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Natural Resources, Human Capital, and Growth

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I: Introduction

What role does human capital investment play in lowering the growth rates of resource-abundant countries?

Most governments around the world extol the benefits of education; investment in this sector is limited, so they say, because of a lack of money. But if limits on human capital investment primarily result from binding government budget constraints, resource abundance should induce additional investment, *ceteris paribus*. Statistics tell a different story: Resource abundant countries, on average, invest less in education than other countries; this holds true for different indicators, at different times, whether or not one controls for per capita income (Table 1). What is the explanation for this negative link between resource abundance and human capital investment? And how important is this link in explaining the lower growth rates of resource abundant countries?

We have argued elsewhere (Birdsall, Pinckney, and Sabot 1999) that countries can achieve rapid, equitable growth by inducing the poor to invest in the assets they control, including their human capital. Raising rates of return to human capital and other assets leads to increased work effort, higher savings and higher investment immediately, while generating higher productivity and lower inequality in the future. This lower inequality itself fosters further growth, providing the incentive for yet more savings and investment by the poor. This virtuous circle is one important explanation for the decades of equitable growth achieved by many Asian countries.

Resource abundance, however, tempts governments to move away from the policies that generate this virtuous circle. Dutch disease and related effects tend to lower the rate of return to the agricultural and human capital investments available to the poor. Resource rents tend to accumulate in the hands of the government, and/or a small number of businessmen, leading to high inequality and thus lower growth. Staple trap effects frequently lead to the subsidization of capital, thereby taxing labor. The government may try to assuage the poor by directing some proportion of resource rents to populist programs, including the expansion of education. Schooling in this environment, however, is more of a consumption good than an investment good. Quality is likely to suffer. The labor market in

a capital-intensive economy offers little benefit for moderate levels of education. The likely result: little investment and dynamism outside of the natural resource sector; high inequality, poor quality schools, and little demand for education.

The rest of this chapter proceeds as follows: First, we describe the virtuous circle leading to rapid growth with equity; that is, a series of self-reinforcing activities that all contribute to increases in per capita income. Choices concerning investment in human capital are central to this virtuous circle. As part of this section, we lay out a conceptual framework, a set of eyeglasses, as it were, that allows us to understand the decisions millions of individuals make that lead to equitable growth. We then examine the role of human capital accumulation in spurring productivity and reducing inequality; the latter impact has a further indirect impact on growth. This highlights the importance of the government's development strategy in fostering the virtuous circle of growth with equity.

Second, we investigate the impact of resource abundance on the virtuous circle. Resource abundance tends to break the virtuous circle in several places: the choice of development strategy, the level of inequality, the lack of incentives for investment in education, and the creation of a welfare state. We illustrate this breakdown by contrasting the cases of Korea and Brazil.

Finally, we draw out policy lessons for resource abundant economies. For resource abundance is not destiny. Most of the negative impact of resource abundance is mediated through government policies. By gaining an understanding of the virtuous circle of savings, investment, and equitable growth, resource abundant governments can identify those policies that disrupt the virtuous circle, and seek to avoid them, while pursuing policies that spur equitable growth.

II: The Virtuous Circle of Growth with Equity

A Conceptual Framework

Considering the poor as potential *investors* is the key to understanding the virtuous circle of growth with equity. The poor have assets under their control: labor in all cases, with the potential for increased skill that would come about through investment in human capital, and agricultural land in many cases. Investment in these resources, however, may be limited because of either low rates of return or lack of investible capital.

Here we lay out a simple conceptual framework for analyzing investment decisions by poor households.¹

Consider a poor household, with a utility function containing two arguments, consumption and leisure. The household uses its labor to produce a single good. Since time is limited, an increase in work implies a decrease in leisure. How much will the household produce? If the household exists for a single period, the solution is simple: Keep working until the marginal utility of an hour of leisure equals the marginal utility of consuming what would be produced in an hour of work.

To make this relevant to savings and investment, we must add a second time period. But adding a time period also forces us to take account of the discount rate, the rate of time preference of the household. Given a choice, consumers would prefer to consume today rather than tomorrow. Call the discount rate d .

The amount of the good produced in the first year is then subject to a choice: the household can consume all that it produces, or decide to consume less and save/invest the remainder. If the household saves amount s , in the next period it will have $(1 + r)s$ available, where r is the rate of return to investment.

Now, assume further that the household is credit-constrained; that is, it cannot borrow today on the basis of expected future earnings. (This assumption together with the absence of shocks in the model implies that savings equal investment in each year).

When will such a household save? Only if r is greater than d . Otherwise, the household is better off consuming all that it produces in the first period.

So imagine an economy in which r is less than d . This economy has:

- No savings (or, in a stochastic world, only precautionary savings); the household consumes whatever it produces each year;
- No increase in income across years;
- No growth.

Note that we are not assuming any cultural predisposition to laziness. This low level of work effort and no progress over time is a rational response to low returns to investment.

