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Addressing the Education Puzzle

The Distribution of Education and Economic Reform

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When and how does education bring a country high payoffs? First, the distribution of education matters: In most countries, unequal distribution of education has a negative impact on per capita income. Second, the policy environment matters, too: Economic policies that suppress market forces tend to dramatically reduce the impact of human capital on development.

Summary findings

No country has achieved sustained economic development without substantially investing in human capital. Previous studies have shown the handsome returns to various forms of basic education, research, training, learning-by-doing, and capacity-building. But education by itself does not guarantee successful development, as history has shown in the former Soviet bloc, Sri Lanka, the Philippines, and the Indian states of Kerala and West Bengal.

The question is, when and how does education bring high payoffs?

Although theory has suggested a strong causal link between education and growth, the empirical evidence has not been unanimous and conclusive.

López, Thomas, and Wang examine two explanatory factors. First, who gets educated matters a good deal, but the distribution of education is complex and not much has been written about it. They construct an asset allocation model that elucidates the importance of the distribution of education to economic development.

Second, how education affects growth is greatly affected by the economic policy environment. Policies determine what people can do with their education. Reform of trade, investment, and labor policies can increase the returns from education. Using panel data from 12 Asian and Latin American countries for 1970–94, they investigate the relationship between education, policy reform, and economic growth.

Their empirical results are promising.

First, the distribution of education matters. Unequal distribution of education tends to have a negative impact on per capita income in most countries. Moreover, controlling for human capital distribution and the use of appropriate functional form specifications consistent with the asset allocation model makes a difference for the effect of average schooling on per capita income. Controlling for education distribution leads to positive and significant effects of average schooling on per capita income, while failure to do so leads to insignificant, even negative effects, of average education.

Second, the policy environment matters a great deal. Our results indicate that economic policies that suppress market forces tend to dramatically reduce the impact of human capital on economic growth. Investment in human capital can have little impact on growth unless people can use education in competitive and open markets. The larger and more competitive these markets are, the greater are the prospects for using education and skills.

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Summary

No country has achieved sustained economic development without substantial investment in human capital. Previous studies have shown the handsome returns to various forms of human capital accumulation: basic education, research, training, learning-by-doing and capacity-building. Yet history also tells us that education by itself does not guarantee successful development. Examples include the former Soviet Bloc, Sri Lanka, the Philippines, and the Indian states of Kerala and West Bengal. The real question, then, is when and how education can bring high payoffs.

While theories suggested a strong causal link from education to growth, the empirical evidence has not been unanimous and conclusive. This paper focuses on two explanatory factors. First, who gets educated matters a great deal. The distribution of education is a complex issue and not much has been written about it. In this paper we construct an asset allocation model that elucidates the importance of the distribution of education for economic development.

Second, the impact of education on growth is greatly affected by the economic policy environment. Policies determine what people can do with their education. Reforms of trade, investment, labor policies can increase the returns from education. Using panel data from 12 Asian and Latin American countries for 1970 to 1994, the paper investigates the relationship of education, policy reforms, and economic growth. Our empirical results are promising.

First, the distribution of education matters. Unequal distribution of education tends to have a negative impact on per capita income in most countries. Moreover, controlling for human capital distribution and the use of appropriate functional form specifications consistent with the asset allocation model makes a difference for the effect of mean education on per capita income. Controlling for education distribution leads to positive and significant effects of average education on per capita income, while failure to do so leads to insignificant and even negative effects of average education.

Second, the policy environment matters a great deal. Our results indicate that economic policies that suppress market forces tend to dramatically reduce the impact of human capital on economic growth. Moreover, the economies in the sample are in a phase of diminishing growth as the stock of physical capital increases relative to that of human capital.

Investment in human capital can have little impact on growth unless people can use education in competitive and open markets. The larger and more competitive these markets are, the greater are the prospects for using education and skills. The policy environment could also help to induce quality improvements in education and to calibrate the distribution of education to achieve the greatest welfare improvements.

I. Issues and Evidence

Studies have shown the handsome returns to various forms of human capital accumulation: basic education, research, training, learning-by-doing and capacity-building. Education enriches people's understanding of themselves and the world. It improves the quality of their lives and leads to broad social benefits to individuals and society. Education raises peoples' productivity and creativity and promotes entrepreneurship and technological advances, demonstrated in countries from Malaysia to Bolivia to Ghana (World Bank 1991).

We also know that education alone does not guarantee sustainable economic growth. The former Soviet Bloc attained universal literacy decades ago. But because these countries were closed to ideas and products from the outside, their economies stagnated. The Philippines, Sri Lanka, and the Indian states of Kerala and West Bengal have experienced periods of lackluster growth even though their education levels outstripped those of countries and states that matched them in other ways. The real question, then, is when and how education can bring high payoffs.

Using panel data from 12 countries from 1970 to 1994, this paper investigates the relationship of education, policy reforms, and economic growth. We hope to shed light on the importance of the distribution of education to economic growth and on how the interaction of education and reforms facilitates economic and productivity growth. We draw on cross-country experience to show how policy reforms bolster returns from education and to highlight the conditions under which investment in both physical and human capital is likely to pay off.

The Education Puzzle

In the earlier neoclassical models, education was not considered a major input for production and hence was not included in growth models.[1] In the 1960s mounting empirical evidence stimulated the "human investment revolution in economic thought" (Bowman 1966). The seminal works of Schultz (1961) and Denison (1962, 1967) led to a series of growth accounting studies pointing to education's contribution to the unexplained residuals in the economic growth of western economies. Other studies looked at the impact of education on earnings or estimated private rates of returns (Becker 1964; Mincer 1974). A 1984 survey of growth accounting studies covering 29 developing countries found estimates of education's

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[1] Arnold C. Harberger described this period in a recent paper, "Many, maybe even most, economists expected that increments of output would be explained by increments of inputs, but when we took our best shot we found that traditional inputs typically fell far short of explaining the observed output growth...." ".. as the newly discovered residual loomed large in our professional thinking, our discussion centered on two potential explanations: 'human capital' and 'technical advance.'" (Harberger, AER, 1998 p.1-2)

contribution to economic growth ranging from less than 1 percent in Mexico to as high as 23 percent in Ghana (Psacharopoulos 1984).

In the late 1980s, as dissatisfaction with the neoclassical growth framework, endogenous growth models began to emphasize the accumulation of human capital, which is not subject to diminishing returns. In these models, growth is explained by endogenously driven technical change, which may be brought about by a variety of factors: learning by doing (Romer 1986), spillover effects of human capital formation (Lucas 1988), production externalities of public expenditure (Barro 1990), and quality improvements through the invention of new products (Grossman and Helpman 1991).

While these theories have incorporated human capital or education as an important input to growth, empirical evidence is still far from unanimous and conclusive. Numerous studies, some using cross-country data, have investigated the relationship between formal education and economic growth in developing countries. While many studies found that additional years of education per person in the labor force increase real output or growth rates (World Bank 1991, 1993 for example), a few studies found that human capital accumulation had a significant negative or an insignificant impact on economic or productivity growth.

Using cross-country data from 91 countries, Pritchett (1996) found a large and significant negative impact of human capital accumulation on productivity growth. Pritchett offered three possible explanations: schooling creates no human capital, the marginal returns to education are falling rapidly where demand for educated labor is stagnant, and perverse institutional environments have misdirected educated labor to activities that reduce economic growth. Islam (1995) finds consistently negative and significant coefficients on the natural log of years of schooling in panel estimates of the level of income. This finding replicated with various panel and GMM estimators in Hoeffler (1997). Benhabib and Spiegel (1994) and Spiegel (1994) find a negative effect for increased years of schooling using a standard growth accounting framework. Spiegel (1994) shows that the negative effect is robust to the inclusion of a wide variety of variables such as regional dummies, size of the middle class, political instability, share of machinery investment, and inward orientation.

Lau, Jamison, and Louat (1991) estimated the Cobb-Douglas production function using log-difference variables, employing panel data for 58 developing countries. They investigated the effects of education level in five regions and found that education had an estimated negative effect in Africa and the Middle East and North Africa and insignificant effects in South Asia and Latin America; only in East Asia was the effect positive and significant. Jovanovic, Lach, and Lavy (1992), using annual data on a different set of capital stocks and the NSD education data, find similar negative coefficients for their sample of developing countries. The World Bank's *World Development Report 1995* on labor issues also notes the lack of importance of education in explaining aggregate growth (World Bank 1995, figure 2.4). Using other proxies for human capital, such as adult literacy and enrollment, gives similar results. Behrman (1987) estimated a production function using data from 68 developing countries, and found that literacy has a positive effect on output in the level regressions while it has a significantly negative coefficient in the differences regressions. Dasgupta and Weale (1992) find that changes in adult literacy are not significantly correlated with changes in output. Gregorio (199?) studied the growth experience of 12 Latin American countries and found enrollment indices have negative but insignificant coefficients on growth.

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So here is the puzzle: while theory suggests a strong causal link from education to growth, the empirical evidence is neither unanimous nor conclusive.

Three Potential Explanations

One common explanation for the puzzle is that measures of human capital often neglect the quality of education, usually because of data limitations. Much has been written lately about the importance of quality. For example, Hanushek and Kim (1995) find that test scores are positively related to growth rates of real per capita GDP in cross-country regressions. Barro and Lee (1997) show that family inputs and school resources are closely related to student performance as measured by internationally comparable test scores, repetition rates, and dropout rates. Hanushek (1995), Duraisamy et al (1998), and others, have also examined the importance of quality, so this explanation is well studied and is not the focus of our study.

Rather, it focuses on two other explanations. First, who gets educated matters a great deal. The distribution of education is a complex but little explored issue. Based on development experience in the past 30 years, we know that broad access to education is necessary for economic growth. We also sense that, given broad access, the deepening of education is also significantly related to technological progress and industrial upgrading. In Thailand, for example, the shortage of skilled labor is a constraint of growth. Using an asset allocation model to examine this issue, we found that the distribution of education is important in the process of economic development.

Second, the impact of education on growth is greatly affected by the macroeconomic policy environment of a country. The policy environment determines what people can do with their education. Policy reforms to open up trade and investment and reduce distorted prices can greatly increase the returns from formal education and enhance the impact of education on growth. Using a model incorporating the interaction of education, its distribution, and policy reforms we found strong evidence supporting the hypothesis that the interaction of education and policy reform matters.

II. Where Education Worked or Did Not Work

Many developing countries have made significant progress in providing better access to education, as evidenced by improved literacy and enrollment rates and higher quality and more equitable distribution of educational services. But the returns from investment in education vary a great deal. In this section, we compare countries where education has worked to boost growth with those where it has not. Most striking in these comparisons across countries are the differences in equality of education, the policy environment for education, and the impact on growth (table 1).[2] This section highlights cases where the distribution of education was key to development, and cases where the interaction of policy reform and education promoted economic growth.

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[2] In this paper, we employ a panel data set of 12 countries from 1970 to 1994 consisting of variables on GDP per capita measured by purchasing power parity (PPP) and by constant dollars, physical capital stock, labor, level of education of the labor force, and the distribution of education in the labor force, terms of trade, and a few dummy variables. (See appendix 1 for data and methods).

Table 1. Social Progress in Selected Developing Countries

Country	Economic indicators		Education				
	Average annual growth of GNP per capita	Average annual growth of exports	Adult illiteracy (%) 1995		Primary gross enrollment[a]	Secondary gross enrollment	Average years of schooling for labor force
	1970-95	1980-95	Male	Female	1993	1993	1992
East Asia							
China	6.9	12.4	10	27	109	52	5.86
Korea, Rep. of	10	11.6	1	3	101	93	8.70
Malaysia	4	13.6	11	22	93	59	6.92
Philippines	0.6	5.3	5	6	111	79	8.34
Thailand	5.2	16.7	4	8	98	37	6.27
South Asia							
India	2.4	6.5	35	62	105	-	4.01
Latin America							
Brazil	..	6.3	17	17	111	43	4.95
Chile	1.8	7.3	5	5	98	70	7.69
Colombia	1.9	8.1	9	9	119	62	5.69
Mexico	0.9	13.0	8	13	112	58	7.12
Peru	-1.1	2.4	6	17	119	65	7.48
Venezuela	-1.1	1.0	8	10	96	35	8.13

a. Gross enrollment rates are used because net enrollment rates are not available for all countries.
Source: World Bank 1997b. Nehru, Swanson, and Dubey (1995) for the last column.

Education alone is not a guarantee for sustainable economic growth. Sri Lanka had higher per capita income than the republic of Korea in the 1960s, and its social indicators outstripped those in many low-income countries. But its income growth stagnated in the 1970s and 1980s. For some time East Asia has scored high both in the importance people attach to basic education (the demand side) and its broad availability (the supply side). But the recent financial crises have exposed the need for East Asian countries to restructure their economies and upgrade their supply of high-skilled labor and their regulatory capability.

Evidence on Access to Education: The Case of Korea

Through a massive national literacy campaign, the Republic of Korea increased its literacy rate from 55 percent in 1945 to 68 percent in 1960 and 88 percent in 1970. Korea achieved universal enrollment in primary schools by 1965, in middle school by the mid-1980s, and in high school by the late 1980s. Enrollment in higher education has also expanded rapidly, reaching 40 percent in 1990.

Korea's experience is marked by a rapid expansion of primary education and equal access to education. Korea closed the gap between genders at the primary school level in the mid-1960s and at the secondary school level in the late 1980s. Korea vastly reduced education inequality between 1970 and 1995. Its Gini coefficient of education started at a higher level than that of Brazil in 1970, 0.439, but declined dramatically to 0.189 in 1995, the lowest among the 12 countries in this study (table 2. For methodology see appendix I). Korea's economy also grew rapidly during this time, soaring ahead at double-digit rates between 1965 and 1979. As government revenue and household income grew, more public and private funding was devoted

to education. As the economy opened to international market, demand for skilled workers increased which provided incentives for getting education. As a result, a virtuous circle was created where education and growth reinforced each other and both contributed to welfare.

Table 2. GINI Index of Education

Country	1970	1975	1980	1985	1990	1995*
Brazil	0.413	0.367	0.373	0.369	0.314	0.260
Chile	0.279	0.275	0.267	0.263	0.266	0.270
China	0.450	0.452	0.447	0.442	0.411	0.379
Colombia	0.415	0.386	0.397	0.399	0.409	0.420
India	0.370	0.394	0.363	0.393	0.422	0.452
Korea	0.439	0.382	0.351	0.296	0.242	0.189
Mexico	0.420	0.415	0.428	0.410	0.365	0.320
Malaysia	0.445	0.439	0.426	0.413	0.398	0.383
Peru	0.428	0.424	0.392	0.391	0.379	0.367
Philippines	0.368	0.320	0.314	0.313	0.309	0.305
Thailand	0.378	0.369	0.268	0.327	0.348	0.370
Venezuela	0.425	0.426	0.351	0.350	0.347	0.345

* 1995 data is based on projections. See Appendix I for methodology.

Policy Reform and Education: The Case of China

The Chinese government started to invest heavily in education and public health since the 1950s. Its social indicators outstripped those of other low-income countries. Primary enrollment in 1980 reached 103 for girls and 121 for boys, and secondary enrollment was 37 and 54. But factors such as a lack of openness, restricted labor mobility, distorted wages and prices, prevented educated workers from finding the most productive use of their talents.

Economic growth did not take off until the policy reforms started in 1978. China started with easy reforms (such as rural and trade reforms) and only later moved on to more complex and politically more difficult reforms (such as state enterprise and banking reforms). Learning has been incorporated in the process of reforms, as reflected by Mr. Deng Xiaoping's famous saying, "crossing the river by feeling the stones at the bottom."

China opened its doors early on to foreign trade and investment by experimentation. It established four special economic zones in 1980; by 1993 it had more than 9,000 economic zones, which played an important role in attracting foreign direct investment, stimulating trade, bringing in advanced technology, and upgrading industries. Similarly China's price reform was gradual. The scope of planning has been systematically reduced. A dual price approach was adopted in 1984 that combined some price setting by the government for products and materials allocated by the plans, and price setting by markets otherwise. This approach allowed decisionmaking to be determined at the margin by market prices. By 1994, 90 percent of price had been liberalized.

Reform of state-owned enterprises has been a process of learning by doing as well. The first phase (1979-86) focused on giving a certain amount of autonomy to enterprises in exchange for greater efficiency, and the second phase (1987-91) focused on improving managerial mechanism. Since 1992 attention has shifted to clarifying property rights. By early 1998, 800 companies were listed on China's two stock exchanges and thousands of firms are going through ownership

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diversification, corporatization, divestiture, and other restructuring. Its approach to reform has been especially conducive to learning-by-doing, human capital accumulation and capacity building.

China has experienced the most rapid growth of any large country in the world during its period of economic reform. In less than two decades it has achieved what it took other countries centuries to accomplish. Its per capita income doubled between 1978 and 1987 and then doubled again between 1987 and 1996 (table 3). Over 170 million of the 270 million Chinese living in absolute poverty in 1978 were raised above the poverty threshold. China went from lackluster growth of 3.9 percent before the reforms to 8 to 9.6 percent after the reforms.

This remarkable record could not have been achieved with policy reform alone, nor with education alone. Rather, much of it is the result of the interactions between policy reform and learning and education. Many studies have found that a significant share of China's growth can be explained by the accumulation of human capital and the reallocation of resources (including human resources) from low- to high-productivity sectors (table 1.1 in World Bank 1997). Millions of rural laborers found jobs in township and village enterprises, and millions of skilled workers found higher-paying jobs in the private sector or foreign-funded enterprises.

Table 3. Average growth rates of GDP per capita, using Purchasing Power Parity dollars (percent)

	Average growth by decades			Reform period	Non-reform
	1970-79	1980-89	1990-95		
Brazil	5.92	0.91	-0.09	-0.09	3.28
Chile	0.88	2.58	5.08	3.12	-0.32
China	3.92	8.03	9.65	8.85	4.07
Colombia	3.16	1.53	2.52	2.60	2.21
India	0.39	3.71	2.77	3.32	2.15
Korea, Rep. of	8.69	6.52	6.89	6.99	8.42
Mexico	3.45	-0.18	-0.65	0.98	1.02
Malaysia	5.40	3.01	6.33	4.40	5.35
Peru	0.87	-2.05	2.07	2.07	-0.67
Philippines	3.26	-0.42	0.13	0.72	1.10
Thailand	4.11	5.24	8.01	7.55	3.89
Venezuela	0.03	-2.80	1.33	NA	-0.79

Source: Authors' calculations. See Appendix I for data and method.

