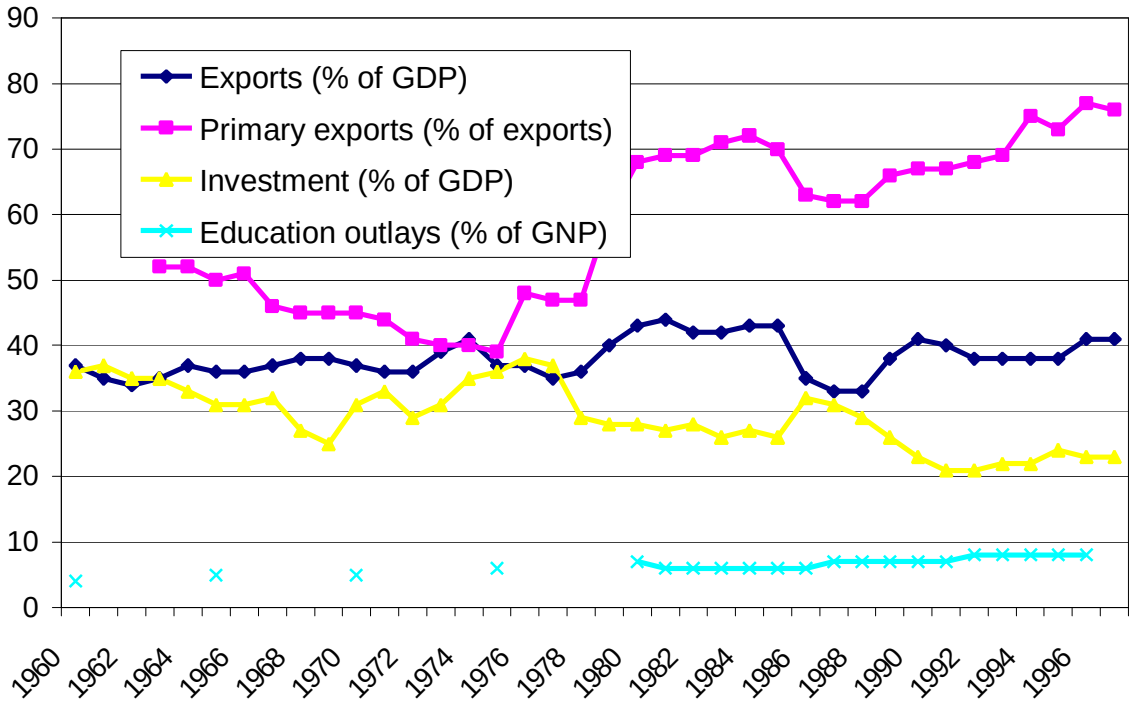

Figure 21. Iceland: Primary exports, exports, investment, and education, 1960-1997