¹ See Birdsall, Pinckney, and Sabot (1999) for a fuller exposition of this framework

Now, assume something changes, making poor households believe that r is greater than d . This could result, for example, from an improvement in local schools, a change in price policy, or the introduction of a new agricultural technology. Now there is an incentive to invest: How can the household finance the investment?

Recall that it cannot borrow. The household has only two ways to raise money: cut back on consumption in the present year, thereby freeing resources for investment, or decrease leisure, allowing more time for work and thus creating more income. As it turns out, a rational household will do both, and invest *all* of the increase in income.

So, when r increases from below d to above d , the rational actor will reduce consumption and increase work effort, and invest all of the savings and increased income. The increase in investment divided by the increase in income is greater than 100%. In these circumstances, the poor contribute to an increase in present GDP by providing more labor, and then take advantage of high-payoff investment opportunities, thereby contributing to an increase in future GDP, all the while helping the country achieve growth with equity.

Under what circumstances will this effect be large? For the very poor, the consumption basket is scanty; they are not able to reduce consumption substantially without inducing considerable suffering, or at least limiting the ability of household members to work hard. So for this impact to be substantial, they must be able to get significant returns from working harder. More technically, the marginal product of labor must not fall rapidly as labor supply increases.

This provides an indication of the role of government in getting this process moving and allowing it to continue. Governments can encourage this response by achieving two objectives: Raising the rate of return to assets held by the poor, and continually improving returns both to labor and investment in skills. Governments that succeed in accomplishing both objectives, as occurred in East Asia for decades, over time provide the poor with considerably more investible assets, thereby allowing them to take advantage of more high-payoff investment opportunities.

The Role of Human Capital in the Virtuous Circle

Study after study shows a high correlation between economic growth and the accumulation of human capital. But the direction of causality implied by this positive correlation is not clear *a priori*; education may be an investment good, directly or indirectly improving output in the economy, or it may be a luxury consumer good, increasingly demanded as incomes rise.

The Direct Impact of Education on Output

Both country and firm-level studies provide evidence that education can be an investment good. Barro-style cross-country growth regressions generally show a large and significant impact of initial level of educational attainment on subsequent growth rates, regardless of the specification of the equation or method of measuring education (Levine and Renelt 1991; but see Pritchett 1996 which challenges these studies). Birdsall, Ross, and Sabot (1995), for example, estimate that countries with primary and secondary enrollment rates one-half standard deviation above the mean had annual growth rates 1.4% higher than countries with enrollment rates one-half standard deviation below the mean. Over 25 years, such a difference in growth rates leads to a 40% difference in per capita incomes.

Human capital theory predicts that education augments cognitive and other skills which, in turn, augment the productivity of labor (Becker 1964, Schultz 1961). Endogenous growth theory predicts the same: a larger stock of human capital facilitates technological progress or, for a country not on the technological frontier, relatively rapid acquisition of technological capability (Nelson and Phelps, 1966; Romer, 1990). Empirical microeconomic studies verify the theory: Both in agriculture (Pinckney 1997, Jamison and Lau 1982) and non-agriculture (Knight and Sabot 1990, Maluccio 1998), numerous studies show that increases in human capital have a substantial direct impact on returns to labor. For example, Maluccio's study of a poor area in the rural Philippines finds that each year of education raises wages approximately 10 percent. For urban labor markets in East Africa, Knight and Sabot find that the human capital accumulation that takes place during secondary school increases wages by approximately 25 percent, even after taking account of the credential effect of schooling as well as the impact of innate ability.

The impact of human capital on agricultural productivity is especially large in environments where new agricultural technology is available. For example, Jamison and Lau (1982) find that four years of schooling on average raise farm output by 7.2 percent, but in dynamic agricultural environments the increment increases to ??%. Thus, strong evidence supports view that education improves productivity, both in agriculture and non-agriculture.

The Indirect Impact of Education on Output

In addition to improving productivity directly, human capital investment also has an *indirect* impact on national per capita income. There are two paths: first, educational expansion can reduce inequality, which then improves growth (Birdsall, Ross, and Sabot 1995); second, education of women has a negative impact on fertility and a positive impact on child health (Summers 1992). In addition to improving growth in per capita income in some countries, a lower population growth rate eases the government's task of continually strengthening the quality of education. But we focus here only on the first of these paths.

Education for the poor can reduce inequality most obviously by raising the productivity of the substantial number of poor who manage their own farms or informal-sector firms. But education also has an impact on the inequality of pay for formal-sector employees. Inequality of pay accounts for two-thirds of total income inequality in rich countries and an increasing share of total inequality over time in poorer countries. The impact of education on inequality of pay is ambiguous theoretically. As more of the labor force is educated, the scarcity rents paid to such workers erode. The resulting compression of the educational structure of wages tends to reduce inequality of pay.

This compression effect of educational expansion, however, may be counteracted by a disequalizing composition effect -- brought about by the relatively rapid growth of the more educated, more highly-paid portion of the labor force. To take a simple example, suppose all workers are either educated or uneducated, and educated workers receive five times the pay of uneducated workers. If the percentage of educated workers increases from 10 to 20 percent of the labor force holding the education wage premium constant, the Gini coefficient in income inequality increases from 0.26 to 0.36. But if the increase in supply of educated workers causes the pay of educated labor to fall to only 2.5 times that of

uneducated labor, the Gini coefficient falls from 0.26 to 0.18; income is more equal than before. The compression effect in this case is larger than the composition effect.