Interaction of Openness and Education: Country and Project Evidence

Some countries have successfully combined openness and investment in learning and education, forming a virtuous circle: openness creates demand for education, and learning and education make a country's export sector more competitive. Knowledge accumulation influences a country's trade performance and competitiveness (Grossman and Helpman 1989, 1990; Romer 1990); trade, in turn, enhances knowledge accumulation, especially through imports (Ben David and Loewy 1995; Coe and Helpman 1993; Keller 1995; and Padoan 1996). Lucas (1993) notes that to sustain any kind of knowledge accumulation, a country has to be outward-oriented and a significant exporter. Young (1991) and Keller (1994) find that trade itself cannot be the engine of growth, but rather must operate through some mechanism, such as the formation of human

capital, to affect growth. A World Bank (1991) study found that economic growth rates in a sample of 60 developing countries during 1965-87 (Updated to 1994 later) were especially high where there was a combination of a high level of education and macroeconomic stability and openness. The impact of trade openness on long-term growth thus depends on how well people are able to absorb and use the information and technology made available through trade and foreign investment.

Thomas and Wang (1997) looked at the interaction of openness and education and the impact on the performance of the World Bank's lending projects.[3] On an average, countries with a more educated labor force and a more open economy had a rate of return on projects 3 percentage points higher than those that had only one or the other (figure 1).

Figure 1. Education and openness interact and increase investment returns

Education, Openness and Economic Rates of Return of 1,265 World Bank Projects
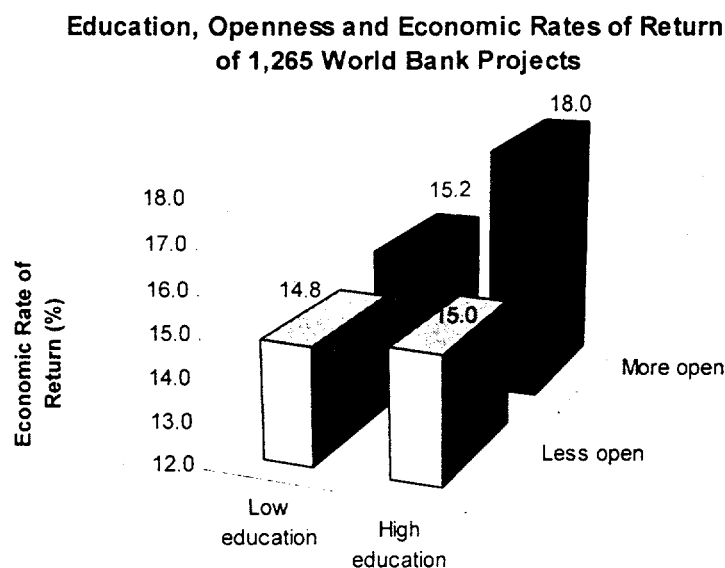
Note: Economic rates of return are from the evaluation database of the Operations Evaluation Department. Education is measured by the average level of schooling of the labor force. and openness by the logarithm of the foreign exchange parallel market premium. Source: Author's calculations.

We have examined case studies of the importance to economic growth of the distribution of education and of the interaction of policy reform and education. We turn next to theoretical models and empirical investigations of the distribution of education and the interaction of policy reforms and education.

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[3] The cross-country project-level data set includes variables on education, per capita income, openness, government expenditure, and project performance. The project data cover 3,590 lending projects in 109 countries evaluated by the Operations Evaluation Department (OED) in 1974-94, with the OED rating of overall performance (satisfactory/not) and economic rates of return.

III. The Distribution of Education Matters

Aggregation, Asset Distribution, and Economic Growth

Most assets are tradable across firms or individuals. This tradability in a context of competitive markets provides a powerful justification for aggregating assets into an aggregate production function. If physical capital, for example, is freely traded across firms in a perfectly competitive environment, then the contribution of physical capital to aggregate output will not be affected by its distribution across firms or individuals. The reason is straightforward: since the marginal product of physical capital is equal for all firms, reducing the capital of one firm and increasing it for another by the same amount will not affect the aggregate output of the economy. If an asset is not traded or is imperfectly traded, however, then the marginal product of the asset across individuals is not generally equalized. In this case aggregate production depends not only on the total level of the asset but also on its distribution. These insights have been well known at least since Gorman's work in 1950. It is surprising, however, that they have not been exploited systematically in growth models.

The assumption of tradability is probably reasonable for most assets, including physical capital, land, and other resources (although tradability may not always be sufficient to equalize asset returns across firms or households). Where this assumption is probably least reasonable is for the distribution of education across individuals. Education and skills cannot be directly traded: only certain services of these skills are traded. This impose restrictions that may ultimately imply systematic heterogeneity of the marginal product of education across individuals.

The vast variability of natural abilities across individuals and the fact that the education children received depends on factors other than their abilities (parents' income, regional location, availability of schools) and is largely determined by nonmarket mechanisms (including government allocation of education services) imply that education levels are not necessarily highly correlated with abilities. That is, the limited role of the market in allocating education may imply large divergence in the value of the marginal products of education across individuals, beyond differences that could be explained by differences in ability.

The importance of these imperfections in the allocation of education and the consequences of such misallocations for aggregate income are examined in this section. We first set up a theoretical framework that integrates asset distribution in the derivation of an aggregate value added or GDP function yielding a structural empirical model. Next we estimate such a model for a group of middle-income developing countries using panel data for 1970-94.

Consider the following production function of individual i,

$$y_i = Ak_i^\beta a_i h_i^\alpha \tag{1.1}$$

where y_i is value added of individual i, A is the coefficient of total factor productivity associated with the overall conditions of the economy, k_i is the share of total capital that corresponds to the individual, a_i is a parameter reflecting the level of ability of individual i and h_i is the level of education of individual i. The variable k represents the tradable factors that have equal marginal products across individual. Thus we assume that k can be aggregated without consideration of its distribution across individuals.

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Average or per capita value added is,

$$y_0 \equiv \frac{\int_0^{y^M} y\,dy}{N} = Ak_0^\beta \left[\int_0^{a^M} \int_0^{h^M} ah^\alpha da\,dh / N \right] \qquad (1.2)$$

where y_0 is per capita GDP, N is the total number of individuals in the economy, k_0 is the average or per capita stock of tradable assets, the term in brackets is the aggregate per capita level of education and a^M and h^M are the maximum levels of ability and education of the population. Clearly, per capita income equation y_0 in 1.2 is not in general independent of the distribution of h and a across the population.

Define $H \equiv \int_0^{a^M} \int_0^{h^M} ah^\alpha da\,dh$ and approximate it up to the second order using Taylor's theorem. It is natural to use the mean education, h_0, and mean ability, a_0, as the point of expansion. Thus,

$$H = \int_0^{a^M} \int_0^{h^M} a_0 h_0^\alpha da\,dh + \int_0^{a^M} \int_0^{h^M} a_0 \alpha h_0^{\alpha-1} da\,dh(h-h_0) +$$

$$\int_0^{a^M} \int_0^{h^M} h_0^\alpha da\,dh\,(a-a_0) + \tfrac{1}{2} \int_0^{a^M} \int_0^{h^M} a_0 \alpha(\alpha-1)h_0^{\alpha-2} da\,dh\,(h-h_0)^2$$

$$+ \int_0^{a^M} \int_0^{h^M} \alpha h_0^{\alpha-1} da\,dh(h-h_0)(a-a_0). \qquad (1.3)$$

Integrating and normalizing a^M and h^M to one, we obtain the expected or average value of H,

$$\frac{H}{N} \equiv E(H) = a_0 h_0^\alpha + \tfrac{1}{2}\alpha(\alpha-1)a_0 h_0^{\alpha-2} E(h-h_0)^2 + \alpha h_0^{\alpha-1} E[(h-h_0)(a-a_0)]$$

$$= a_0 h_0^\alpha + \tfrac{1}{2}\alpha(\alpha-1)a_0 h_0^\alpha (\sigma_n/h_0)^2 + \alpha h_0^\alpha (\sigma_{ah}/h_0) \qquad (1.4)$$

where σ_h^2 is the variance of education, σ_{ah} is the covariance of education and ability and σ_h/h_0 and σ_{ah}/h_0 are the coefficient of variability of education and the coefficient of covariability of education and ability, respectively. Using (1.4) in (1.2) we obtain,

$$y_0 = Ak_0^\beta a_0 h_0^\alpha [1 + \tfrac{1}{2}\alpha(\alpha-1)(\sigma_h/h_0)^2 + \alpha(\sigma_{ah}/h_0)]. \qquad (1.5)$$

Using the definition of the correlation coefficient, ρ, we have $\sigma_{ah} = \rho\sigma_a\sigma_h$. Taking logs of equation 1.5 and replacing we have,

$$\ln y_0 = \ln C + \beta \ln k_0 + \alpha \ln h_0 + \ln[1 + \tfrac{1}{2}\alpha(\alpha-1)(\sigma_h/h_0)^2 + \alpha(\rho\sigma_a)\sigma_h/h_0]. \quad (1.6)$$

It can be shown that if education is optimally allocated, (if the marginal product of education is equalized across individuals), then $\rho = 1$ and $\sigma_h = \dfrac{h_0}{1-\alpha}\sigma_a$. That is, there is a perfect correlation between education and ability, and the standard deviation of education mirrors the standard deviation of ability.

To see this consider a two-stage maximization. In the first stage individuals optimize with respect to capital given their abilities a_i and education h_i:

$$R_i \equiv \max_{k_i} \{Ak_i^\beta a_i h_i^\alpha - p_k k_i\} \qquad (1.7)$$

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where R_i is the net revenue of individual i conditional on a_i and h_i and p_k is the rental price of capital. By using the first-order conditions of equation 1.7 and replacing the optimal value of k_i on the objective function, we obtain the following (indirect) revenue function for individual i,

$$R_i = \tilde{A} p_k^{\frac{\beta}{\beta-1}} a_i^{\frac{1}{1-\beta}} h_i^{\frac{\alpha}{1-\beta}},$$ (1.8)

where $\tilde{A} \equiv A^{\frac{1}{1-\beta}} \beta^{\frac{\beta}{1-\beta}} (1-\beta) > 0$ if $\beta < 1$.

In the second stage individuals maximize R_i with respect to h_i. If education is perfectly allocated, then the allocation of h is such that all individuals equalize their marginal value products of education to a common rental price of education, p_h. Thus, in the second stage individuals,

$$\underset{h_i}{Max} \; \tilde{A} p_k^{\frac{\beta}{\beta-1}} a_i^{\frac{1}{1-\beta}} h_i^{\frac{\alpha}{1-\beta}} - p_h h_i.$$ (1.9)

The first order condition of equation 1.10 is,

$$A \frac{\alpha}{1-\beta} p_k^{\frac{\beta}{\beta-1}} a_i^{\frac{1}{1-\beta}} h_i^{\frac{\alpha}{1-\beta}-1} = p_h; \quad \forall i = 1, ..., N$$ (1.10)

Normalizing $p_h = 1$, and defining $\tilde{A} p_k^{\frac{\beta}{\beta-1}} \equiv b$ we have

$$a_i = b^{1-\beta} h_i^{1-\alpha-\beta}$$ (1.11)

From equation 1.6 it is clear that the effect of σ_h/h_0 on y_0 is negative as long as $\sigma_h > \frac{h_0}{1-\alpha} \rho \sigma_a$. If education is efficiently allocated across individuals then $\sigma_h = \frac{h_0}{1-\alpha} \sigma_a$ and $\rho = 1$, in which case the marginal effect of σ_h/h_0 on income vanishes. If the coefficient of variability of education is greater than $\rho\sigma_a/(1 - \alpha)$ then per capita income can be increased by reducing the dispersion of education. If the coefficient is less than $\rho\sigma_a/(1 - a)$ then per capita income can be increased by concentrating education more among the people that have greater abilities.

Results: The Extended Production Function with Distribution of Education

An implication of the previous section is that one possible reason for why the role of education in production may not be captured in empirical studies that control for country (fixed) effects are specification biases arising from aggregation problems. Explicit consideration of aggregation leads us to two key issues, (i) the role of the distribution of education, an important variable omitted by previous studies, and (ii) the proper specification of an explicitly aggregated production function which turns out to be non-linear.

Table 4 reports four estimates of the aggregate per capita production function for the twelve middle income countries of our sample for the period 1970-94. The first row of Table 4 presents the traditional fixed effect log-linear model that ignores both of the above issues. As can be seen, human capital has a positive but non-significant effect.

The second column of Table 4 shows the fixed effect model still in log-linear from but now allowing the distribution of education to play a role. In fact, after some preliminary trials it was found that while the effects of average education, physical capital and of the 1982-85

dummy for the world crisis were not statistical different across countries, the effect of the education variability coefficient was statistically different across countries. This cross countries diversity of the effect of education dispersion is consistent with the idea presented above that the effect of education dispersion is likely to vary and change sign according to whether it is below or above its optimal level. In this specification the effect of average education becomes negative and significant at 10% level of significance. Thus, the partial correction of the aggregation problem seems to make things "worse" in terms of the coefficient of average education.

The third column of Table 4 presents the results obtained by using the non-linear specification suggested by the theoretical model. That is, this specification deals with both the omitted variable and the functional form specification problems. In this case we obtain that the coefficient of average education becomes positive and statistically significant at 10%. The coefficients of the variability of education for the various countries are jointly significant at 1%, although 8 of the 12 coefficients are not statistically different from zero.

The last column of Table 4 uses the standard deviation in logs as another measure of dispersion of education instead of the coefficient of variability. Two things emerge from this last regression: First, the effect of average education continues to be positive, but now becomes much more significant. Second, this measure of dispersion exerts a much greater effect on per capita income, with most coefficients being now highly significant. Most of these coefficients are now negative and highly significant. Moreover, there is now a negative correlation (about –0.26) between the average value of the log standard deviation for the period and the impact of education dispersion on per capita income of each country. That is, these estimates suggest that the greater is the dispersion of education, the more negative is its effect on per capita income. This result is consistent with the predictions of the theoretical model under the assumption that the level and distribution of abilities are the same in all countries.

Table 4. Production Function Estimation

	Fixed Effects[1] excluding effect of education distribution	Fixed Effects[1] log-linear allowing for education distribution effect using coeff. of variability of education	Non Linear Fixed Effects[2] allowing for education distribution effects using coeff. of variability of education	Fixed Effects[1] allowing for education distribution effects using standard deviation of the log of education
	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Human capital	0.496 (0.369)	-0.182* (0.103)	0.088* (0.046)	0.098** (0.011)
Capital	0.299** (0.025)	0.330** (0.009)	0.327** (0.004)	0.257** (0.008)
Dummy 1982-85	-0.029** (0.011)	-0.018* (0.011)	-0.034* (0.019)	-0.023** (0.010)
Education distribution effects				
Brazil		1.130** (0.569)	-0.404 (0.930)	-0.495** (0.083)
Chile		-2.476** (0.390)	0.586 (0.775)	-0.986** (0.082)
China		-5.163** (1.999)	-7.851* (4.416)	0.923** (0.204)
Colombia		1.044 (0.687)	0.516 (0.426)	-0.891** (0.091)
India		-1.224** (0.244)	1.480** (0.147)	0.174 (0.132)
Korea		-1.030** (0.074)	-0.572 (0.747)	-0.297** (0.044)
Mexico		0.402** (0.188)	-0.572 (0.747)	-0.923** (0.091)
Malaysia		0.160 (0.657)	0.543 (0.846)	-1.010** (0.092)
Peru		1.040** (0.329)	0.745* (0.387)	-1.556** (0.213)
Philippines		0.451 (1.064)	-0.475 (1.237)	-0.461** (0.095)
Thailand		-0.540 (1.108)	-0.357 (0.905)	-0.245** (0.062)
Venezuela		1.336** (0.496)	1.621* (0.905)	-1.578** (0.097)

Note: One star denotes significance at the 10% level, while two stars denote significance at the 5% level.

1. A first-order autoregressive coefficient was estimated by Maximum Likelihood for each country separately. This information was used to correct the data. Standard errors reported correspond to White's heteroscedastic consistent covariance estimator.

2. A first-order autoregressive coefficient was estimated by Maximum Likelihood for each country separately.

IV. The Policy Environment for Education is Crucial

Growth and Human Capital

The theoretical model underlying the empirical growth equations is based on the two-factor growth model discussed by Barro and Sala-I-Martin (1995). The model assumes that the economy can accumulate two factors of production, physical capital and human capital, yielding the possibility of long-run unbounded growth or stagnation.

Consider an aggregate production function,

$$Y = F(K, hL; v) \tag{2.1}$$

where K is total physical capital, h is human capital per capita, and L is the labor force and v is a vector of other variables that affect total factor productivity. The vector v includes the policy environment and the distribution of nontraded assets. Dividing the left and right sides of equation 2.1 by L yelds

$$\frac{Y}{L} = y = L^{\Omega} F(k, h; v), \tag{2.1'}$$

where y is output per capita and k is capital stock per capita. We assume that F(.) is a homogenous function but not necessarily of degree one. If F(.) is homogeneous of degree one then $\Omega=0$, meaning that y is not dependent on the size of the labor force. Otherwise, $\Omega<0$ if F(.) is homogeneous of degree less than one, and $\Omega>0$ if it is homogenous of degree greater than one.

The economy accumulates k and h by investing in either of them,

$$\dot{k} = I_k - \delta_k k \tag{2.2}$$
$$\dot{h} = I_h - \delta_h h$$

where I_k is gross investment per capita in physical capital and I_h in human capital, and δ_k and δ_h are the rates of depreciation of k and h.

The economy's budget constraint at each point in time (the time subscripts are suppressed) is

$$c = L^{\Omega} F(k, h; v) - I_k - I_h \tag{2.3}$$

where c is per capita consumption or real per capita income of the economy at each point in time. We assume a constant risk aversion cardinal utility function, $u = \frac{1}{1+\theta} c^{1+\theta}$, as usual in growth models, where u is utility of the representative consumer and θ is the coefficient of risk aversion. Maximization of the present discounted value of u subject to equation 2.1, 2.2, and 2.3 over an infinite horizon yields the usual Hamiltonian function,

$$H = \frac{1}{1+\theta} c^{1+\theta} + \lambda L^{\Omega}[F(k, h; v) - I_k - I_h - c] + \gamma(I_k - \delta_k k) + \eta(I_h - \delta_h h), \tag{2.4}$$

where λ is the Lagrangian multiplier of the budget constraint and γ and η are the costate variables associated with k and h, respectively.

Barro and Sala-I-Martin assume that $F(\cdot)$ is linearly homogeneous in k and h (and hence that $\Omega=0$). This implies that in the long-run, once the net marginal products of both types of capital are equalized, the economy may reach a unique k/h ratio. We do not impose this assumption here, meaning that positive long-run growth is not assured.

The first-order conditions of this problem (assuming a constant L) include,

(i) $c^\theta = \lambda$,   (2.5)

(ii) $(\gamma - \lambda)I_k = 0$; $I_k \geq 0$,

(iii) $(\eta - \lambda)I_h = 0$; $I_h \geq 0$,

(iv) $\dot{\gamma} = (r + \delta_k)\gamma - \lambda L^\Omega F_1(\cdot)$

(v) $\dot{\eta} = (r + \delta_h)\eta - \lambda L^\Omega F_2(\cdot)$

where r is the discount rate and $F_1 \equiv \partial f/\partial k$ and $F_2 \equiv \partial F/\partial h$. Additionally, of course, the necessary conditions include equations of motion 2.2 (i) and 2.2 (ii) as well as transversality conditions. Note that we added non-negativity constraints on investment.

As Barro and Sala-I-Martin note, the long-run equilibrium can be obtained by assuming that both I_k and I_h are strictly positive. In this case we have that $\lambda = \gamma = \eta$ and $\dot{\gamma} = \dot{\eta}$. Hence, in long-run equilibrium we would have,

$$L^\Omega F_1(k, h; v) - \delta_k = L^\Omega F_2(k, h; v) - \delta_h \qquad (2.6)$$

that is, the net marginal products of both factors are equalized in the long run. If $F(\cdot)$ exhibits constant returns to scale (CRS) in k and h, then $F_1(\cdot)$ and $F_2(\cdot)$ are homogenous of degree zero in k and h (and $L^\Omega=1$). This implies that they can be written exclusively as functions of the factor ratios. That is, under CRS equation 2.6 solves for

$$(k/h)^* = \phi(v, \delta_k - \delta_h) \qquad (2.7)$$

where $\phi(\cdot)$ is a well-defined function. That is, if $F(\cdot)$ exhibits CRS and is concave, there is a unique (optimal) factor ratio that the economy would approach in the long run. If $F(\cdot)$ does not exhibit CRS then there is not a unique k/h optimal ratio. However, a correspondence between k and h may still exist in the long run,,

$$k^* = \psi(v, \delta_k - \delta_h, hL). \qquad (2.8)$$

Given concavity and gross complementarity between k and h, we have that $\partial k^*/\partial h > 0$ (also $\partial h^*/\partial k > 0$).

In the short run if for a given h, $k < k^*$ (where k^* is defined by equation 2.8), then k is the binding factor and growth of the economy in the short-run depends on the accumulation of k. Alternatively, if for a given h, $k > k^*$ then the economy's growth is based on the accumulation of h ($I_h > 0$, $I_k = 0$ in this case). Similarly, in the CRS case if in the short-run $k/h < (k/h)^*$, k then is the binding resource and the economy's rate of growth is given by the accumulation of k until it reaches the long-run ratio. If $k/h > (k/h)^*$ the opposite happens.

In the short and intermediate runs, therefore, we have:

(a) $\gamma > 0$, $I_k > 0$, $\eta = I_h = 0$ if k is the binding resource.

(b) $\eta > 0$, $I_h > 0$, $\gamma = I_k = 0$ if h is the binding resource.

Differentiating equation 2.5 (a) under alternatives a or b, we obtain the following alternative specifications for the economy's growth rate g over the short and intermediate runs:

$$g^a = \frac{1}{\theta} [L^\Omega F_1(k, h; v) - (r + \delta_k)] \qquad (2.9)$$

if k is the binding factor of production, or

$$g^b = \frac{1}{\theta} [L^\Omega F_2(k, h; v) - (r + \delta_h)] \tag{2.10}$$

if h is the binding resource. g^a or g^b is the rate of growth of c or income.

Specifications 2.9 or 2.10 imply that if specification 2.9 prevails then the growth rate g^a would be decreasing in k and increasing in h (this is so because $F_{11} < 0$ by concavity and $F_{12} > 0$ by gross complementarity). That is, if the binding resource is k (there is too little physical capital relative to human capital) then the rate of growth will be declining in the (predetermined) stock of k and increasing in h. The opposite happens if the binding resource is h. In this case the rate of growth over the short and intermediate runs is given by g^b in specification 2.10, and it is increasing in k and decreasing in h. This provides a basis for empirically testing whether an economy's binding resource constraint is related to human or physical capital.

We note that in long-run equilibrium (where equation 2.6 holds) $g^a = g^b$ — that is, the two growth regimes coincide. Also, if CRS prevail then growth in either regime depends only on the k/h ratio. It is increasing on k/h under regime b and it decreasing in k/h under regime a. The long-run growth rate may be positive even under CRS. This is so if $F_1((k/h)^*, 1; r) + \delta_k \equiv r^* \equiv F_2((k/h)^*, 1; v) - \delta_h > r$. If, however, $r^* < r$, that is, if the net marginal products of the resources are, when evaluated at the long-run ratio $(k/h)^*$, less than the discount rate r, then growth will be smothered before k/h reaches $(k/h)^*$ (López, 1998). That is g^a or g^b becomes zero before reaching the optimal ratio $(k/h)^*$.

The model assumes that the accumulation of both physical and human capital is driven by private profitability motives. In reality, part of the accumulation of human capital is dictated by the government. Since investments in education are, in important ways, a policy variable. Private investments in human capital generally take up the slack left by public education. Also, investments in education are not likely to be driven exclusively by economic efficiency considerations. Thus in many instances the stock of human capital can be considered largely nonoptimal (and to some extent exogenous). However, private education is likely to be significant at the margin, by affecting the net changes of education. And the private sector largely controls investment in physical capital, which responds in part to the stock of human capital. The large role of the public sector in education implies that the economy is less likely to be at a balanced growth stage. The relationship between h and k is may not be optimal at each point in time and thus the economy is almost continuously in the process of adjusting the stock of k in relation to h.

Empirical Specification of the Growth Model

In order to derive an empirical specification for growth rates g^a or g^b, we use discrete approximations for equations 2.9 and 2.10:

$$g_t^a = \frac{1}{\theta}[F_1(k_{t-1}, h_{t-1}; v_{t-1}) - (r + \delta_k)] \tag{2.9'}$$

or

$$g_t^b = \frac{1}{\theta}[F_2(k_{t-1}, h_{t-1}; v_{t-1}) - (r + \delta_h)]. \tag{2.10'}$$

These specifications are highly consistent with the temporary equilibrium interpretation of the growth model. At the beginning of each period (or the end of the previous period),

decisionmakers evaluate the marginal returns to each factor of production, comparing them with their respective marginal costs ($r + \delta_k$ or $r + \delta_h$). If the marginal return of a factor is above its marginal cost, there is positive investment in that factor during the period; otherwise not. Relating the growth rate in period t to stocks of factors at time t− 1 and structural factors (vector v) at t − 1 considerably reduces the simultaneity biases that usually plague growth estimates. Biases due to omitted variables can still be a problem, although with panel data much of the problems related to time-invariant country-specific omitted variables can be reduced by using within estimators. The only remaining problem is omitted variables that are country specific but change through time.

In addition to the marginal effect of the factors of production the policy environment variables (vector v) are also allowed to affect total factor productivity. We are particularly interested in distinguishing countries and periods in which structural adjustment has occurred from those with a traditional inward regime and heavy government intervention, exchange controls, and highly restrictive trade policies. Thus we use the following empirical specification:

$$g_{it} = \alpha_0^i + \beta_0 DV_{i,t-1} + \alpha_k \ln k_{i,t-1} + \alpha_h \ln h_{i,t-1} + \alpha_L \ln L_{i,t-1} \qquad (2.11)$$

$$+ b_k DV_{i,t-1} \ln k_{i,t-1} + b_h DV_{i,t-1} \ln h_{i,t-1} + \varepsilon_{it},$$

where g_{it} is growth rate of country i in period t, Dv_{it} is a dummy variable equal to zero in periods under the traditional policy regime and equal to one in periods when structural reforms are in place $k_{i,t-1}$ is the stock of physical capital in country i at time t− 1, $h_{i,t-1}$ is the stock of human capital in country i at time t− 1, $L_{i,t-1}$ is thelabor force at time t-1, α_0^i is the fixed country effect that includes total factor productivity levels and is also related to the marginal costs, $r^i + \delta_k/\theta^i$ or $r^i + \delta_h/\theta^i$, and ε_{it} is the random disturbance satisfying the usual properties.

Equation 2.11 is the benchmark empirical specification. Several variants are also estimated. We allow for the policy regime to be quite general, affecting the marginal (logarithmic) effects of each factor of production as well as the intercept. One hypothesis is that distortionary regimes tend to reduce the impact of human capital and to increase the impact of physical capital on growth: most distortions in developing countries protect capital-intensive activities and tax human capital intensive activities (Krueger, 1978; Bhagwati, 1978). That is, we expect that $b_k < 0$ and $b_h > 0$. (Though the model here obviously cannot account for interindustry effects such as these, López (1998) uses a two sector growth model and shows that the growth effects of capital stocks are larger under conditions of protection to capital-intensive activities.)

Also, if growth is dictated by physical capital accumulation, then $\alpha_k < 0$ and $\alpha_k + b_k < 0$ while $\alpha_h > 0$ and $\alpha_h + b_h > 0$. If growth is dictated by human capital, then $\alpha_k > 0$ and $\alpha_k + b_k > 0$ and $\alpha_h < 0$ and $\alpha_h + b_h > 0$. Economic growth is more likely to be dictated by physical capital accumulation in middle-income countries that have invested heavily in public education for long periods of time and by human capital driven in generally poor countries that have underinvested in education.

The coefficients in equation 2.11 can be related to the parameters of the underlying production function. Assuming a Cobb-Douglas production function,

$$F = AV\eta\, k^a\, h^d \qquad (2.12)$$

then from equations 2.9 or 2.10,

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$$\frac{\partial g^{a}}{\partial \ln k} = \frac{a-1}{\theta} F_{k} \; ; \qquad \frac{\partial g^{a}}{\partial \ln h} = \frac{d}{\theta} F_{k}$$

or, alternatively,

$$\frac{\partial g^{b}}{\partial \ln k} = \frac{a}{\theta} F_{h} \; ; \qquad \frac{\partial g^{b}}{\partial \ln h} = \frac{d-1}{\theta} F_{h} \; .$$

Hence,

$$\frac{\partial g^{a}/\partial \ln k}{\partial g^{a}/\partial \ln h} = \frac{a-1}{d} \; ; \qquad \frac{\partial g^{b}/\partial \ln k}{\partial g^{b}/\partial \ln h} = \frac{a}{d-1} \; . \qquad (2.13)$$

Combining equations 2.11 and 2.13 we can identify the ratio of the parameters associated with k and h in the underlying production function. Note that this provides a test for CRS: Under CRS in k and h, $1 - a = d$. Hence, the ratios in equation 2.13 are in this case equal to -1.

Results for the Growth and Human Capital Model

We estimated the fixed-effect model (equation 2.11 and several variants.) Related specifications include the suppression of the labor force as an explanatory variable and the inclusion of the coefficient of variability of education as an additional explanatory variable. The use of the labor force as an explanatory variable could decrease problems of heteroscadasticity, while the use of the coefficient of variability of education is consistent with the asset distribution model presented in section III.[4] We also estimate the growth equation using a random-effect specification as an alternative to the fixed-effect model.

Table 5 presents two estimations for the fixed-effect and two for the random-effect models. The fixed-effect model that includes the labor force as an explanatory model seems better because it passes the White specification test; that without the labor force does not. Also, both estimators reject the hypothesis that the coefficient value of average schooling of the labor force is equal to minus the coefficient value of the stock of capital per capita (that is, they reject a specification that uses k/h as the explanatory variable instead of k and h as separate variables). That is, we reject the CRS hypothesis, meaning that the labor force should be an explanatory variable.

The estimated parameters in the fixed-effect and random-effect specifications are quite similar and highly robust with respect to changes of specification. Increases in the stock of human capital tend to accelerate growth, particularly under free market conditions and an outwardly oriented economic structure. In the random-effect specifications, education has no significant effect on economic growth in the absence of these conditions and in the fixed-effect specifications, this effect is significant at the 10%. The effect of average education on growth is zero or barely significant in closed or semiclosed and highly regulated economies, but very large and significant once economies become outwardly oriented with reduced government intervention. A 5% increase in the average schooling of the labor force, all else remaining the same, accelerates the annual growth rate by about 0.85 percentage points in a free market environment.

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[4] The asset distribution model, however, predicts that the coefficient of variability of education affects the production function (and, hence, the growth rate) in a highly nonlinear form. In the growth model we only consider log linear specifications due to the difficulties of estimating a nonlinear growth model.

By contrast, the negative impact of capital on growth is much larger in periods of liberal policies than in periods of regulated economic environments. This is consistent with the fact that most countries in the sample protected their capital-intensive activities during periods of heavy government intervention. Thus, once the policy environment is liberalized, capital-intensive activities get lose protection, with a consequent reduction in the contribution of physical capital to growth.

An increase in the stock of physical capital, maintaining human capital constant, exerts a negative effect on the rate of growth for both distorted economic regimes and free market regimes. Using the fixed-effect estimates in column 1 of table 5, a 5 percent increase in capital stocks reduces the annual rate of growth by about 0.2 percentage points in periods of liberal policy environments. This negative effect of capital on the growth rate is consistent with a positive effect on output levels.

The negative effect of an increase in physical capital stocks on growth and the positive effect of human capital indicate that growth rates are determined by a regime in which capital per capita rather than average schooling of the labor force is the binding constraint (see equation 2.9'). That is, these results suggest that these economies have levels of capital per capita that are below the long-run equilibrium, k^* (see equation 2.8), or, equivalently, that the stock of human capital is too large for the stock of physical capital. The growth rate is dictated by the gap between the net marginal value of physical capital and its marginal cost (rather than by the human capital gap that is not necessarily positive). In other words, these economies have not yet reached a balanced growth stage, and economic growth is declining as k/h increases toward its long-run equilibrium.

Balanced expansion of both human and physical capital increases the rate of economic growth under liberal economic regimes but not necessarily under restrictive regimes. An increase of both human and physical capital stocks by 5% under a liberal economic environment may increase the growth rate by 0.65 percentage points.

Overall the results indicate that economic policies that suppress market forces tend to dramatically reduce the impact of human capital on economic growth. Moreover, the results suggest that the economies in the sample are in a phase of diminishing growth as the stock of physical capital increases relative to human capital.

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Table 5. The growth equation under various specifications

	Fixed Effects		Random Effects	
Average schooling	0.111* (0.063)	0.094* (0.058)	-0.006 (0.027)	-0.017 (0.026)
Schooling × reform dummy variable	0.186** (0.047)	0.183** (0.047)	0.182** (0.046)	0.174** (0.046)
Per capita capital stock	-0.027* (0.016)	-0.033** (0.015)	-0.017* (0.009)	-0.013* (0.007)
Capital × reform dummy variable	-0.036** (0.011)	-0.036** (0.010)	-0.036** (0.010)	-0.035** (0.010)
Dummy 82-85	-0.021** (0.007)	-0.021** (0.006)	-0.022** (0.006)	-0.023** (0.006)
Labor force	-0.090* (0.049)	-0.083* (0.048)	-0.005 (-0.006)	--
Coefficient of variability of schooling	0.034 (0.047)	--	0.013 (0.035)	--
Homoscedasticity (Breusch-Pagan test)	Rejected at 5%	Rejected at 5%	Not rejected at 5%	Not rejected at 5%
White Test of Specification	Rejected at 5%	Rejected at 5%		
Hausman test: Fixed vs random effects	--	--	Not rejected at 5%	Not rejected at 5%

Notes:
* means significant at 10%; ** significant at 5%.
All variables are in log form. All explanatory variables are lagged by one period
Standard errors of the coefficients are in parentheses.

V. Conclusions

In reconfirming the importance of education, this paper has emphasized the importance of quality as well as quantity. The qualitative side includes the conventional issues of the relevance of the curriculum, the nature of adult learning, and the impact of learning, aspects that are important in determining whether the education makes a difference to economic performance. In addition, we emphasize two other aspects of quality not often assessed in the literature: distribution of education and the link between policies and the input of education.

The distribution of education matters and equal access seems key. Unequal distribution of education tends to have a negative impact on per capita income in most countries. Moreover, controlling for human capital distribution and the use of appropriate functional form specifications consistent with the asset allocation model makes a difference for the effect of mean education on per capita income. Controlling for education distribution leads to positive and significant effects of average education on per capita income, while failure to do so leads to insignificant and even negative effects of average education.

There is a clear link between economic policies and the impact of education. The focus on education matters little for growth unless people can use education in competitive and open markets. The larger and more competitive these markets, the greater are the prospects for using education and skills.

These insights about the importance of equity and policy provide a basis for linking education policy and economic policy reform. Economic policymakers should recognize that investments in education, including improvements in equality, are essential for economic success. Education policymakers would do well to recognize that the economic policy environment crucially influences the impact of education. The policy environment can also help to induce quality improvements in education and to calibrate the distribution of education to patterns that make for the greatest welfare improvements. The evidence on this two-way link is the most important finding of this study.

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Appendix I: Data, Sources and Methodology

Data

In this paper, we investigate the relationship between the distribution of education, economic reform and economic growth by a panel data set of 12 countries from 1970 to 1994. The data set consists of variables on GDP per capita measured by purchasing power parity (PPP) and by constant dollars, physical capital stock, labor, level of education of the labor force, and the distribution of education in the labor force, terms of trade, a dummy variable on economic reforms, and a few time dummies.[5] Most data was extracted from the World Bank's main database, except for a few.

Output level is measured by GDP per capita in constant US dollar at 1987 prices. Growth rates are calculated using the log-difference method. In order to allow cross country comparison of "unexplained residual" or total factor productivity, we also converted GDP into one measured by Purchasing Power Parity (PPP) or international dollars, by using a single year (1995) PPP conversion ratios. Table 3 shows the average growth rates by decades and for reform versus non-reform periods. See also the charts at the end of the paper.

For physical capital stock, we used the variable estimated by Nehru and Dhareshwar (1993) using the perpetual inventory method. Gross domestic investment as a ratio of GDP was used as a proxy measure in some regressions. Labor input was taken from the labor force information from the World Bank main database. For human capital stock, we used the variable---average years of schooling for the labor force, as estimated by Nehru, Swanson and Dubey 1994.