Whether the compression or composition effect dominates in any particular country depends on the nature of the educational system and the country's development strategy. When the country pursues a labor and skill-intensive growth path in conjunction with expanding opportunities for high-quality education, demand and supply of skilled labor can both expand rapidly, as seen in East Asia. In such cases, the compression effect will often outweigh the composition effect. On the other hand, if the country pursues a capital-intensive growth path which pays a small number of workers high salaries, and allows the quality of the bulk of its education sector to deteriorate, there may not be any compression effect at all.

Brazil and Korea exemplify these two possibilities. From 1975 to 1985 secondary enrollment in Brazil increased from 26 to 35 percent, and in Korea from 56 to 92 percent. However, for reasons we explore later in this chapter, there was no compression effect on wages of educational expansion; the composition effect dominated, thus increasing wage inequality by four percent. In contrast, during the same years in Korea, the premium paid to workers with a high school education fell from 60 percent to 34 percent over a primary graduate; the premium paid to those with higher education fell from 164 percent to 93 percent. This large compression effect dominated the composition effect of educational expansion, leading to decrease in wage inequality of 22 percent.

So expanding opportunities for high-quality education coupled with a labor-demanding growth path can lead to reductions in inequality. But does inequality have an impact on growth?

Our conceptual framework suggests that, holding per capita income constant, the poor will be able to afford more high-payoff investments if inequality is lower. Clearly if the lowest income quintile receives only 2% of GDP, as in Brazil, they have considerably less opportunity to invest than if they receive 9% of GDP, as in Indonesia. Given that investments in human and other forms of capital controlled by the poor have the potential for very high returns, more unequal countries miss out on this source of growth. But there are other possible ways in which low inequality can spur growth.

First, by *enhancing political and macroeconomic stability*. Lower inequality reduces the tendency for fiscal prudence to be sacrificed to political expediency,² while simultaneously minimizing the risk is that a large proportion of the population becomes politically alienated. A more stable political and macroeconomic environment is conducive to economic growth: investment will be higher where the risks of economically disruptive political upheaval and runaway inflation are lower.

These benefits accrue when inequality results from expanded education and increasing returns to assets held by the poor. They may not accrue when low inequality has been purchased through transfers, subsidies, and public sector employment policies, for three reasons. First, expenditures such as these tend to grow over time, taking an increasing proportion of the government budget, thereby increasing the likelihood of economic instability (Gelb, Knight, and Sabot 1991). Second, at some point the increase in transfers will become unsustainable; their reduction or removal increases the likelihood of instability. Third, educational expansion in this context can lead to the destabilizing force of frustrated young people, educated and having a subsistence income, but having no outlet for their training.

Second, inequality can raise growth by *increasing the x-efficiency of low-income workers*. Children from low-income households are unlikely to work hard if, no matter how great their effort, they have no chance of gaining scarce places in the university system. By contrast, poor children in high quality schools who see tangible rewards for effort are more likely to make such an effort. Similarly, extra effort is unlikely to be forthcoming from low-income workers or farmers who, because of policy biases, face economic incentives that do not reward effort. They are more likely to shirk and to become resentful and alienated. By contrast, if economic incentives do reward effort, they are likely to respond. Though difficult to quantify, the increases in productivity associated with low inequality may, nevertheless, be large

Third, low inequality spurs growth by *expanding the multiplier effects of a given increase in per capita income*. Many of the poor reside in rural areas and participate in the

² Persson and Tabellini (1991) argue that where distributional conflict is greater, the incentives for the accumulation of knowledge by individuals are weakened. Alesina and Rodrik (1991) argue that democracies with a more unequal distribution of capital ownership will grow less rapidly than more egalitarian democracies because the median voter has a relatively small endowment of capital when wealth is unequally distributed and thus favors high taxes on capital.

agricultural sector. Higher incomes for the poor generate higher demand for non-tradable agricultural inputs and consumer goods, stimulating production of these items. In general, investment and consumption goods demanded by the poor have a much higher non-tradable component than those demanded by the rich. This has led, for example, to the strong positive correlation in Asia between the rate of growth of the agricultural sector and the rate of growth of the non-agricultural sector (Mellor 1995). The estimated multiplier effects of agricultural growth on manufacturing, construction and services are large: a 1 percent increase in agricultural growth is associated with a 1.5 percentage increase in the growth rate of the non-agricultural sector.³

Because the relatively simple manufactured inputs and consumer goods demanded by rural residents are generally more efficiently produced with labor intensive techniques, the employment effects of these increases in demand are amplified.⁴ By contrast, when the incomes of the urban elite increase, the tradable goods on which they spend their increased income tend to be capital intensive goods.