The distribution of education was characterized by coefficient of variability of education for population aged over 15, and several other dispersion measures. The calculation took several steps. First, we obtain data on educational attainment at various levels for the population over the age 15 from Barro and Lee 1997. Second, school cycling data was obtained from Psacharopoulos & Arriagada 1986, Table B-1. Third, we then calculated the mean year of education, variance of education, standard deviation of education, coefficient of variability of education, and GINI coefficient all for the population aged over 15. Table 2 presents the calculated coefficient of variability of education by five-year intervals. In most countries, this variable shows a decline over 25 year period.

The dummy variables for economic reforms (DREF) and for political upheavals (DPOL) were constructed based on the chronological description of development and reform for each country (Appendix II), which summarize both the economic and the political processes occurred in the 12 countries during the historical period from 1970 to 1995. On the terms of trade (TOT), we used the country specific terms of trade for each country whenever it is available in the IMF International Finance Statistics Yearbook (IFS). Some proxy measures were used when the TOT data is not available for a particular country.

Twelve countries were selected into the sample based on the following rationales: First, determined by the objectives of this paper, we must select countries which conducted some policy reforms. Second, the effects of policy reforms must have been felt within a reasonable period. This rules out most countries in East Europe and Formal Soviet Union because their market reforms were too recent. This also rules out some low-income countries in Africa where the implementation of reform measures were too uncertain due to weak institutions or lack of legal infrastructure. Third, in order to do a good in depth analysis, one has to be reasonably familiar with the economy and political history in these countries. Data availability, our knowledge regarding the countries and resource constraint put a limit on the number of

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[5] We are grateful to Jong-Wha Lee and Robert Barro, V. Nehru and S.Patel for kindly allowing us to use the education, and capital variables that they have. Other variables are from the World Bank main database.

countries that can be included in the study. Our sample thus include Brazil, China, Chile, Colombia, India, Korea, Malaysia, Mexico, Peru, the Philippines, Thailand and Venezuela, which are, largely, middle income countries with a per capita income of over $1500 PPP dollars in three regions, Latin America, East Asia and South Asia.

Table A1. Coefficient of Variability of Education for Population 15 Years and Older

	1970	1975	1980	1985	1990	1995
Brazil	0.93	0.87	0.88	0.86	0.79	0.71
Chile	0.60	0.61	0.57	0.57	0.57	0.57
China	..	1.02	0.92	0.89	0.76	0.62
Colombia	1.02	0.87	0.90	0.90	0.91	0.93
India	1.74	1.64	1.62	1.50	1.37	1.24
Korea, Rep. of	0.93	0.70	0.60	0.52	0.42	0.31
Mexico	0.99	0.96	0.91	0.86	0.68	0.50
Malaysia	1.03	0.95	0.85	0.80	0.75	0.70
Peru	0.93	0.93	0.75	0.78	0.77	0.77
Philippines	0.80	0.64	0.60	0.60	0.58	0.57
Thailand	0.79	0.82	0.78	0.75	0.74	0.73
Venezuela	1.09	1.04	0.70	0.71	0.78	0.85

Source: Authors' calculation.

Sources of data

Variable	Meaning	Source	Notes
GDP	GDP in constant 1987 US $	WDI (see note 1)	1970-1995
OGDP	GDP in constant 1987 local currency	WDI	1970-1995
CGDP	GDP in current local currency	WDI	1970-1995
INV	Gross domestic investment in constant 1987 US $	WDI	1970-1995
L	Population	WDI	1970-1995
LBR	Labor force	WDI	1970-1995
EDU	Human capital stock: total mean years education	Nehru, Swanson & Dubey, 1994 (see note 2)	1970-1992
CAP	Total physical capital stock in constant 1987 local currency (original)	Nehru & Dhareshwar ,1993	1970-1990
KAP	Total physical capital stock in constant 1987 local currency (converted)	calculated based on Nehru & Dhareshwar ,1993	1970-1990
KKAP	Total physical capital stock in constant 1987 US $. KKAP=KAP*GDP/OGDP	calculated	1970-1990
KPPP	PPP conversion rate, KPPP = (GNP per capita, Constant 1995 int'l $) / (GNP/Population constant 1987 $)	calculated	1970-1995
PPP	GDP in PPP terms. PPP = GDP * KPPP	calculated	1970-1995
PPPC	GDP per capita in PPP terms	calculated	1970-1995

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	PPPC = PPP / Population		
UVI	Unit value of import	IFS (see note 3)	
Copperchl	Copper price for Chilean TOT	IFS	
TOT	Terms of trade	IFS and calculated (see note 4)	1970-1995
DREF	Dummy variable for reforms	constructed (see note 5)	1970-1995
DPOL	Dummy variable for political upheaval	constructed (see note 5)	1970-1995
EDI	mean years of education for the population age over 15	constructed from (a) Barro & Lee 1997 and (b) Psacharopoulos & Arriagada (see note 6, 7, 8)	1970-1995
EDV	variance of education for the population age over 15	constructed	1970-1995
EDS	standard deviation of education for the population age over 15	constructed	1970-1995
EDZ	coefficient of variability of education for the population age over 15	constructed	1970-1995
GINI	GINI index of education for the population age over 15	constructed	1970-1995
THL	Theil index of education for the population age over 15	constructed	1970-1995
SDL	Standard Deviation of Logs of education for the population age over 15	constructed	1970-1995

End Notes for the data sources and data calculations

1. WDI

World Bank, *World Development Indicators (WDI), CD-ROM.*

2. Nehru & Dhareshwar, 1993

Nehru, Vikram, and Ashok Dhareshwar. 1993. "A New Database on Physical Capital Stock: Sources, Methodology and Results." Revista de Análisis Economico 8 (1): 37-59.

Nehru, Vikram, Eric Swanson, and Ashok Dubey. 1994. " A new database on human capital stock: sources, methodology and results." Journal of Develoment Economics.

The two variables of (1) total physical capital (CAP) and (2) human capital stock: total mean years education (EDU) are quoted from the above papers.

3. IFS

International Monetary Fund. *International Financial Statistics Yearbook (IFS).*

4. The terms of trade

For Brazil, Colombia, India, Korea, Malaysia, the Philippines, Thailand, and Venezuela, the terms of trade are quoted directly for the IFS. For Chile, China, Mexico, and Peru, the terms of trade are not available from the IFS, and they are obtained through the following processes.

a. For Chile, the terms of trade are substituted with the ratio of the copper price (Copperchl) to the unit value of imports (UVICHL), let 1990 =100.
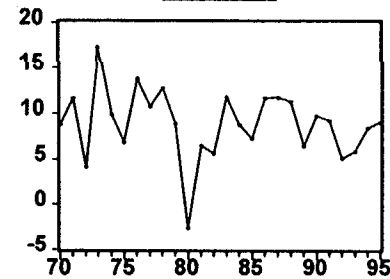
b. For China, the terms of trade are substituted with the terms of trade of Asia.

c. For Mexico, the terms of trade are substituted with the terms of trade of Venezuela.

d. For Peru, the terms of trade are substituted with the terms of trade of Chile (see 4.2a)

5. The dummy variables for economic reforms and political upheavals

The dummy variables for economic market reforms (DREF) and for political upheavals (DPOL) are constructed based on the country stories, which summarize both the economic and the political processes occurred in the 12 countries during the historical period from 1970 to 1995.

6. Barro & Lee

Barro, Robert and J.W. Lee, "International Measures of Schooling Years and Schooling Quality," AER, Papers and Proceedings, 86(2), pp. 218-223. Data file "School4.raw" contains the data on educational attainment at various levels for the population over the age 15.

7. Psacharopoulos & Arriagada 1986

> Psacharopoulos, George & Ana-Maria Arriagada. "The educational attainment of the labor force: an international comparison." The World Bank, October 1986. Report No.: EDT38. Appendix B, Table B-1: The Structure of Educational System.

8. EDI, EDV, EDS, and EDZ

> First, we obtained education distribution data for 1970, 1975, 1980, 1985, and 1990 from Barro & Lee data file "School4.raw," then make the categories of education distribution mutually exclusive. Second, we obtained the school cycling data from Psacharopoulos & Arriagada data Table B-1. Then we calculated the following:
>
> EDI: mean years of education for the population age over 15
>
> EDV: variance of education for the population age over 15
>
> EDS: standard deviation of education for the population age over 15
>
> EDZ: coefficient of variability of education for the population age over 15
>
> GINI: GINI index of education for the population age over 15.
>
> The formula to calculate the GINI is:
>
> $$\gamma = \frac{1}{\mu N(N-1)} \sum_{i>j} \sum_{j} \left| x_i - x_j \right|.$$ Where γ is the GINI index, μ is the mean of the variable, and
>
> N is the total number of observations.
>
> THL: Theil index of education for the population age over 15.
>
> The formula to calculate the theil index is:
>
> $$\tau = \frac{1}{N} \sum_i \frac{x_i}{\mu} \ln\left(\frac{x_i}{\mu} \right).$$ Where τ is the theil index, μ is the mean of the variable, and N is the total
>
> number of observations.
>
> SDL: Standard Deviation of Logs of education for the population age over 15.
>
> Finally, we estimated the values in between through linear interpolation.

Real GDP Growth Rate

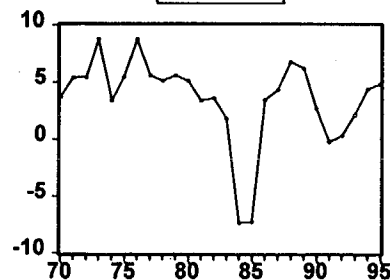# GDP Per Capita Measured by Purchasing Power Parity (PPP)
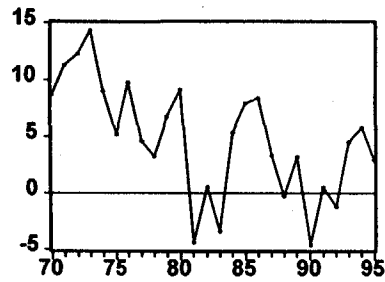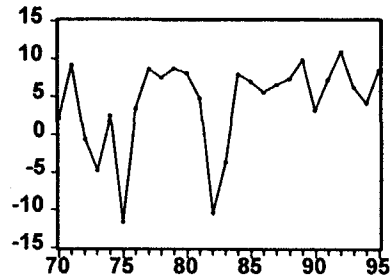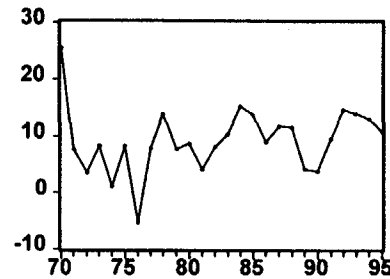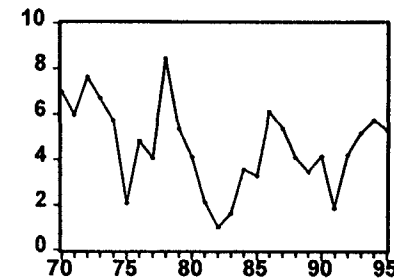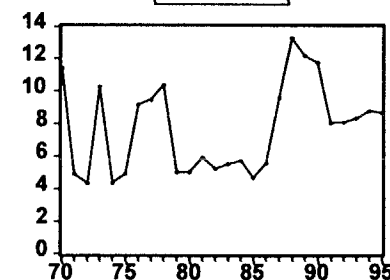

BRAZIL

CHILE

CHINA

COLOMBIA

INDIA

KOREA

MEXICO

MALAYSIA

PERU

PHILIPPINES

THAILAND

VENEZUELA

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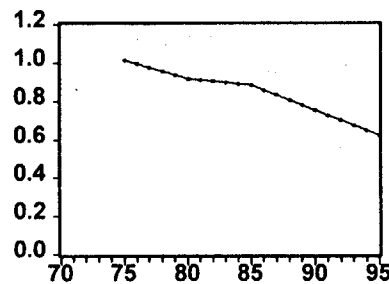# Coefficients of Variability of Education
(for the Population Age over 15)

Mean Years of Education
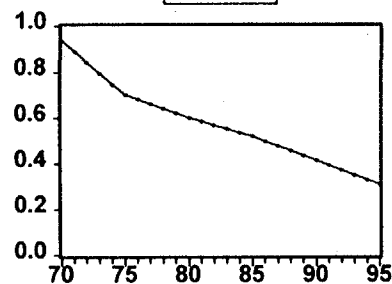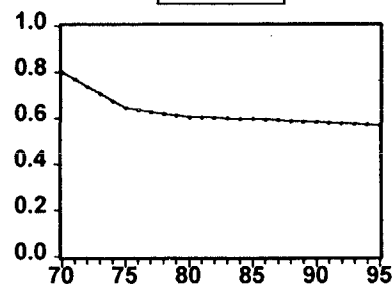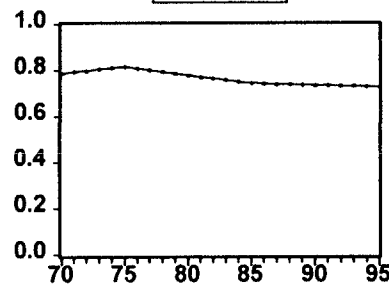
Terms of Trade (1990=1)
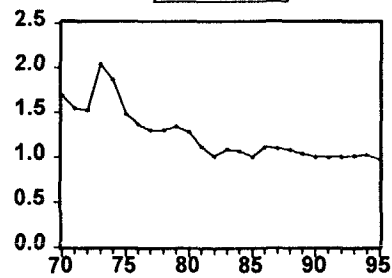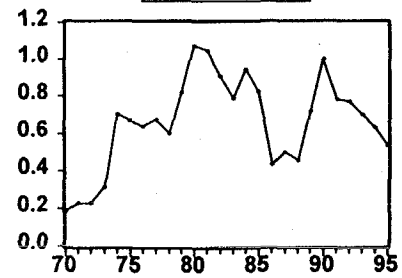
Appendix II Chronology of Reforms and Development in 12 Countries

China:
Building Learning into Reforms

Development Strategy before 1978

China had a planned economic system from the 1950s to early 1970s, which was endogenous to its development strategy and external environment. Chinese leaders adopted a heavy industry-oriented development strategy, similar to those of the former Soviet Union. To implement such a strategy in a poor rural and capital-scarce economy, it was imperative to artificially underprice capital, foreign exchange, energy, raw materials, labor and other necessities in order to lower the cost of capital formation in the heavy industry. Plans and other administrative resource-allocation mechanism were established in order to channel the scarce resources into heavy industry. 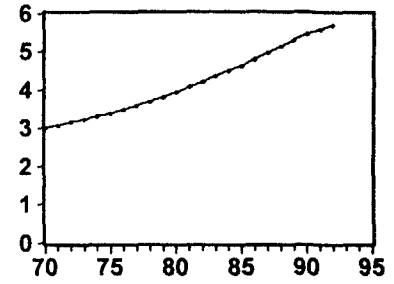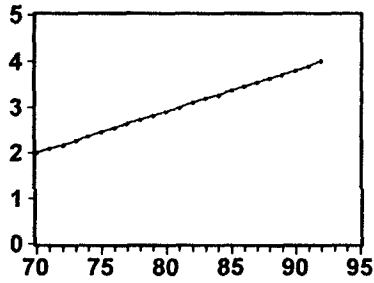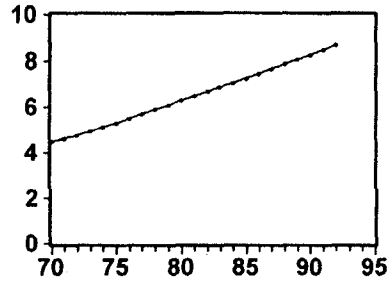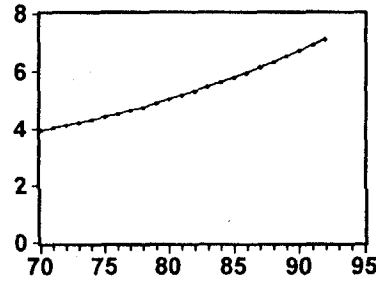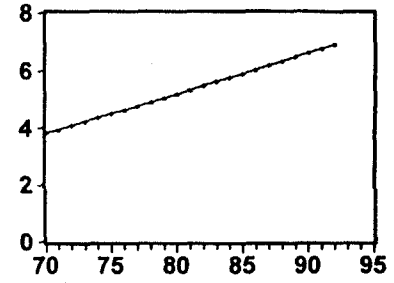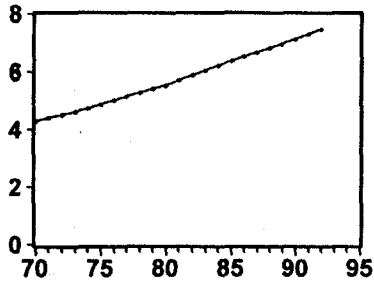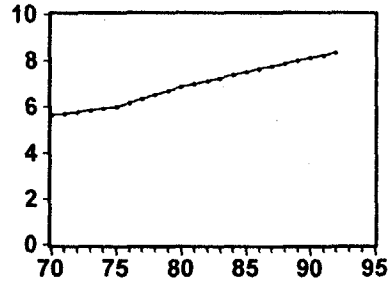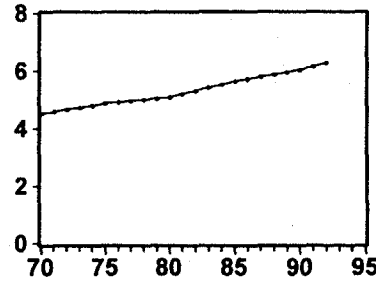To exploit and control the surplus produced by micro-institutions (firms and farmers), industries were nationalized and peasants were organized into communes, and almost all means of productions were controlled by the state. Distortions in prices and industrial structure were widespread and enormous. (Lin, Cai and Li 1996)

The Great Leap Forward in the 1958-62 and Cultural Revolution from 1966 to 1976 represented long lasting disasters interruptive to economic development and destructive to the cultural heritage of Chinese people. Without the Great Leap Forward and the Cultural Revolution, output per capita in 1993 would have been double its actual level (Chow and Kwan 1996).