The Human Capital/Equitable Growth Virtuous Circle

Figure 1 displays key parts of the virtuous circle we have described. If the rate of return to human capital investment rises about the discount rate, the poor will increase work intensity to finance these investments, leading to growth in the short run. Even this short run growth will have some impact on the rate of return to additional human capital investment. Demand for schooling will rise, and -- if schools are available -- human capital accumulation will take place.⁵ This leads to reductions in inequality given proper government policy, which both spurs growth in the long run and increases further the demand for schooling (by providing more resources for the poor). The growth itself once again feeds into higher rates of return to human capital investment, continuing the circle.

³ The relationship also implies that the faster agriculture grows, the faster its share of total output declines. Again with the exception of the East Asian city states, those Asian countries with the fastest rates of growth of agricultural output over the last 30 years have tended to experience the biggest declines in the share of agricultural output in GNP.

⁴ See Ranis and Stewart (1987). A detailed study of these backward and forward linkages in the Muda River region of Malaysia provides microeconomic confirmation of the magnitude of the intersectoral multiplier suggested by the cross-country relationship. See also Bell, Hazell and Slade (1982).

⁵ In some conditions, as in Kenya in the 1960's and 1970's, the demand for education will be so great that the poor will create their own schools when the state fails to supply educational services. See Thomas (1981) and Knight and Sabot (1990).

The Role of the Government

Figure 2 adds details of the government's impact on this virtuous circle.⁶

Government's supply of schooling to the poor will be necessary in most circumstances. The poor will find investment in education difficult if there are no schools, or if existing schools are full. But classrooms and teachers are not enough. High *quality* of educational services provided to the poor is vital if human capital accumulation is to take place. In some environments, education is seen as a plum awarded by the government, an enhancement of consumer (and voter) satisfaction. If that is the only role played by education, if education is almost exclusively a consumer good, then quality may matter little. But if the poor view education as a form of investment in human capital, then, as our diagram shows, perceived quality is an important determinant of educational demand.⁷

Governments can build schools and maintain their quality, but the poor will not invest in education unless the perceived payoff warrants the financial and opportunity costs of sending a child to school. The conceptual framework highlights the need for the return to investment to exceed the discount rate. Government has a major impact on this return through its choice of *development strategy*. A strategy that focuses on increasing demand for labor and demand for skills in an internationally competitive economy will raise the rate of return to human capital investment; a set of policies that that biases incentives against manufactured exports and agriculture will have the opposite effect.

We thus have outlined a human capital/equitable growth virtuous circle that can be spurred and maintained by appropriate government policies. Government works to expand efficient demand for skilled labor, to provide opportunities for high quality, universal education, and to generate other profitable investment opportunities for the poor. The poor then respond by working harder at present to finance these investments -- including the investment in education -- thereby raising growth rates in the short and long run. Over time

⁶ We have included in the figure the impact of government on human capital accumulation; clearly government affects growth and inequality in many additional ways.

⁷ Behrman, Ross, Sabot, and Tropp (1994) find that the social rate of return to improving primary school quality exceeds the rate of return to increasing the available quantity of either primary or middle school places. With regard to improving school quality, the production function results suggest that larger gains can be made by investments that improve teacher quality (by increasing their cognitive skills) and increase student exposure to teachers (by reducing class size) than by investments that improve physical infrastructure and equipment.

this leads to higher incomes for the poor, and more investment by them. Growth is generated by high-payoff investments by the poor.

This virtuous circle is related to the sequenced industrialization model of resource-poor countries outlined in Chapter ? of this volume. Industrialization with a rapidly expanding labor force and rising real wages took place in resource-poor East Asian countries in part because of successful land reforms and agricultural research that induced productivity-enhancing investments in agriculture. With no labor "sink," and with the drive for international competitiveness keeping wages in line with productivity, there were large incentives for everyone involved to invest in high quality education. The poor were active participants in this process.

III: Risks Posed to the Virtuous Circle by Resource Abundance

Resource rich countries face several challenges in generating this virtuous circle. We here examine those challenges, using the contrasting examples of Korea and Brazil to highlight the problems.

Inequality of Income and Asset Distribution

Figure 3 details some of the impacts of resource abundance on the virtuous circle. First, consider inequality, which tends to be higher in resource-abundant economies. This stylized fact held even 100 years ago, as noted by Williamson (1998). In point-source resource abundant countries (to use the language of Chapter ?), resource rents are controlled by a small number of persons or firms. Owners of the firms or the government officials concerned can capture the rents. Furthermore, Dutch Disease effects also tend to concentrate income in the hands of those with investments in the booming sector, as incomes fall for producers of other tradable goods. Both of these impacts are most obviously the case in some mineral exporters, such as Nigeria.

With initial high inequality, the effects of the virtuous circle are necessarily of less importance. Resource constraints are binding at lower levels, limiting the ability of the poor to invest even if rates of return exceed their discount rates.

Capital-Intensive, Inward-Looking Development Strategy

Other impacts of resource abundance are mediated through government policy. First, as discussed elsewhere in this volume, resource abundance tends to push countries towards a staple trap, often leading to the closure of trade policy and the adoption of a capital-intensive, inward-looking development strategy. Dutch Disease impacts are important; when the price booms for the major export, unsterilized foreign exchange increases will cause the real exchange rate to appreciate, with negative (and possibly devastating) effects on all other producers of tradable goods. Thus, in Figure 3, the Dutch Disease effects have a negative impact on the choice of a labor-demanding development strategy. The story is more complex than can be shown in the diagram, however.

The appreciated exchange rate makes imported capital cheaper, while biasing incentives against exports. This encourages the government to attempt import substitution based industrialization via the importation of capital, rather than following an export-oriented strategy based on many small domestic investments, or through reliance on local unskilled or semi-skilled labor. Governments frequently exacerbate the problem by making imported capital even cheaper through duty-free importation of capital equipment, investment tax breaks, and tax holidays for foreign investors. The result: high capital/labor ratios, inefficient production, an expanding production base but little employment.

The appreciated exchange rate also hurts what is generally the largest employer in the country, the agricultural sector. Agriculture tends to be more highly tradable than other sectors, and thus is hurt most by appreciation. In many countries, agricultural land and labor are the two most important assets of the poor, in which the virtuous circle induces investment. Resource abundance, then, tends to lower the rate of return to investment in both assets, thereby impoverishing rather than enriching the poor.

The appreciation also hurts non-agricultural producers of exports and import-competing goods. Countries sometimes respond to the resulting outcry from local producers by raising tariff walls and encouraging capital-intensive, inefficient production of tradable goods for the domestic market. But the resulting industrialization employs few people, tends to exacerbate inequality, and offers little scope for the development of an efficient entrepreneurial class. Manufactured exports, one of the most important driving

forces behind the labor-demanding growth path in the East Asian economies, have a difficult time even getting started in this environment.

Populist Pressures for Creation of a Welfare State

Resource abundance thus tends to concentrate income and assets, while reducing efficient employment and investment opportunities for the poor. This leads to a political problem: How does the government assuage the majority of the people, who see much money made from their country's resources, but benefit little themselves?

The logical response is to provide benefits to the people from the resources gained. While in and of itself this is not problematic, the role of government becomes much different from that seen in the conceptual framework. There, the government is concerned with creating an environment in which there are large returns to the assets of the poor. The poor then invest, and through their hard work and improvements in productivity achieve growth with equity.

In resource abundant countries, however, the role of the government can easily become exclusively a provider of welfare goods, with the poor -- indeed with much of the populace -- as beneficiaries. The government's role is then to extract resources from those involved in tapping the natural resources, and turning over what is extracted to the people, frequently through makework jobs or inefficient development projects.⁸ The government becomes Santa Claus, dispensing its largesse on the people, who in consequence demand more and more.

Low Incentives for Investment in Education

The impact of the Santa Claus method of allocation of rents is most important in the education sector, as shown in Figure 3. We have already seen that the predominant development strategies adopted in resource rich countries do not raise the rate of return to human capital investment. The most highly-skilled workers in these economies may receive a hefty wage premium, as they compete with foreign workers for the best salaries in the resource-based sector, or for management positions in protected, import-competing firms. But the child from a poor family who completes primary or lower secondary school

reaps few benefits; agriculture is moribund, and the manufactured exports sector, so important in many countries for hiring semi-skilled workers, is non-existent. Therefore, even if schools are of high quality, there may be little return to investment in human capital.

Furthermore, if a Santa Claus government has created schools in effect as a palliative, as a consumption good to assuage the disgruntled poor, these schools are unlikely to be effective at imparting knowledge. Thus, the quality of schooling suffers, as Figure 3 indicates. At least for a while, even poor schools can serve their purpose simply by dispensing school-leaving certificates, giving a credential but not producing human capital. So low quality schools abound in poor regions, lowering yet further the expected rate of return to investment in human capital. Ironically, when the resource sector boom ends, this poor education leaves the country without the well-trained workers or entrepreneurs required for developing efficient, non-resource based firms (see Chapter ? on Saudi Arabia for a good example).

Differences between Point Source and Diffuse Resource-rich Countries

Not all resource abundant countries face the same risks. Land rich countries in which land is inequitably distributed -- those that pursue a bimodal agricultural strategy, to use Johnston's (1975) term -- tend to behave much like mineral-rich countries. Thus, Chapter ? terms both such economies "point source." Resource rents are concentrated, leading to high inequality; governments are unlikely to pursue a labor-demanding growth path, leading to low returns to investment in human capital; school quality is unlikely to be a government priority. Unless government resists these temptations, the virtuous circle cannot begin moving.

But, on the other hand, if land is equitably distributed -- Johnston's (1975) unimodal agricultural strategy, Chapter ?'s "diffuse" resource-rich economies -- the country faces fewer of the same temptations as mineral-rich economies. In particular, incomes are likely to be more equitably distributed; if the agricultural sector is dynamic, investment in education may have high returns. While the country still faces the

⁸ Gelb, Knight, and Sabot (1991), in an article originally entitled "Lewis Through the Looking Glass," show how a large, unproductive labor sink in the formal sector can have devastating impacts on growth.

temptation not to diversify its export base, and thus can be subject to Dutch Disease, generating the virtuous circle we describe is considerably easier for diffuse compared to point source resource rich economies.