China was ready for reform in 1978 after more than ten years of stagnation of rural incomes, shortage of foreign exchange, raw materials and many consumer goods, and a widening technological gap with the rest of the world. In particular, Chinese leaders were impressed by the rapid rising of its East Asian neighbors which adopted market principles and export-oriented policies, and was determined to catch up. At this time, Chinese economy was largely rural with two-thirds of the population lived in the countryside, and around 600 commodities allocated through central plan. Chinese people enjoyed better health and education status than their counterpart in low-income countries, with life expectancy at 64 years (1975) and gross secondary enrollment at 47%.

Rapid Rural Reform and Opening Up (1978-83)

Economic reform in China has been characterized by pragmatism and incrementalism. China started from easy reforms, and moved later to more complex and politically more difficult reforms, which happens to be consistent with the logic of learning. In other word, China has incorporated learning in the process of reforms. Even from the beginning, Chinese leaders realized institutional reform is a long "process" which no other country has ventured through, and the best strategy is to "cross the river by feeling the stones at the bottom," or learning-by-doing.

Rural reforms were launched in 1978 by the large increases in the procurement prices for grains. And farmers were able to sell above quota output at the market prices. At the same time, experiments started at various localities on the household responsibility system (HRS), under which collectively owned land was assigned to households for up to 15 years (the contractual period was

lengthened several time to fifty years). In 1981 the central government approved the implementation of HRS nationwide and by 1984, 99 percent of rural households participated in HRS. Rural reforms were successful with growth in agricultural yields accelerated, and rural income rose rapidly.

Rural industry developed rapidly as rural reforms created several favorable conditions. First, income rose and more savings could be invested in rural industries which have higher rate of returns than farming. Second, reforms boosted productivity and freed surplus labor and provided a steady supply of workers for rural industries. Government provided support to rural industries since 1984 in the forms of easing state control on materials, allowing sub-contracting by urban firms, and low taxation to township and village enterprises (TVEs). The share of collectively owned enterprises grew rapidly: in 1978 these enterprises accounted for 22 percent of industrial output. This share rose to 30 percent in 1984 and to 36 percent in 1988, where it has remained since.

China opened its doors to foreign trade and investment steadily at an early stage of reforms. First China reformed its trading system by increasing the numbers of firms allowed to trade internationally, by lowering tariffs on imports steadily and giving exemptions. Second, initially exporters were allowed to retain a portion of foreign exchange receipts. Government maintained a realistic exchange rate policy and devalued five times since the reform started. Interbank market for foreign exchange was developed and the dual exchange rates were unified at the market rate in 1994. Third, regulations on foreign direct investment were gradually relaxed. Four special economic zones (SEZs) were established in 1980, and a fifth was added later, which offered foreign investors special fiscal, infrastructural and financial incentives. By 1993, more than 9,000 economic zones were established throughout China, which played important roles in attracting foreign direct investment, stimulating trade, bringing in advanced technology and upgrading industries.

Reforms in public finance, financial and enterprise sectors (1984-89)

This period was marked by partial reforms in many areas and a dual-track price/exchange rate system. The scope of planning has been gradually reduced, with the number of materials in the state unified plan decreased from 256 in 1980 to 27 in 1988. Starting in 1984, dual price approach was adopted in which the prices of products and materials allocated by the plans were set by the government, whereas the prices of the same products and materials allocated by non-planning channels were determined by the market. This approach allowed decision-making to be determined at margin by market prices, but at the same time created rampant rent-seeking behavior and corruption.

Table A2.1
Share of Goods Sold at State-fixed Prices, 1978-93
(percent)

Year	Retail commodities	Agricultural goods	Capital goods
1978	97	94	100
1992	10	15	20
1993	5	10	15

Source: Lardy 1994

Fiscal decentralization in China happened in the early 1980s and took the form of a revenue-sharing system between the central and provincial governments, which is called a contract responsibility system or "eating in separate kitchens". For 15 provinces, revenues were divided into three types, central-fixed revenues, local-fixed revenues and shared revenues. During 1980-84 around 80 percent of the shared revenues were remitted to the central government and 20 percent retained by the local governments. Other provinces and cities had adopted a variety of revenue-sharing methods, after prolonged negotiations with the Central government. In 1988, fiscal contract system further increased the revenue share retained by the localities. The system initially stimulated the local government's incentives for tax collection. However, it gave the localities control over effective tax rates and tax base, and thus, caused continue erosion of central government's revenue and undermined its ability to use fiscal policy instruments. From 1978 to 1993, the ratio of total government revenue to GNP declined from 35 to 13 percent; and the ratio of central government revenue to total government revenue declined from 51 to 37 percent (Ma 1996).

Reform of China's state-owned enterprises (SOEs) has gone through three phases. The first phase (1979-1986) focused on giving a certain amount of autonomy to enterprises in exchange for their efficiency. New freedoms included a slowly rising share of profits that could be retained for wages and bonuses and new investment, greater autonomy over production decisions and wages, adoption of the management responsibility system, and in some cases recruitment of new management (table A2.2). Enterprises were able to sell more and more of their products at the market prices, and benefiting from a dual-track pricing system which allowed better resource allocation at the margin. Productivity of firms improved as a result of these reforms even though the extent of productivity growth is under much debate.

The second phase (1987-1991) focused on the reconstruction of state enterprises' managerial mechanism. The government introduced various forms of managerial responsibility systems, including management contract system for the large and medium-sized enterprises, the leasing system for small enterprises and experiments on the stockholding system. By 1987, about 33,000 state enterprises adopted "asset management responsibility system" accounting for 90 percent of SOEs in the same category. At the same time, enterprise tax burdens were reduced and "profit-remittance" system was replaced by corporate income taxes. After 1992, the dominant view shifted to clarifying the property rights by way of adopting the shareholding system. SOE reform entered its third phase and "corporatization" became the fashion (1992-present). Along with the development of stock market, more and more SOEs are allowed to issue stocks and over 500 firms are listed on China's two stock exchanges (Xu and Wang, 1996)

Table A2.2
Increased Autonomy for State Enterprises during the 1980s
(percent)

Control rights	1980	1985	1989
Base profit retention rate\a	7	37	39
Marginal profit retention rate\b	11	17	27
Autonomy in production decisions\c	7	35	67
Wage discretion\c	1	9	35
Management responsibility system\c	0	4	88
New management appointed after 1980\c	9	40	94

Note: based on a 1991 retrospective sample survey of SOEs by Chinese Academy of social Sciences
a: Portion of profits that could be retained if profits did not exceed a specified base level.
b: Portion of profits that could be retained if profits exceeded the base level.
c: Share of firms in the sample.
Source: Xu 1996.

Accelerating Reforms after 1992

After a period of retrenchment in 1989-91 due to the Tiananmen square event, the government accelerated the reform efforts and speed of opening up. The era of "dual price/exchange rate" is over. By 1993, 95 percent of consumer goods are sold at market prices. The exchange rates were unified at the market rate in January 1994, representing a 20 percent depreciation.

Chinese government has long realized that another round of Fiscal reforms is essential to stem the continued erosion of government revenues. The following reforms were introduced since 1994: (i) simplification of the structure and rate of indirect taxes, with a greatly-expanded VAT as the centerpiece; (ii) uniform application of domestic enterprise income taxes in place of the enterprise-specific contracts of the past; (iii) a move to tax-assignment system in 1994 that will gradually increase the central share of revenues; and (iv) centralization of the administration of central and shared taxes through establishing a National Tax Service (NTS). In 1995, in an effort to improve tax revenue collections, the Government has moved towards reducing and eliminating a variety of tax exemptions. Duty exemptions for foreign investors were removed and VAT rebates for exporters were reduced from 14% in 1995 to 9% in early 1996. Following wide-ranging tax reforms, tax revenues as a share of GDP stabilized in 1996.

SOE reforms are accelerating, as SOEs continue to absorb a disproportionate share of investment resources, and their lackluster performance has hampered growth and employment creation. A 50-point program was adopted to establish a modern enterprise system, the 10,000-1,000-100-10 program of SOE reforms[1] and the enactment of a company law marked the beginning of a process to enforce market discipline *on* SOEs and to improve incentives *within* SOEs. The government announced in 1995 that it would retain the 1,000 largest enterprises, and "throw the rest out to sea". After the 15th party Congress in 1997, SOE reform entered a new but hardly a final stage in converting public enterprise system into one based on market competition and profit oriented management. The strategy is two folds. First, consolidate and concentrate resources in large profitable SOEs, and converting them into shareholding stock companies. And second, divest inefficient and non-strategic SOEs while avoiding social and political disruption. Over 800 companies are listed on China's two stock exchanges by early 1998, and thousands are going through ownership diversification, corporatization, divestiture, mergers, leasing, joint ventures, conversion to collectives and exit.

Financial sector reforms in China started in 1979 and initially transformed the state mono-banking system into one consisting of 4 state commercial banks and a central bank (1979-85). From 1986 onwards, market mechanisms were introduced in to the financial system on an experimental basis. The market for interbank loans was developed gradually and became the major means of adjusting loanable funds across regions. The Central Bank gradually phased out direct controls over the allocation of investment resources and moved towards a greater reliance on commercial criteria. The Government has: (i) approved several laws governing the PBC and the banking and insurance sectors; (ii) eliminated certain preferential lending rates in an effort to rationalize the structure of interest rates, and adjusted interest rates more frequently; (iii) increased

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[1] 10.000 large and medium-sized SOEs are to adopt modern accounting standards. 1000 large SOEs are to adopt new state asset administration regulations. 100 large SOEs are to be corporatized. and 10 municipalities are to undergo comprehensive reforms. In fact, 18 municipalities have been selected for these reforms.

the autonomy of the state commercial banks in making lending decisions; (iv) introduced asset-liability ratios for nationwide commercial banks as a complementary indirect instrument of monetary policy; and (v) implemented the divestiture of NBFIs from banks. These reforms set the stage for the introduction of indirect instruments of macroeconomic policy, and ultimately lead to a more efficient allocation of investment resources. From 1998, the Central Bank has started to use open market operations and other indirect monetary policy instruments to adjust money supply. To deal with the mounting bad-loans in the state banking system, the government has recently decided to issue $50 billion state bonds to re-capitalize the state commercial banks.

Impact of reforms and performance of Chinese economy

China has experienced the most rapid growth among any large country in the world during its economic reform since 1978. In less than two decades, it has achieved what took other countries centuries to accomplish. Its per capita income first doubled between 1978-1987, and then double again in nine years between 1987-1996 (figure A2.1). Real GDP growth has averaged 9.3 percent a year, and inflation 6.9 percent a year.[2] Average consumption more than doubled, and over 170 million of the 270 million Chinese living in absolute poverty in 1978 were raised above the minimum poverty threshold. A number of key policies made possible these remarkable achievements. The household responsibility system and partial liberalization of agricultural prices helped raise agricultural production and rural incomes, especially in the early years of reforms. Liberal policies toward non-state enterprises and a gradual introduction of market forces into the state-owned enterprise (SOE) sector provided a powerful catalyst for rapid growth in industrial output, exports and employment. The "open-door" policy toward trade and foreign investment supported brisk export growth averaging 13 percent over 1980-95, and large foreign direct investment (FDI) inflows, reaching $48 billion in 1996 and $37 billion in 1997.

For the first time since the beginning of the reforms in 1978, the authorities were able to cool an overheated economy without jeopardizing growth. GDP growth subsided from a frenetic 13.5% in 1993 to 11.8% in 1994, before descending further to 10.2% in 1995. Inflation declined steadily from a peak of 25.2% in October 1994 (on an twelve-month basis) to 8.3% in 1995, and to near-zero in early 1998.

Figure A2.1.

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[2] As measured by the average annual percentage increase in the retail price index. Unless otherwise noted, average growth rates are calculated using the least-squares method.

China double its per capita income at a remakable rate

United Kingdom
(1780-1838)

United States
(1839-86)

Japan (1885-1919)

Korea, Rep. of
(1966-77)

China (1978-87)

China (1987-96)

0   10   20   30   40   50   60

Years taken to double per capita incomes
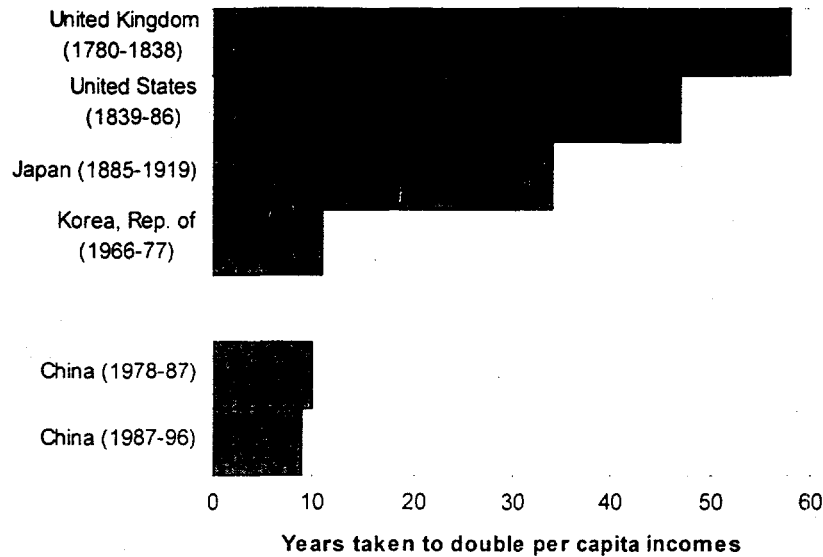
Key Challenges

Despite China's achievements since 1978, the Government faces significant challenges over the medium-term, which can be broadly divided into two sets: (i) achieving sustainable growth within a stable macroeconomic environment; and (ii) reducing poverty and maintaining a relatively egalitarian distribution of income and wealth.

- Sustainable Growth and Stability. China's economy has experienced a strongly cyclical pattern of growth, with periodic episodes of overheating and inflation followed by contractionary policies leading to sharp declines in growth. Large *aggregate public sector deficits*[3] estimated at 11.5% of GDP over 1987-93 developed, driven by weak tax collections, SOE investment demand and the political commitment to support loss-making SOEs. This fueled inflationary pressures which, in the absence of indirect macroeconomic policy instruments, could only be held in check by the application of blunt administrative measures. The fundamental causes of macroeconmic instability remain, even though the recent cycle (1994-95) of overheating was cooled down through a skillful use of administrative measures, and "soft landing" was achieved. Growth is further hampered by bottlenecks in infrastructure and energy. In addition. development activities increasingly strain the environment. and some of China's cities are now among the most polluted in Asia.

- Managing financial risks and averting crisis. State-owned bank are burdened with bad-loans accounting for about 20 percent of its total assets. It needs to be re-capitalized if financial crisis is to be prevented. Public finances, already weakened by difficulties in revenue collection, will continue to face pressures, both from the support of SOEs as well as from the long-term need for substantial expenditure increases in key areas such as infrastructure,

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[3] The aggregate public sector deficit measures the excess of expenditures over revenues for the consolidated government and state-enterprise system.

health and education. As thousands of SOEs are going bankrupt (6000 cases in 1996) and unemployment soaring (12million workers were laid off in 1997), there is an urgent need to establish a market oriented social safety net, covering health, pension and unemployment benefits.

- Poverty and Income Distribution. Despite extraordinary growth over the reform period, according to official statistics some 70 million people remain in absolute poverty, mostly in remote rural areas, and increasingly so in urban areas. However, China's relatively flat income distribution implies that these estimates are very sensitive to the choice of poverty lines, and a large proportion of the population can be considered "near-poor" by international standards. Although urban-rural income disparities declined somewhat in 1995, these disparities remain substantial. Together with regional income growth differentials, these income disparities feed migration pressures. The "floating" population of unregistered rural migrants living in urban areas is estimated at 80 to 120 million people.

Looking ahead, China is in a good position to keep a balance between economic reform, learning and institution building, and economic growth. In the past 17 years, China has managed to build learning into the process of a historical transition from a planned to a market economy, and maintained the highest growth rates among large developing countries. In order to tackle the daunting tasks and challenges China now faces, it needs to do more in combining learning and reforms, especially learning from the positive and negative experiences of its neighboring countries.

Table A2.3. Chronology of Economic Reforms in China

1978	1980	1983	1984--	1990	1993	1995	1996-present
Trade and investment reforms "Opening up" (very successful)			**Fiscal decentralization and tax reforms (on-going with mixed results)**				
continued opening up, both export and import increase	decentralize export rights, experiment on SEZs and open cities	Opening to foreign investment, FDI soared, technology has been flowing in.	"Revenue sharing" system experimented since 1980	Revenue sharing system were revised and made national in 1988	Problems with declining revenue /GDP ratio	Tax and expenditure assignment system implemented since 1994. pension reforms designed and implemented partially.	
Price and exchange rate reforms: (successful)							
Raising prices for agricultural products	Prices were allowed to float for many products in excess of planned quota. Dual exchange rate allowed		The scope of plan has been reduced gradually Foreign exchange swap markets allowed	Exchange rates were merged at the market by 1/1/94	90% of prices liberalized	Current account convertibility achieved smoothly in Dec 1996	
Rural reforms (successful)			**Reforms of SOEs (slow and unfinished)**				
Local experiments on rural household responsibility system (HRS)	Experiments with HRS successful. Implemented to the whole nation	Benefit the poor greatly and reinforce the determination for reforms	Experiments on managerial responsibility systems with some efficiency gains	Bankruptcy law passed and started. 100+ cases each year	More bankruptcies (6,232 cases in1996), more mergers and acquisitions, experiments on sales, corporatization and small privatization. 12 million state workers were made redundant.		
			Reform of Banking systems, and development of capital markets (slow and unfinished)				
			Corporatization started, foreign advice sought on both banking and capital market	Two stock exchanges opened	More regulatio-ns passed; more companies listed on stock exchanges (800+ by 1998)	Learning and training on open market operations. Laws on banking passed. Some state banks are insolvent.	Central bank started open market operations. Some foreign banks allowed to conduct RMB business. Competition was introduced. But some state banks remain insolvent.

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Chile

History

Occupied by the Spanish in 1536, Chile became a Spanish colony until 1819. The country was not densely populated by aboriginal cultures, and given the mixing behavior of the Spanish, Chilean society is today ethnically homogeneous. Also, the country was not provided with easy access to gold and silver ores, which condemned it to be a poor and marginal colony in the context of the great Spanish empire. This position would change after independence. In 1819, Chile declared independence, and immediately went through several institutional experiments from quasi monarchy to federalism, until in 1930 a strong presidential system was established. Unlike its neighboring countries, until 1973 Chile enjoyed a lasting democracy with only a short parenthesis during the late 1920's.