The Examples of Brazil and Korea

Let us now turn to the examples of Brazil, which is land and resource abundant, but with an unequal distribution of land and other assets, and Korea, which is resource poor.

While Brazil's export base was not dominated by a single product, nevertheless the country pursued an inward-looking development strategy. This reinforced the country's unequal initial distribution of income because it generated little demand for moderately-skilled workers, reducing the return to, and thus the demand for, schooling. By contrast, East Asia's aggressively outward-oriented development strategy provided strong incentives for the growth of manufactured exports. These industries initially generated demand for unskilled labor, but as wages rose they became increasingly skill intensive. Korea and Brazil had roughly the same shares of exports to GDP in 1960. By the mid-1980's, Korea's share of exports to GDP had increased from 9% to 37% while Brazil's remained at 8%. High tariffs and quotas protected the Brazilian market from international competition while an overvalued exchange rate weakened incentives to export.

Export orientation increases the demand for skilled workers -- and thus the household demand for education -- in two ways. First, the higher growth rate of aggregate output in an export-oriented economy increases the growth rate of the overall demand for labor. Second, an export-oriented development strategy leads, as wage levels rise, to more skill-intensive production. In East Asia, high returns to schooling, driven by the demand for skills from the export push, kept the incentives for acquiring education strong. This led to a positive interaction between improved educational performance and faster export-oriented growth (Birdsall and Sabot 1996).

In Brazil, the limited demand for educated workers in the protected labor market interacted with the poor quality of schooling and the high level of income inequality to weaken the household demand for education. Brazil's import-substitution strategy

initially appeared to be a success, creating a temporary boom in the 1960's and 1970's that masked the strategy's longer-term implications. The strategy's negative effects on the accumulation of human capital were therefore protracted (Pastore and Zylberstajn 1996).

Besides stunting the demand for labor, Brazil's inward-looking economy used human capital less efficiently than did the East Asian economies. For human capital accumulation to pay off, those leaving the school system must find jobs where their skills are used most productively. Because Brazil did not need to compete internationally, employers and government put up less resistance to rent-seeking by workers. Organized demands for high wages and excessive levels of employment led to the inefficient use of human capital and ultimately became a drag on growth (Robbins and Minowa 1996). Labor extracted rents by raising wages to levels above the supply price, or by raising employment to levels above those justified by the derived demand for labor. To recoup, private and public firms could raise the prices they charged in their protected domestic market. Alternatively, public enterprises could hold the line on prices by receiving increased subsidies from the government, raising the tax burden. Both phenomena tended to lower rates of saving and investment and to reduce the international competitiveness of Brazil's manufacturing enterprises (Birdsall and Sabot 1995).

With lack of dynamism in Brazil's labor market in the late 1970's and the 1980's, workers in the organized sector tended to resort to rent-seeking, thereby maintaining high wage premiums for educated workers. In East Asia, labor was much less successful in organizing in the 1960's and 1970's. In Korea and Singapore, there had been political suppression of labor movements. More importantly, throughout East Asia there were regular and large increases both in real wages and in alternative employment opportunities. The dynamism of the labor market, stimulated by an export-oriented economy, reduced incentives for rent-seeking by workers.

All this serves to explain the large difference in enrollment, dropout, and repetition rates between Brazil and Korea, even in the early 1970's when the Brazilian economy was booming. Korea's enrollment ratio at this time was almost double Brazil's. Korea's export-oriented, labor-demanding growth strategy raised the marginal return of the labor of the poor, making it attractive to increase time allocated to work to finance high-return investments in their children. Public policy also ensured high quality

schooling, even in poor districts, thereby contributing to the high rates of return to investment in schooling. The labor-demanding growth path became increasingly skill-intensive over time -- yet another factor contributing to high expected rates of return to schooling and hence strong household demand. In sum, in Korea there were strong incentives for the poor to invest in their children and to work more to finance that investment. It is reasonable to suppose that marginal savings rates among the poor were exceptionally high.

By contrast, in Brazil the inward-looking growth strategy was not labor-demanding and thus the returns to additional work effort were quite low. In addition, school quality for the poor tended to be abysmal. Although the average returns to investment in schooling were high, for the poor returns to investment in schooling were low. Lack of dynamism in the demand for labor and skills also held down expected returns to investment in schooling. In sum, Brazilian public policy created incentives for high levels of leisure and low levels of saving among the poor.

IV: Policy Implications for Resource Abundant Countries

Resource endowment is not destiny. Instead, resource abundance generally leads to high initial levels of inequality, making more difficult the generation of a human capital/equitable growth virtuous circle. Yet as Figure 3 shows, the other impacts of resource abundance are mediated through government policy. If governments can resist the temptation to ignore quality of schooling and to pursue a capital intensive growth strategy, the virtuous circle is achievable.