After the independence of the former Spanish colonies, the region was open to free trade. Chile's privileged geographical position in the south Pacific gave the country a leading role in the new trade routes, exporting commodities like wheat and silver; and later, at the turn of the century nitrate and copper. The Great Depression hit the country particularly hard as most of its revenue came from Nitrate exports and its price plummeted not only as a result of the Depression, but by the developing of synthetic nitrates by the Germans. As a result the country embarked in a inward looking development strategy that relied in an entrepreneurial state and import substitution. There was relative success as an industrial base was created and GDP growth rates averaged around 4.6% between 1950-1971.

Extreme Liberalism 1973-1981

After a brief socialist experiment that was violently ended with a coup d'etat in 1973 a military regime introduced a package of extreme liberal reforms. Trade reforms included the quick elimination of al non-tariff barriers, and the reduction of tariffs that averaged nearly 100% in 1973 to a flat 10% for all goods by 1979. In the agricultural sector the regime returned 30% of the land that had been legally expropriated to their original owners, 20% was auctioned to no rural residents, and about 30% was assigned to peasants. This created a very active land market that would later be the base for the development of a new agricultural export sector. Additionally, the capital account was also liberalized, and in the exchange market a crawling peg system was adopted. Furthermore, banks that previously had been bought by the state were privatized and controls over the banking system were minimized. Finally, a tax reform ended with cascading taxes, by introducing a global 16% value added tax (VAT).

In all, the very fast and "neutral" openness of the economy left the country in a very vulnerable state to foreign shocks. The negative effects of the first oil shock were multiplied in the Chilean economy as the GDP fell 13% in 1975. It was expected that exports would rapidly respond to the trade reforms incentives, however it was the imports that promptly responded, increasing very speedily more than triplicating by 1980. Thus, there were strong disincentives to production in the country, investment fell below historical levels to 16%, and it was covered mostly by foreign debt instead of national savings. Industrial product was in 1979 8% lower than in 1974. Also, as exports were not growing as fast as imports, the Current Account deficit, which was being covered by debt, peaked to 18% of GDP in 1981, one of the highest in developing nations.

In 1979, in an effort to control inflation, the nominal exchange rate was frozen, hoping to tag national inflation to international levels. All the attention was placed in inflation. By 1982

local inflation was similar to international levels, but the real exchange rate had strongly appreciated, and the foreign debt had duplicated in three years. In this context of severe macroeconomic disequilibriums the economy faced the second oil shock.

Pragmatic Export-Driven Growth 1982-1989

The second oil shock had three strong manifestations in the Chilean economy. First, capital flows that had reached 18% of GDP in 1981, were reduce to one half of that in 1982, and later one fourth in 1983. Second, the increase in the interest rates made more expensive the service of a recently doubled debt. Finally, the terms of trade were worsened, led by a strong decrease in the international price of copper. As a result, 1982 experienced a negative growth of GDP of 14%, and unemployment rates rose to almost 30%. The regime had to respond to the political turmoil that followed. Tariffs were momentarily raised to 35% and the exchange rate was devaluated in a crawling peg scheme. Imports responded immediately reducing in 1983 to less than one half of their 1981 level. Exports lagged, but started to grow specially after 1986. The economy grew at a fast pace, but most of the initial inertia was just recovery and full utilization of installed capacity. On the other hand, investment kept low like in the previous period, only starting to grow by the end of the regime.

An assessment of the military regime leaves many negative marks. For the whole 1973-1989 period the economy grew at a disappointing average of 2.6%. Industrial product practically did not grow. In 1989 real wages and minimum wages stood at a level lower than 1970. The "neutral" liberalization approach put the incentives on the export of goods were there was natural comparative advantages, not acquired, thus most of the exports since have been resource intensive. There was a severe worsening in the distribution of income, official consumer surveys for CPI construction reveal that from 1969 to 1987 the richest quintile increased its share of consumption from 44.5% to 54.9%. Also, the fast liberalization, as expected cause firms to be more efficient, that is in 1989 the surviving industrial sector was more efficient, but smaller. On the positive end, a financial sector was developed during the regime, which now has more controls after the 1982 crisis. Also, different exports grew significantly diminishing the historical dependence in the copper exports. While in 1974 non copper exports accounted for only 32.7% of the value of total exports, in 1989 this share was 22.6%. Finally, although the fashion and timing of the trade liberalization is very arguable, it left a country outward looking ready to base it growth in the export sector.

Export-Driven Growth and the "Social Debt" 1990 - 1995

With the return of democracy in 1990, the export-driven growth model did not change. However, the government recognized that during the previous regime there was very little spending in social programs, it recognized a "social debt". The period is characterized by very strong growth, with an average GDP growth of 9.6%. Export not only grew at a similar rate, but were diversified in its components and their destinations. By 1996 non copper exports amounted for 60% of the value of the country's total exports.

The most important reform of the period was agreed with the military regime and it consisted of granting the Central Bank independence from the executive power, thus guaranteeing independent monetary policy. The Bank informs agents by the end of the year its goals for next year's inflation, and it has gained complete credibility by reaching the goal each year, reducing inflation each year. The foreign exchange have been liberalized, but they are overlooked by the Central Bank which has a preestablished "ceiling" and "floor" for the foreign currency trading, that if overpassed will cause the Bank to intervene. Tariffs were further reduced

to a flat 11% in 1991, however different preferential trade agreements signed with countries like Colombia, Ecuador, Mexico, Venezuela, Canada, etc., have caused average tariff to stand even lower.

In this context of high growth, poverty has decreased sharply in Chile, while the official poverty head count ratio was 44.6% in 1987, by 1994 it had been reduced o 28.5%. However, important challenges await for Chile. The economy has to reduce present Current Account deficits, increase the value added of its exports. For the latter, it must create a stock of human capital able to manufacture more technology intensive exports.

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Brazil

History

Over 1.5 million indigenous people, belonging to various tribes and speaking different languages, inhabited in Brazil when the Portuguese arrived in 1500. The Spanish colonial control lasted about three centuries. The Spanish authority provoked the anti-colonial movement when it tried to impose a strict tax system and a law prohibiting Brazilian manufacture. In 1822, Brazil gained independence in the form of monarchy. In 1824, the first constitution was promulgated, a constitutional monarchy was established with three branches, executive, legislative, and judicial. In the second half of the 19th century, the immigrants from other European countries, especially United Kingdom, helped the country creating a domestic market with local commerce and industry. Coffee plantation was one of the major economic activities. Dom Pedro II was crowned in 1841, but in 1889 a federal republic was constituted and the royal family banned from the country.

Economic Miracle (1960s-1970s)

The military leadership, who supported President Getulio Vargas (1930-45), saw the importance of industrial development. Motivated by this aspiration, the military officer corps seized power in the March 1964 and controlled the country for two decades. Import substitution industrialization (ISI) was the major strategy of economic development. This inward-looking strategy was supported by the advantage of rich natural resources, such as arable land, metalliferous ores (iron and aluminum), livestock, wood and hydroelectricity. The country earned the reputation of being

a "miracle economy" in the late 1960s when double-digit annual growth rates were recorded and the structure of the economy underwent rapid change. Brazil developed clear comparative advantage in agricultural product (coffee, soybeans, sugar, orange, tobacco, and cocoa), in livestock products (meat, poultry, and leather footwear), in wood product pulp, paper, veneer and plywood), and mineral products (iron, steel, and aluminum).

External Shocks and Political Opening Up (1974-1984)

The highly centralized military government showed its inability to meet the challenge in the seventies and eighties, such as the oil shocks over 1973-74 and over 1979-80, the increases in real interest rates, the 1982 debt crisis and resulting cut-off of foreign credit and foreign direct investment. The external shocks revealed the internal weakness of the ISI strategy and the economic miracle disappeared. On the economic policy aspect, the military government kept a high spending program in order to buy the support from the Congress. On the political aspect, fearful of the results of the repression of the political opposition, general Ernesto Geisel, president (1974-79), began to open up the politics to civilian groups, and the process was continued by the succeeding president, general João Figueiredo (1979-1985). In 1981, a multiple-party democratic election ended the military regime. Although the worsening of economic performance led to the political change, political transition could not save the economy instantly. The external shocks, in combination with poor management of public finances and heavy state intervention resulted in large fiscal deficits at state and federal levels. The economic policy in the first half of 1980s was to generate enough trade surplus to pay foreign debt. The Brazilian economy run into recession right in the year of 1981. Since 1981, Brazil's economic performance has been poor in comparison to its potential. The average annual rate of GDP growth was only 1.5 percent between 1980 and 1993. In addition, Brazilian income distribution, already poor, become worse in 1980s.

Short-lived Stabilization Plans (1986-1991)

To finance the huge deficit gap, the government tried expansionary monetary policy. Hyper-inflation occurred. Monthly interest rate skyrocketed from 3% in late 1970s to 50% in the mid-1994. To stabilize the economy, the government created a sophisticated system of price indexation. Between 1986 and 1991, the government tested five unsuccessful plans to stabilize the economy and the name of the currency was changed four times. All these stabilization programs used price-freezing measures.

Structural Reforms (1990-1993)

The government come into power in March 1990 introduced significant structural reforms, including trade liberalization, deregulation and privatization. The average nominal tariffs were reduced from 32% in 1990 to 14% in July 1993, the import prohibitions on 1800 goods were abolished, and most quota restrictions were eliminated in four years. As for economic deregulation, the government eliminated the domestic production and distribution quotas, licensing, and prior approval of investment plans. The privatization program started in 1991. Privatization has completed in steel sector and in most of the fertilizer and petrochemical industries, and a broader private participation in infrastructure, such as railway and ports, was introduced through sale of state-own equity. The adjustment caused the deep recession over 1990-1992, then the economic recovery started in 1993.

The Real Plan (1994-present)

When Fernando Henrique Cardoso become the financial minister in May 1993, he made it clear that economic stabilization would be sought not by price-freezes but by a gradual pre-announced program. His plan is now known as the Real Plan. It was based on market forces, and composed of two major steps. The first priority was to eliminates the public-sector deficit. The 1988 Brazilian constitution obligated the government to make transfers to state and municipalities, and to protect jobs of public workers. When the government proposed amendments in order to cut public expenditures, the Congress resisted the government's proposal. Then the government proposed to set up the Fundo Social de Emergência (FSE), the Congress finally approved the FSE in February 1994. The second step was to introduce the transitional unit of account, the Unidade Real de Valor (URV), as a mechanism to avoid a prize freeze while de-indexing from the past inflation. One URV roughly equals to one US dollar. Prices were converted to the URV and hence kept stable. On the market, prices denominated in cruzeiros reais (CR) would increase in line with the inflation. Wages and tariffs were also converted into the URVs and then into Reais. All parties knew that one real, the new currency, would equal to one URV and that the URV would equal to CR2,750 exactly on July 1, 1994. In this way the introduction of the new currency would break with the indexation mechanism which automatically transmitted the inflation into current and future rates of inflation. The Real Plan achieved its goal of controlling inflation right in the year of 1994. Monthly inflation rate dropped from 50% in June to 2% in the fourth quarter of 1994. The annual inflation rate has been reduced from 5,000% at the end of June 1994 to 30% in July 1995, then to an annualized rate about 15% in 1996. Growth rates were satisfactory in 1994 and 1995, 5.8 percent and 3.8 percent, respectively. Mr. Fernando Henrique Cardoso, master of the real plan, become the Brazilian President in October 1994 and remains popular today.

After the initial success of the Real Plan, the government re-introduced reforms in trade and privatization. A common external tariff in the rang of 0 and 20 percent went into effect among the MERCOSUR countries on January 1995. Privatization program was extended into the sectors of energy (power and natural gas), banking, and telecommunication. Trade liberalization and privatization, which started in early 1990s, also led to high labor productivity. Labor productivity growth rate per year between 1990 and 1995 was 6-7% compared with approximately 1.4% per year between 1986 and 1990.

Remained Issues

(1) The fall of inflation boosted domestic demand and push the trade balance into red in 1994. The Mexico crisis in December 1994 fueled the fears that no enough external capital would be available to finance the trade deficit. The government first temporarily halted trade liberalization process by raising sharply the tariffs for cars and other consumer durable goods, and then tightened credit and raised interest rates. The rising of interest rates caused troubles for both public and banking sectors. While the inflation rate was high, the government could cut expenditures by delaying payment, enjoying the benefit of "inflation tax". At a low inflation rate, the public sector could no longer use this mechanism to cut cost. As for the banking sector, a high inflation means a low (even negative) real interest rate of deposit, hence a low cost. When price stabilized and interest become high, banks had to pay a high cost for the deposit. This caused banking crisis, which was further exacerbated by non-performing loans. (2) The insolvency of several state-own banks during the 1995 banking crisis removed the financial sources from the states. Their deficit and debt increased. (3) Spending cut is key for the success of the Real Plan.

The government met strong resistance in the congress when it proposed reform on tax, social security, administrative systems. Now the Real Plan relies on an over-valued exchange rate, which in the long run is harmful. (4) Even though the per capita income is high, the quality of Brazilian education is poor. Teachers are underpaid. Dropout rates are high. Of the children who start primary school, only 60% reach grade 4, 43% grade 8. This is inadequate for the requirements of an industrial state.

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Colombia

History

Colombia declared its independence from Spain in 1810 while the Napoleon's French forces occupied Spain. After the defeat of Napoleon, Spain tried to restore its colonial control. Under the leadership of Simon Bolivar, Colombia won the war against the loyalists and gained the full independence in 1819. Colombia, Venezuela and Ecuador formed the Republic of Gran Colombia, and Panama was annexed in 1821. Then Venezuela and Ecuador ceded from the republic and become independent countries in 1830. Panama, supported by the USA, declared independence during the war over 1899-1902. The Colombian domestic politics was characterized by the rivalry between the Conservatives and the Liberals. After "La Violancia" over 1948-58, which claimed 250,000 lives, the two parties decided to settle their differences by forming the National Front. From 1957 to 1973 the two parties rotated the presidency. This power-sharing system between the two parties excluded other sections of the population from the domestic politics. Guerrilla groups were formed against the government in mid-1960s. Only some of the guerrilla groups were disarmed in 1991 after the cease-fire agreements were reached in 1989. The negotiations with the two best armed and most extreme groups, the Fueraz Armadas Revolucionarias de Colombia (FARC) and the Ejército de Liberación Nacional (ELN), have dragged on without any results.

Coffee Bonanza (1970-1979)

Colombia was for many years heavily dependent on the export of coffee even though it has abundant natural resources, such as agricultural land, water of irrigation, energy resources (oil, natural gas, and coal), and mineral resources (nickel, gold, and emeralds). The GDP growth was at 6% annually on average during 1970s thanks to the more than fourfold coffee price increase over a period of two years, which is known as the coffee bonanza of 1975-80.

World Recession and a Stable Growth (1980-1985)

During the first half of 1980s, the world economy run into recession. The Latin American debt crisis erupted in 1982. The growth of Colombian economy slowed down. Unlike other Latin American countries, Colombia still enjoyed a healthy, albeit not high, economic growth rate.

Healthy Growth and Austerity Program (1986-1990)

Colombia achieved high growth rate during the second half of the 1980s. Its prudent and gradual approach to macroeconomic management contributed to this unique stable economic growth. Unlike other Latin American countries, Colombia has avoided major debt re-scheduling after the debt crisis. In 1985-86, Colombia pursued a IMF style austerity program to curb inflation, which was also served as a quid pro quo for new multilateral and commercial bank financing. The IMF and the World Bank together monitored Colombia's policy and helped Colombia to get from commercial banks $1 billion and $1.65 billion loans respectively in 1988 and 1989.

In addition to the prudent macroeconomic austerity policy, several other factors helped the growth. (1) Poor weather in 1986 Brazil cut the coffee supply, and Colombia benefited from this coffee price boom in the world market. (2) The growing of oil industry after the discovery of large oil fields at Cusiana and Cupiagua has changed Colombia's export pattern. Oil output tripled in the 1980s, and oil export earnings surpass those of coffee export for the first time in 1990. (3) Export of no-oil sectors, such as mining, grew at a rapid speed.

Reform (1990-1994)

The macroeconomic policy alone could not increase productivity in the long term. The government started structural reforms in 1990. (1) On trade policy, the government cut the average tariff from 40 percent at the end of 1989 to less than 12 percent at the end of 1993. (2) On the resource relocation policy, the government allowed foreign ownership of financial institution and free entry into all segments of the market. (3) The central bank gained greater autonomy through a new central bank law passed by the congress. (4) Exchange rate was unified on January 24, 1994. (4) Reforms were also conducted in other fields: elimination of monopoly, reduction of labor rigidity, and decentralization of government.

The Plan of Social Leap (1994-Present)

In 1994, the government announced the 1994-1998 national development plan -- the *Salto Social* (the Social Leap) -- which covers four critical areas of action: social development, competitiveness of the economy, environment, and decentralization and institutional strengthening. The government, encouraged by the oil boom, increased the spending on social programs and infrastructure. The position of the non-financial public sector switched from a surplus of 0.5 percent of GDP in 1994 to a 0.6 percent of deficit in 1995, because less tax was collected, coffee price dropped, and spending increased.

Remained Issues

(1) One of the major international economic activities related to Colombia is the trade in illegal drugs, particularly cocaine. No reliable statistics is available for this. It was estimated that 75% of the world cocaine is from Colombia. Illegal drug counts for 7% of GDP. However the social

costs have clearly outweighed the possible benefits. The drug money provides funds for corruption, and it also causes troubles for making of monetary policy and for managing of the exchange rate. (2) The earnings from both oil and coffee exports are subject to world oil market shocks which have happened several times since the 1970s. The ambitious spending plan for development could become a burden once the oil revenue is negatively affected.

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India

Chronology of Development Strategy and Recent Economic Reforms

Development Strategy before 1980s

India's approach to economic development had until recently been highly interventionist and inward-oriented. In the mid-1950s, India initiated the trend among newly independent nations in selecting the economic strategy of state-led industrialization or SLI, characterized by economic planning, high protectionism, and extensive state regulation of the economy. In most of the four decades following independence, India had relied heavily on a complex system of industrial licensing, high protection against imports, and extensive government intervention in financial intermediation.