This happened in Indonesia. Despite resource abundance, Indonesia managed to avoid the traps we describe for decades, at least in part through trying to follow the development examples of Taiwan, Korea, and Japan. Indonesia successfully avoided most Dutch disease effects by sterilization and nominal devaluations; pursued a unimodal agricultural strategy, together with considerable investment in agricultural research; and spurred the development of a relatively low-capital, manufactured export sector. Education expanded rapidly, while poverty fell. The problems the country has experienced in the last few years result, in part, from departures from this successful development strategy.

Other countries also can use resource abundance to their advantage by carefully managing the macroeconomic effects of commodity booms. They can use revenue raised from resources to improve the rate of return to investments available to the poor -- especially in human capital -- instead of increasing the availability of consumption goods directly. They can invest in high quality education, viewing schooling as an investment good.

The virtuous circle of growth with equity is achievable by all countries. Those with resource abundance face more challenges in getting the circle moving. But if governments of resource abundant countries overcome these challenges, the poor can become an engine of growth, and not only its beneficiaries.

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Table 1: Education and Resource Abundance

		Secondary Enrollment, %		Adult Literacy, %	
		Mean	Median	Mean	Median
1975	Resource Poor	28.5	26.0	56.4	61.3
	Resource Rich	25.3	19.5	52.2	53.2
	Difference	2.8	6.5	4.2	8.1
	Controlled Difference	5.7		6.2	
1985	Resource Poor	39.5	40.5	64.7	72.5
	Resource Rich	35.7	34.0	60.8	63.4
	Difference	3.8	6.5	3.9	9.1
	Controlled Difference	7.4		5.9	

Note: "Controlled Difference" takes into account the average impact of income on secondary enrollment and illiteracy by means of regression analysis. Categorization of countries taken from Auty 1997.

Source: World Development Indicators and authors' calculations.