The choice of SLI in India and elsewhere is understandable given the choices facing the leaders of developing countries at the end of World War II. By 1949, only a handful of countries had convertible currencies, and global trade was managed through national governments, and accounted for a small fraction of national income. At the same time the industrialization of the Soviet Union also point to a model of development based on state-ownership and extensive barriers to trade. (Bajpai and Sachs, 1996)

Economic development before the June 1991 Crisis

During the 1980s, the government started to liberalize trade, industrial and financial policies. Export incentives were improved by subsidies, tax concessions and the depreciation of the currency. These measures helped GDP growth to accelerate to over 5 percent annually during the 1980s and reduced poverty more rapidly. However, tariffs continued to be extremely high and quantitative restrictions remained pervasive. State owned banks continued to dominate the banking system and public enterprises (which generate 17 percent of GDP) continued to operate very inefficiently.

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India borrowed heavily from abroad, especially in the late 1980s. Much of the borrowing was from commercial banks and a large part was the Non-resident Indian balances, which were short term capital inflows at high interest rates. In 1990 and 1991, increased political risk, overly expansionary macroeconomic policy and a sharp decline in remittances from overseas Indian workers, led to outflows of short-term capital, putting extreme pressure on India's foreign exchange reserve. By mid-1991, India's foreign exchange reserve had declined to about US$1 billion (two weeks of imports) in June 1991, putting the country on the verge of defaulting on its external debt. This serious balance of payment crisis was the cause of the start of India's market liberalization in 1991.

Stabilization and Structural reforms since 1991

In June 1991, the new Indian government undertook major steps in stabilizing and liberalizing the economy. The reforms adopted in India in 1991 had four main elements:

1. Immediate stabilization measures, notably a 19 percent devaluation of the rupee and increase in interest rates designed to restore confidence and reverse the short-term capital outflow.
2. Fiscal consolidation aimed at reducing the central government deficit from 8.5% of GDP in 1990/91 to 5% in 1992/93.
3. Mobilization of substantial exceptional financing from the IMF, the World Bank, and bilateral donors to maintain a minimum level of imports
4. Initiation of major structural reforms. The early emphasis of the reforms was on industrial deregulation and trade liberalization, in a push to reduce drastically licensing requirements for investment and imports. Subsequently, the focus turned to tax reform, further trade liberalization (including reduction of tariffs), and financial sector reforms.

Structural Reforms

a) Trade and Exchange Regime Reforms

Until the recent reforms, India's trade policy was geared toward self-reliance through import substitution policies, with pervasive restrictions and extremely high import tariffs. In June 1991, India's average import weighted tariff rate of 87 percent was the highest in the world. Trade reforms were preceded by a substantial devaluation of the rupee, which led to a 15 percent depreciation of the real effective exchange rate between 1991 and 1992. The reforms aimed at reducing the level and dispersion of tariffs and easing quantitative restrictions. Several rounds of reforms since 1991s have lifted all licensing restrictions on imports of intermediate and capital good, liberalized marginally imports of consumer goods, and reduced maximum tariffs for non-consumer goods to 40 percent. In parallel, the exchange-rate regime has been liberalized, and full convertibility has been established for current account transactions. Despite these reforms, protection remains high by international standards, especially in consumer goods. India's import weighted average tariff of 27 percent, for example, is significantly higher than that of East Asian and Latin American competitors where import weighted tariffs are in the 10-15 percent range.

Table A2.4
India: Tariff Structure, 1990-1996

	1990/91	1992/93	1993/94	1994/95	1995/96
Mean and Standard Diviations					
Whole economy	128	94	71	55	42
	(41)	(34)	(30)	(25)	(21)
Agricultural Products	106	59	39	31	26
Mining	..	..	71	48	37
Consumer goods	142	92	76	59	43
Intermediates	133	104	77	59	45
Capital goods	109	86	58	42	35
Imported weighted average					
Whole Economy	87	64	47	33	27
Agricultural Products	70	30	25	17	15
Mining	..	..	33	31	30
Consumer goods	164	144	33	48	39
Intermediates	117	55	40	31	24
Capital goods	97	76	50	38	30

Notes: Standard Diviations are in parentheses. In 1990/91 and 1992/93, mining is included in intermediates.
Source: Ministry of Finance, Government of India and World Bank estimates. Also in Ahluwalia 1996.

b) Investment Reforms

Discouraged by a tight regulatory regime as well as the highly distorted economy, capital flows to India have historically been low. Direct investment was limited, averaging around $200 million a year over 1985-90. A key component of the economic reform program launched in July 1991 was the adoption of a much more open approach to foreign investment. At the outset, approval for direct investment participation up to 51% in priority areas was made automatic, while the criteria for approval were liberalized more generally. In February 1992, it was announced that Indian firms in good standing would be allowed to raise funds through equity and convertible bond issues in euromarkets. In September 1992, registered Foreign Institutional Investors (FII's) were allowed to purchase both equity and debt securities directly on local markets. To encourage these flows further, in March 1993 budget the tax on interest and dividend income on FII holdings was set at 20 percent while capital gains tax was set at 30 percent on investment held for less than one year and 10 percent thereafter. The response to these liberalization measures was strong: total FDI and portfolio investment rose to $5.1 billion in 1994/1995, from $585 million in 1992/93 and $148 million in 1991/92. (Charles Collyns, 1995)

c) Industrial Sector

Measures to deregulate the industrial sectors included removing investment licensing requirements in most industrial sectors, with the exception of only a few areas such as petroleum, coal, and agroprocessing. Anti-trust legislation was amended to eliminate the restraints to large firms' expansion, diversification, merger and acquisition. Many price controls (for example, on steel, aluminum, and cement) were eliminated.
These reforms have produced positive results for the Indian private sector. Investment picked up

significantly in 1994/95, and output in most areas (and particularly, in automobiles, consumer electronics) has increased rapidly. However, remaining licensing restrictions used mainly to protect small scale industry, including agro-industry have considerable negative repercussions. Moreover, in many instances, investing in India remains difficult due to state-level regulations and administrative burden.

d) Tax Reforms

Before 1991, India's tax base was highly dependent on customs revenues, and had multiplicity of high rates falling on a narrow base. The principal feature of the tax reform has was the general lowering of tax rates. The structure of indirect tax rates has also been improved. In the 1994-95 budget, taxes on corporate income were unified at 40 percent, from 45 percent for widely held companies and 55 percent for branches of foreign banks. In addition, a major reform of excises was implemented to make it more closely resemble a value-added tax, and the coverage of MODVAT (modified VAT) was extended to include manufacturing sector as well as some services for the first time. The 1995-96 budget further reduced peak excises and emphasized simplification, compliance, and lower rates. These reforms have considerably simplified India's tax system and made it possible for the Central Government to improve tax administration.

The Effect of Reforms on Growth and the Poor

Since India did not have the inflation, external debt, and social inequalities as severe as those in Latin America, it was able to stabilize the economy more rapidly and at a lower cost. Indeed, India's economic recovery from adjustment programs has been both rapid and robust. Economic growth declined sharply in response to the devaluation and contractionary fiscal and monetary policies adopted in June 1991 -- from over 5 percent in 1990-91, GDP growth declined to less than one percent in 1991-92. However, helped by an unprecedented sequence of good monssons, a relaxation in fiscal policies, and a strong supply-response to the reforms, growth accelerated to 5 percent in 1992-94, 6 percent in 1994-95, and 7 percent in 1995-96. Since growth was driven mainly by exports and private investment, the recovery did not put pressure on inflation or the external accounts.

Five years of stabilization and reforms have positively impacted the poor mainly through two channels,. First, the sharp devaluation of the rupee and the decline in the protection of manufacturing have improved the agricultural terms of trade. Second, the reduction in the anti-export bias implicit in the pre-1991 regime has led to a rapid expansion of labor intensive exports--which can be a key factor in employment generation and poverty reduction. There are reasons for concern as well. Significant increases in the prices of key commodities such as fertilizers, rice sugar, cotton and gasoline can negatively impact the living standards of the poor. In addition, increases in inflation caused by rapid monetary growth in 1993-94 and 1994-95 (because of monetization of capital flows) and increases in the prices of key agricultural products (result of higher issue prices and the delayed effect of the sharp devaluation) have caused fears that the burden of adjustment may have fallen disproportionately on the poor.

Though largely successful, the process of economic reform in India is not complete. The annual report of the Ministry of Finance on the economy developments in 1994-95 highlight some of the remaining challenges. Without substantial improvements in public savings, the economy will not be able to accommodate higher levels of investment needed to sustain growth and reduce poverty.

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Korea: Major Reform Events

In retrospect, Korea's development has passed four main stages. Unlike several of the larger economies in East Asia, which evolved from protectionism, inward-looking trade regimes toward relatively open economies, Korea did not have a sufficiently large population to contemplate a strategy other than export-led development, which consists importing raw materials and intermediate goods for processing and export with value-added. It development experience shows that export orientation, effective public policy intervention, and financial liberalization are the center of fast economic development over the past three decades.

War and Construction (1950-60)

After World War II, devastating South Korea was almost entirely dependent on US aid for Korea's reconstruction in 1953.[4] Some argued that the significance of US aid have helped Korea to prepare for an industrial takeoff in 1960s.. The development efforts in the 1950s included several false starts; progress was made in reconstruction, including the restoration of transportation and communication networks. The government also completed a land reform program that has stalled before the war.

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[4] Aid financed nearly 70% of total imports between 1953 and 1961 and 75% of total fixed capital formation (See Stephan Haggard, Byung-Kook Kim and Chung-in Moon, Nov. 1990, pp. 3)

Export Promotion and Industrial Takeoff (1961-73)

Under President Park, aggressive promotion of export was combined with classic import protection at home. Korean policymakers maintained close control over trade, exchange and financial policy as well as aspects of industrial decisionmaking. In contrast to other controlled economies, they used these instruments to pursue primary objective of export growth. The instruments included multiple exchange rate support, direct cash payment, permission to retain foreign exchange earnings, tariff exemption to exporters. Support for exports was pervasively channeled through the state-controlled banking system; banks increasingly used export performance as the criterion of creditworthiness. Moreover, major devaluation of 1961 and 1964, along with other supporting policies, also provided a strong initial impetus for export growth.

As a result, Korea's outward-looking trade strategy contributed significantly to the overall expansion of the economy. It also led to increasing confidence in Government's ability to initiate and direct national development strategy. Buoyed by its past success, the Government next turned to more direct efforts to accelerate structural change and plunged into the battle to promote heavy industries.

Government Intervention through Heavy and Chemical Industries Drive (1973-79)

The shift from general export promotion to a sectoral development strategy, focused on heavy and chemical industries (HCIs), was announced in 1973 by the late president Park. It represented a major change in policy in favor of specific industrial targets and a wide- ranging commitment by Government to using trade and financial policies to steer resources to the HCI sector. The motivation for the shift are: a) the need for deepening industrial structure reform, b) the oil shock of 1973-74 justified greater attention to import substitution.

The promotion of the HCI sector was supported by a broad range of policy instruments, including import protection, fiscal preferences, interest subsidy, investment tax credit, allocation of credit and policy loan. For instance, the National Investment Fund (NIF), established in 1974, lent as much as two thirds of its portfolio to HCI projects.

Economic Stress Period (1979-1981)

Korea faced formidable problem in 1979: the structural and macroeconomics imbalances created by the HCI drive were aggravated by the second oil crisis, the assassination of President Park added great political uncertainty.

Functional Incentives and Liberalization (1980-90)

Fifth Year Plan (1982-86)

In order to reverse a series of adverse events rocked the economy in 1979-81, the Fifth Year Plan was lunched. The Plan placed great emphasis on a program of stabilization and adjustment, featuring conservative monetary and fiscal policies, exchange rate depreciation, and initiatives to reduce the rate of growth of wages and the intensity of energy use. On industrial policies, Government reversed its past preferences toward large, heavy industry firms by reserving credit for small and medium firms. It terminated policies which awarded the HCI large-scale preference.

Liberalizing Foreign Direct Investment and Portfolio Foreign Investment

Internationalization of Korea's capital market has been carried out cautiously since the announcement of the long-term plan in 1981. Since 1984, limited indirect investment in Korean stocks has been allocated through foreign investment funds, Korea Fund and Korea-Europe Fund. Foreign securities companies were allowed to open representative offices. Korean began liberalizing FDI in the early 1980s, and since 1985, the stock of FDI has more than doubled, from $0.5 billion to 1.3 billion in 1988. Around a half of the direct investment has come from Japan.

Foreign Debt Crisis and Debt-Reduction Policy (1984-85)

Due to heavy borrowing to finance private sectors and heavy industries in the earlier 1970s, Korean foreign debt reached more than half of its GDP by 1986, making Korea the fourth most indebted among developing countries. As a result, the government pursued an active debt-reduction policy, by 1990, debt-GNP ratio was down to 14 percent.

High growth period (1986-88)

As a result of government efforts in stabilizing economy, the Korean economy grew at a remarkable rate over this period, 12% in each of these three years. Real export growth averaging more than 20% per year. Main external factors behind high growth are low and stable oil price, the appreciation of the Yen and strong growth of OECD countries (Korean main export markets).

Domestic financial reform

The favorable economic conditions from 1986-88—provided the ideal condition for liberalizing the domestic financial system. It included privatization of the banking system, interest rate deregulation, phasing out differences between policy loan and general loan, lowering of entry barriers to the financial services industry. In 1985 the banking sector was opened to allow foreign banks into the domestic market on an equal footing with domestic banks and discriminatory laws against foreign banks were removed. In 1987 foreign insurance companies were allowed access to the Korean market (World Bank 1996). On December 1988, Government announced plans to liberalize domestic financial markets. Lending rate were decontrolled, monetary operation was shifted from direct credit control to indirect credit control.

Financial Sector Liberalization (1987-)

Started at the end of 1980s, foreign banks and insurance companies were allowed to enter Korean market. At the same time, international investment trusts were permitted, and foreign and

domestic securities companies were allowed to do business with each other. This made possible limited foreign ownership of Korean equities through the country funds. The government permitted individual foreign securities companies to own up to 10 percent of the paid-in capital of large domestic securities firms, provided that the total stake of foreign securities companies in a domestic securities firm did not exceed 40 percent. Under a guideline announced in November 1990 foreign securities companies were allowed to establish branch offices or joint ventures in Korea. In 1989 and 1990, Government prepared for the imminent opening and expand foreigners' indirect investment by increasing the foreign investment funds. A matching fund, which will invest in both domestic and foreign securities, was created in 1990. From January 1989, foreign securities companies were entitled to increase their share in a domestic joint venture from 10 percent to a maximum of 40 percent on a global basis.

In 1992, Government announced plans to liberalize the capital account in several steps. Starting January 1992, foreigners were allowed to invest directly in Korean stocks with certain limits, and substantial overseas capital flowed into the Korean stock market. In 1994, the Korean bond market was opened to foreign investors on a limited basis: foreigners were allowed to invest in nonguaranteed bonds of small-scale industries. Since February 1995 Koreans have been allowed to hold foreign currencies without any restrictions, invest up to $300,000 in overseas real estate, and deposit up to $30,000 in overseas banks. In June 1993, the government announced a three stage program for complete liberalization of financial, capital and foreign exchange market by 1998 (Table 3.1 in World Bank 1996).

Although Korea took several steps to liberalized its financial sector and capital account, many internal and external factors triggered a severe financial crisis at the end of 1997. The causes of the crisis have been subject to heated debate, including, inter alia, a weak legal and regulatory framework, regulatory forbearance and weak enforcement capacity, and excessive government intervention to promote certain industries. Nonetheless, the tremendous progress made by Korea in economic reform and human development over the past 40 years cannot be ignored.

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Malaysia

History

Although the Malayan peninsula is located at the heart of where Buddhist and Hindu influence intersect, since its beginning the country has been Islamic. Its recorded history starts early in the XV century with the settlement on Malacca of the Sumatran prince Parameswara, who adopted Islam and the title of Sultan Iskandar Shah. In 1511 Malacca was conquered by the Portuguese. Later, the colonial ruler changes, in 1641 the Dutch takeover, and in 1795 the British arrive. However all the colonial rulers had in common that they were more interested in trade than in subjugating and converting. Thus, during the period different sultanates flourish. Chinese presence in the peninsula had been irregular since the sixteenth century attracted by tin mines. However, new tin mine discoveries in the XIX century, and later trading possibilities attracted a steady flow of Chinese migration. Later, brought by the British Indian labor was imported at the early stages of the next century. By the early 1900's thanks to the introduction of the Brazilian rubber tree, Malaysia had established itself as the world's main supplier of tin rubber. However, the Malays kept aside from this "modern" operations.

By the end of the Second World War, when the myth of British invincibility had been destroyed, nationalism grew in the peninsula. Yet it was Malays nationalism, Chinese nationalism, and Indian Nationalism acting as three separate forces. It took a special consensus of moderate parties of the three ethnic group to form an Alliance Party that would give birth to the federal nation of Malaysia in 1957. The social composition of the country was at the beginning, roughly, one half Malays, one third Chinese, and one tenth Indian. There was an implicit social contract at the beginning of the nation that gave the Malays the political monopoly, while the Chinese controlled the industry and trade affairs. This order was violently brought to a halt with riots in 1969. Extreme inequalities altered the peace of the country. By the late sixties a peninsular Malays average income was one half of a Chinese. Changes had to be made.

Market Led Development 1957 - 1970

Since its independence the Malaysian economy has been very open. In 1960, exports amounted to 55% of its GDP and import 42%. However, being essentially a primary commodities exporter Malaysia was very sensitive to terms of trade shifts. The economy was led by an import substitution strategy, but without protectionism. This may sound like an oxymoron, but the rate of effective protection has been estimated in only 6% for the 1960's. Public spending was focused in agricultural and infrastructure projects, specially in the eastern part of the cuntry were Malays were in a greater proportion. Import substitution was aimed at broadening the industrial base and reducing the dependance of foreign consumer goods. During the 60's GDP grew at an average 6% per year. Investement was low, at only 14% of GDP, but saving rates were twice as high. Low investment rate may be explained by an overcautious enterpeneurial class, and fiscal prudence. Even growth was not slow for developing country standards, there was an uneven distribution of it, and unemployment lingered by the end of the decade at 7%.

State-Led Development, the NEP 1971-1985

After the 1969 riots, growth with equity became not only a desirable outcome, but the only sustainable path. The answer was the New Economic Policy which had as socio political

goals the promotion of national unity, eliminating the identification of race with economic function, by reducing poverty and making the Malays participate in the ownership of capital. To a certain extent the NEP was succesful, if in 1970 Malays owned 2.4 % of corporate equity, in 1990 this share had risen to 20.3; and the incidence of poverty fell from 46.4 to 17.1 during the 1976-1990 period. These equity improvements were accompanied by an average GDP growth rate of 7%.