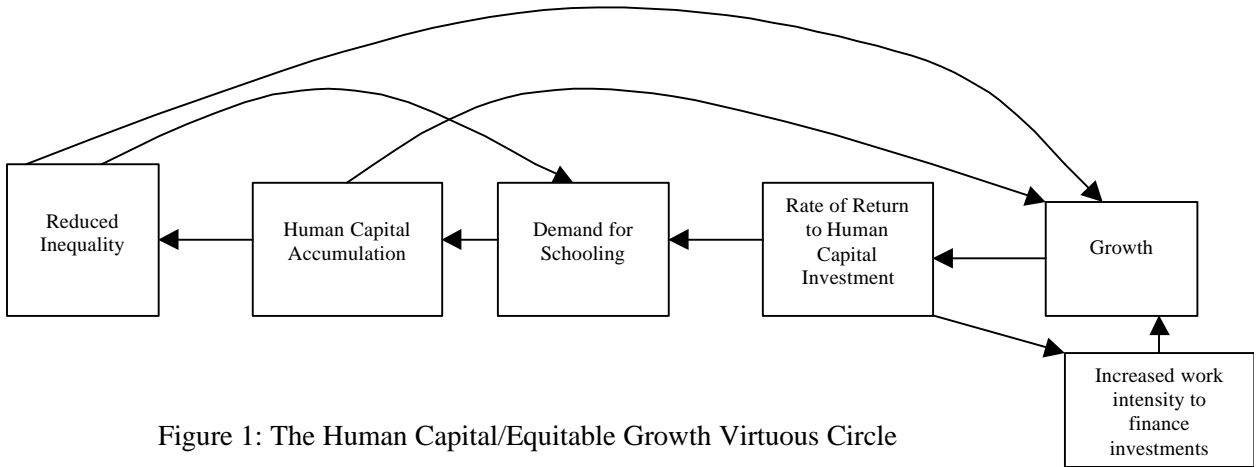


Figure 1: The Human Capital/Equitable Growth Virtuous Circle

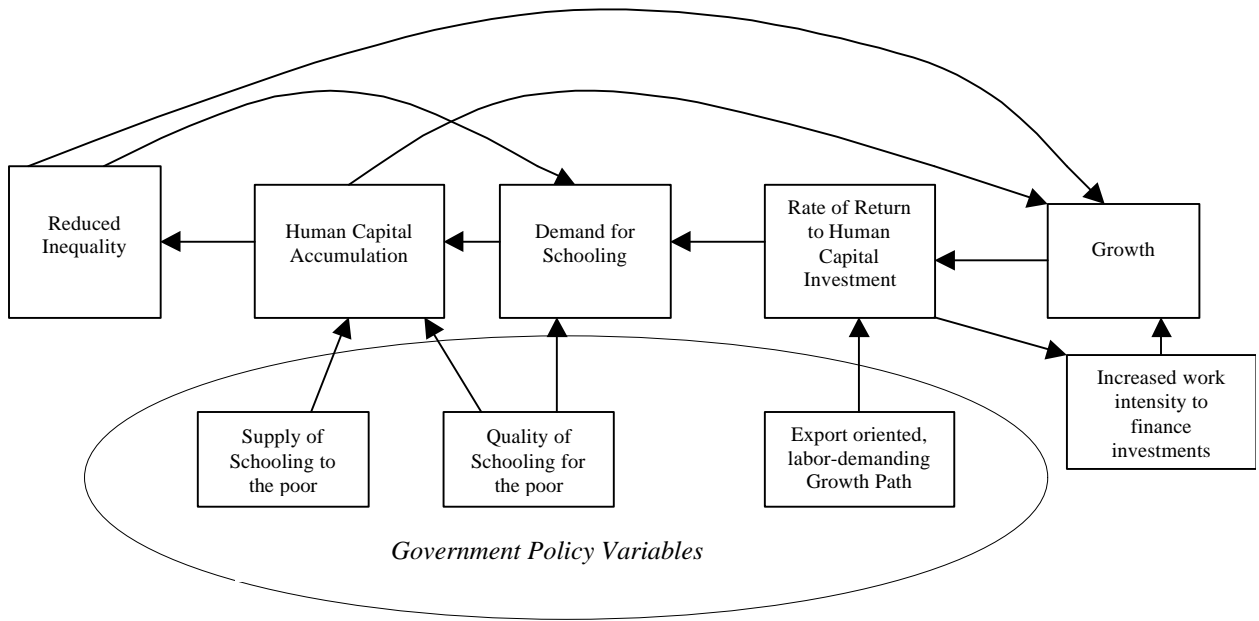


Figure 2: Government's Positive Impact on the Virtuous Circle

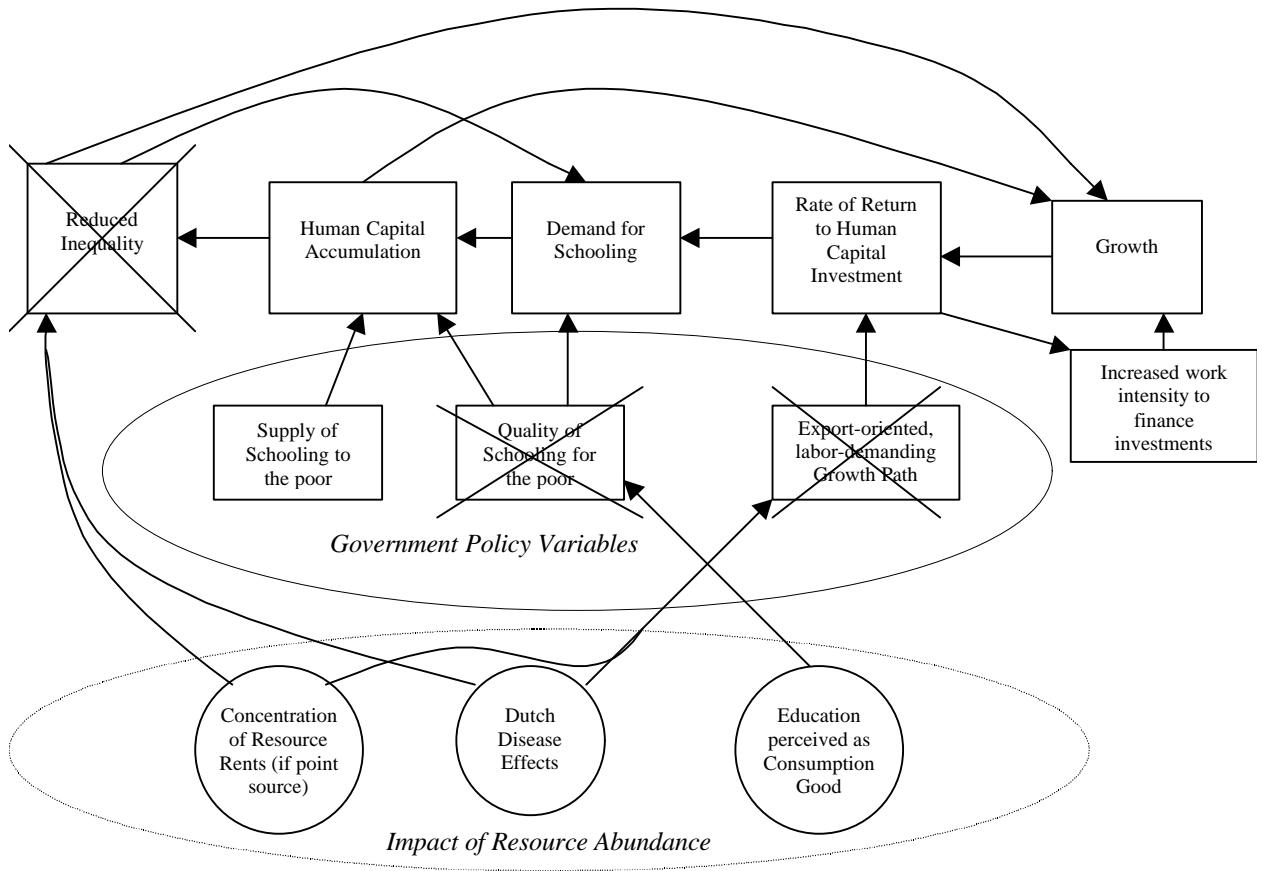


Figure 3: Impact of Resource Abundance on the Virtuous Circle