During this period the government changed its focus to an export oriented growth. Export Processing Zones EPZ's and Free Trade Zones FTZ's with other tax breaks and subsidies acted as effective export incentives. However these market inc were combined with strong public intervention. The Industrial Coordination Act ICA imposed price regulation, licenses and quotas all directed to the accomplishment of public goals. The discovery of rich fossil fuel deposits together with increasing international prices for the resource helped national accounts, although it caused some "Dutch disease", appreciation the exchange rate. In the Agricultural sector there was a shift from rubber to oil palm and cocoa production.

The second oil shock hit Malaysia. Inflation doubled to 9% in 1980. Investment that had been funded mainly by national savings started to be increasingly covered with debt. External debt grew from 9.5% of GNP in 1980 to 76% in 1986. Also, as the OECD countries adjusted to the same shock, the terms of trade deteriorated. By the mid 80's the ICA restrictions were becoming an active constraint for the economy. In this context, recession hit the country, in 1985 the economy experienced a negative growth of GDP of 1% and almost 0 growth in 1986.

Adjustment and Liberalization 1986-1995

The recession obliged Malaysia to relax the strict controls of the NEP. The economy recovered its high growth record, with an average GDP growth of 8% for the period, specially boosted by direct foreign investment. By 1987 50% its investment was direct foreign investement and it peaked to 70% in 1989.

Controls in the economy were reduced, for example exempting from ICA controls all companies with a shareholders capital smaller than US$2.5 million. Also, policies that previously had deterred foreign capitals like ethnic quotas in equity ownership were relaxed. At the same time the Japanese had problems jump starting its economy after the recession and were looking outward. Malaysia was succesful in attracting Japanese capital, not only because it opened in the right time, but had social and macroeconomic stability to offer. Most of this direct foreign investment was oriented to the more dynamic electronic and electric machinery industry.

By the late eighties, the ringgit had depreciated helping the export of manufactures, and the foreign debt had been reduced. However during the 90's foreign debt has been held steady at nearly 40% of GDP, and their balance of payments shows a current account deficit that has been growing to -8.5% of GDP in 1995.

The future challenges for the Malaysian economy as stated by its own government is to transit to "productivity-driven growth". This means that the country has to develop human resources able to absorb and develop new technologies. Another challenge for Malaysia to maintain its impressive growth record is to correct its deficits in its external accounts. See World Bank 1998 for recent events.

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Mexico

History

Mexico, in its early history, was a place for several civilizations including Olmecs, Mayas, and Aztecs. The Spanish destroyed the Aztec empire and established in 1521 the colony of New Spain on the land of Mexico and Central America. Three centuries later, Mexico declared independence from Spain. Mexico later suffered from the predatory incursions from the United States of America. In 1835, Texas ceded from Mexico and was annexed to the USA in 1845. War break out between the USA and Mexico. At the end, Mexico lost not only Texas, but also California, Arizona, and New Mexico. Anti-US sentiment remained strong and only recently it has subsided to a lower level following closer economic relations between the two countries.

Rapid Growth (1958-1970s)

The growth rate of the Mexican GDP was maintained at 6.85% from 1958 to 1970, which also meant a 3.2% growth rate of the per capita GDP while the population was growing at an average rate of 3.5%. The Cuban revolution in 1960 fueled the political instability in Mexico. Discovery of the massive Chiapas oil field in 1970 and the oil price surge in the world market over 1973-74 brought economic prosperity into Mexico and relieved the social tension.

Cumulating of External Debt (1976-1982)

Mexico attracted massive capital inflow following the oil boom. International capital flew into the country and Mexico cumulated huge external debt over 1976-82. The government also pursued a policy of high public spending for high growth rate and for income re-distribution. Even though Mexico increased export both by huge volume and by value, the foreign exchanges earned from the export were wasted quickly by the policies of defending the overvalued Peso and maintaining the high level of public expenditures. There was massive capital flight. At the end of 1982, the foreign exchange reserve left could not afford to pay for the import of three weeks.

Debt Crisis and Retrenchment (1982-1988)

The fortune of oil boom was brought into an abrupt end when the Latin American debt crisis erupted in 1982. In 1986 the world oil prices collapsed, and decreased the revenue earned from oil export. Mexico is under heavy pressure to tackle the problem of inflation. In December 1987, the Pacto de Solidaridad Económica (PSE), an anti-inflation plan, was agreed among the

government, the labor unions, and the business organizations. It fixed prices, wages, and the exchange rate, and it reduced tariff rates. Those stabilization measures reduced the inflation rate from 157% in 1987 to 52% in 1988. During the retrenchment from 1983 to 1988, the economic growth was less than 0.1%. Investment suffered the most, decreasing by an annual rate of 4.3%. The public investment fell by more than 11% annually.

Salinas' Recovery Plan: Half Fallacy (1989-1994)

Carlos Salinas took the office on December 1, 1988. In May 1989, his government unveiled the national development plan for 1989-94. It has two major objectives: promoting economic growth at a rate of 6% and keeping the inflation rate comparable to its major trading partners. The strategy relied on two measures: (1) maintaining economic stability by a predetermined nominal exchange rate anchor supported by restrained fiscal and monetary policy, and (2) promoting domestic and foreign private investment by aggressive structural reforms including price and trade liberalization, privatization, financial sector liberalization, deregulation, and tax reform. The exchange rate policy led to an overvalued peso, and the current account would grow and had to be financed by the foreign capital inflow. This plan became the hostage of foreign capital movement.

It appeared to be working at the early stage. Inflation fell to 8% by 1993, GDP growth rate reached 4% over 1989 to 1991. Foreign capital inflow surged and covered the growing current account deficit. In 1993, Mexico got $29 billion net capital inflow which raised the reserve by $6 billion after covering the $23 billion current account deficit. But the capital inflow was used for consumption instead of investment. The reforms could not go far enough without the complementary reforms in labor market, legal system, and financial market. Productivity simply did not grow at a high speed. Current account deficit became larger and larger, from 3% of GDP in 1989-90 to 7% of GDP in 1992-94. In 1994, net capital inflow drop to only $10 billion, and current account deficit increased to $29 billion. This caused the reserve to drop by $19 billion.

The Mexico Crisis and the Rescue Coming from the US and the IMF (1994-)

The investors began to loss their confidence and capital inflow slowed down. In reaction, the Mexican government first shifted the composition of domestic public debt from peso-denominated securities to dollar-indexed securities and maintained a rigid exchange rate. This policy quickly drained the reserve of foreign exchanges. Zedillo government took the office on December 1, 1994, and his government was forced to relax the band of exchange rate on December 20, 1994. With only $6 billion reserve left on December 22, which could not afford a month of imports, the government floated the peso. As soon as the peso floated, the investor's confidence collapsed. The peso's value was on a free fall, and market volatility continued through February 1995.

On March 9, 1995, the government come up with a stabilization program which was also backed by a $50 billion international financial assistant package, including $20 from the US and SDR 12.1 from the IMF. The program achieved substantial results.

Two additional events had possibly contributed to the 1994 Mexican Crisis. (1) The peasants uprising in the poor southern state Chiapas send a signal of political instability and fueled the uncertainty of the investment. (2) Mexico joined the North American Free Trade Agreement (NAFTA) in 1992. Once the NAFTA come into force on January 1, 1994, the Mexican economy

got subject to the influence of the economic performance of the US. When the interest rose in the US, the investment in Mexico was made less attractive and capital began flow out of Mexico. The $20 billion financial assistant from the US was a reward from the US in return for Mexico's weakening hostility.

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Peru

A Glorious Ancient History

Peru is the birthplace of the Inca Empire, one of the most important ancient civilization centers both in the pre-Hispanic Americas and in the World. The Spanish conqueror, Francisco Pizarro, arrived in 1532. Forty years after, the Inca Empire was finally defeated in 1572. Then the Spanish colonized Peru for more than two centuries. Peru declared independence from Spain in 1821. During the War of the Pacific over 1879-83, both Peru and Bolivia lost lands to Chile, and the mutual distrust among them remains toady.

Economic Experiments (1950s-1990)

Peru has abundant natural resources, including mineral, fishing, hydrocarbon and human capital. Mining is import for balance of payment, which accounted for half of export.

Peru tried all kinds of economic polices for its development, first the laissez-faire policy in 1950s, and then import substitution and nationalization in 1960s and early 1970s. The rule of dictatorship dominated Peruvian politics. A democratic government led by President Fernando Belaunde Terry was elected and then overthrown by a coup in 1968. From 1968 to 1975, the military government started land reform and nationalized industries. Spending and foreign borrowing spiraled out of control. A bloodless coup installed another military regime and continued control till 1980. In the 1980 democratic election, Fernando Belaunde Terry was elected for his second term as the President. He started to reform the economy, but the debt crisis of 1982 forced the reforms into a pause. Garcia took the office in July 1985. Over 1985-90, Peru retreated to protectionism. Garcia promised to achieve high economic growth rate and to increase the living standard of the poor. He announced radical policies. He devalued the currency, raised wages, The unorthodox economic policy only led to short-lived growth in 1986-87 and then caused hyper-inflation. In 1987, the ill-judged move to nationalize banking system provoked protest and rallied opposition, over 1988-90 the economy contracted sharply. By 1990, the economy was on the verge of economic collapse. Rampant and terrorism grew out of the poor economic performance during the 1980s.

Fujimori's Reform (1990-1997)

After taking office in July 1990, Albert Fujimori pursued a bold reform agenda, moved the Peruvian economic onto a right track. (1) When price control was eliminated in August 1990, price rose 500% overnight and then inflation dropped several months later. (2) Public spending was cut through down-sizing the public sector. (3) Tight monetary policy under the term of he 1993 IMF agreement required informal currency fully backed by foreign reserves. (4) Privatization and investment promotion to finance economic development. (5) Tax reform led to tax collection from 5% of GDP in 1990 to 13.9% of GDP in 1995. In 1995, Albert Fujimori was elected for the second term.

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The Philippines

History

In 1521, the Spanish expedition led by Ferdinand Magellan reached the Philippines. Forty years later, European settlers come for the purpose religious conversion, with little resistance from the local Malay people. At the beginning of the 19th century, the European settlers engaged in economic activities. The Chinese entrepreneurial class formed the elite based on land ownership. In 1896 the local people mounted a rebellion against Spain. After the US intervention, Spain ceded the Philippines to the USA in 1898. The struggle for independence continued against the US. The Filipino-American War (1899-1902) ended with the imposition of the US colonial rule, and semi-colonial control after 1935. Both English education and democratic institutions were introduced into this country. The planned independence of 1946 was interrupted by Japanese invasion in December 1941. The US forces under the leadership of General MacArthur liberated the land during the World War II. The Philippines gained its full independence on schedule in 1946.

Close Tie with the US (1946-1974)

The newly independent republic maintained preferential economic relations with the USA. Under the Laurel Langley Agreement, certain quota of goods was allowed duty-free access to the US market until 1954 and the tariffs gradually moved up to full scale by 1974. The parity for US citizen also continued until 1974. Two major US military bases, the Clark Field air base and the Subic Bay naval base were stationed in the Philippines until 1991-92. Like the political system in the US, power was alternated between two parties, the Nationalists and the Liberals.

Marcos Autocracy (1967-72-83-86)

In September 1972, the peaceful transition of power was interrupted. Ferdinand Marcos, who was at the end of its second term as the president, imposed martial law by citing the threat of "subversive forces." From 1972 to 1986, the Philippines experienced "constitutional authoritarianism." Marcos succeeded in all the following elections both through manipulating the media and through cheating the polls. In August 1983, the political situation changed when the strongest opposition leader, Benigno Aquino, returned to the country from the US. Mr. Aquino was assassinated minutes after he landed at the airport under military escort. People including the business community took the street and mounted massive demonstrations. Capital flight that followed the political turmoil hurt the economy. Under the pressure from Washington, Marcos called an early election in 1986. This time he lost to Mrs. Aquino, the widow of Mr. Benigno Aquino.

Political Transition, Shocks, and Beginning of Reforms (1986-1992)

A series of coup attempts clouded the Aquino government. The first military coup saw in July 1987, and the last and most nearly successful one in December 1989. No more coup attempts after the year of 1989 during which Marcos died in Hawaii. While making political efforts for stability, the Aquino government maintained a high spending program and high wage to buy social stability. The recovery over 1986-87 was a consumption-led growth. The coconut price increase in the world market also helped the economy. Unfortunately, several domestic and international events slowed down the growth over 1988-90. First the drought in Luzon hurt power supply; second the Persian Gulf crisis following the Iraqi invasion of Kuwait in August 1989 led to sharp increase of oil price, and this in turn worsened the term of trade of the Philippines; third the military coup in December 1989.

During the turmoil of 1980s, both political and economic, external debt was cumulated, and both investment and saving were discouraged. To attract international capital and promote private investment, the Aquino government started economic reforms, mainly through privatization. In June 1989, 30 percent of the equity of the Philippine National Bank was privatized. In June 1991, the Foreign Investment Act allows 100% foreign equity ownership except in restricted sectors.

Economic Reform along with Political Stability (1992-1997)

In May 1992, Aquino peacefully transferred through election the power to the next president Fidel Ramos. Ramos expanded economic liberalization while continuing the privatization program. In August 1992, the exchange control was lifted on virtually all current-account transactions. In February 1993, the telecommunication monopoly was ended. In 1994, 60 percent of the equity of the state owned refinery was privatized, and the ban on entry of foreign bank branches was lifted. In 1995, aviation services opened up for private involvement, and 100 percent foreign equity was allowed in mining in exchange for technology and investment. In 1996, maximum tariff was cut from 50 percent to 30 percent. All those structural reforms created an environment of attracting investment and promoted export. The economic growth in 1990s was characterized by export promotion, investment attraction, and private sector participation.

Other Factors

(1) The Philippines has wide range of diversified resources, physical and human. However, the economic performance has not reached its potential. The social and economic inequality is the

major obstacle for its economic development. With respect to geographic disparity, the National Capital region (NCR) centered on Manila, accounts 13 percent of population and produces 30 percent of GDP. As for the income inequality, the richest 20 percent of the population have an income 10.7 times that of the poorest 20 percent. (2) The remittance from Filipinos overseas accounts for 2.2 to 4.5 percent of the GDP, and it was a important factor for economic growth.

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Thailand

History

The first unified Thai kingdom was found at Sukhothai in the northern part of the Central Plain on the Indochinese peninsula. The Thai kingdom flourished in the 13 century and expanded its territory down the Chao Phraya valley to the City of Ayuthaya. From this city, the Thai kingdom extended its hegemony southward to the place where is now the modern Malaysia and eastward to the Khmer Empire. During the 19th century, the European powers expanded their colonial control to Asia. Even though the boundary of Thailand was reduced by the French encroachment in Laos and Cambodia and by the British influence in the Malay states, Thailand maintained the political independence by taking advantage of the rivalry between Britain and France. In the economic terms, however, Thailand was colonized. The British controlled the exploration of the major commodities including rice, rubber, tin and teak. The economic penetration created new interest groups in the Thai society and caused conflicts, and further led to political changes. In 1932, the monarchy was overthrown and a constitutional monarchy was set up and this political structure continues to the present time. Nevertheless, the monarchy plays an important role as a stabilizing force in the domestic politics.

Natural Resource Based Exports (1950s-1960s)

Till 1973, most of the time Thailand was under the control of military government. The military government undertook a "state capitalism" program for economic development during the 1950s. The Board of Investment (BOI) was established in 1959 to stimulate both domestic and foreign investment with high protection barriers. In the 1960s, the BOI encouraged the development of an industrial sector based on import substitution. And it also concentrated on infrastructure, such as roads, power stations, and irrigation projects, which opened up the large areas of new agricultural lands for crop cultivation.

Oil Shocks, Export Diversification, and Import Substitution (1970s)

During the 1970s, Thailand increased its tariff in favor of Import substitution and kept searching for the market for its crops (such as cassava, sugarcane, and pineapples), textiles, and garments. Helped by the export diversification, Thailand managed to minimize the damage of the first oil

shock over 1973-74. However, the current account worsened and the budget deficit grew, which signaled the structural problem of the Thai economy.

In 1973, an uprising engineered by students removed the military strongmen from the government. Even though a bloody coup in 1976 restored military to power the military involvement in government was limited to power-sharing with the civilians.

Even though the discovery of natural gas in the Gulf of Thailand helped to relieve the pressure of energy cost after the second oil shock over 1979-80. The second oil shock intensified the structural problem of the economy. At the same time, the world was in economic recession, and the world commodity price decreased. The import substitution strategy reached it limits.

Slow Structural Adjustment (1979-1984)

Realizing the limitation of the import substitution strategy, the Thai government unilaterally started a World Bank style structural adjustment program (SAP) in 1980. In return, the World Bank agreed to a series of unconditional structural adjustment loans to Thailand two years later. The Fifth Five-Year Development Plan (1981/82-1985/86) embodied this program. However the reform was slow for the economy was still in a sound condition, with price distortion not that serious comparing to other developing countries and with capital inflows from other private and official sources being big enough to cover the growing foreign debt.

Recession and Export Promotion (1985-1995)

The recession over 1984-85 accelerated the process of reforms. The government devalued the currency in November 1984 and started a far more vigorous export promotion policy.
Tariffs were lowed and made more uniform, notably the rice and energy prices were brought into line with the market levels. The budget ran surplus after 1988 till 1996.

In 1988, a democratic government was elected through general election. Unfortunately, factionalism and corruption in the civilian government led to another military coup in February 1991. When the pro-military party tried to back the former army command-in-chief, Suchinda, as the premier, people took the street and the bloody clash happened. After the intervention from the King, Suchinda stepped down and a fresh election was held in September 1992.

Thailand continued its reform in the area of financial deregulation. In 1993, the Bangkok International Banking Facility (BIBF) was established for easy access to funds. This and many other factors led to accumulation of huge debt, concentrated in the financial firms and banks, and finally triggered off the 1997 economic crisis. The crisis now spread across Southeast Asia and causes uncertainty for the world economy. See World Bank 1998 for financial crisis after 1997.

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Venezuela

History

The Carib and Arawak Amerindian tribes lived on the territory of Venezuela before the Spanish colonized this land in the 16th century. Christopher Columbus sighted Venezuela in his third trip to the Americas in 1498. Then the Spanish colonized Venezuela for about three centuries. After a protracted war led by Simon Bolivar, the hero of Latin American history, Venezuela declared independence from Spain in 1819. Venezuela first joint Colombia and Ecuador to form the Republic of Gran Colombia, and then ceded from the republic and become an independent country in 1830. After one century of rule of dictatorship, democratic government was briefly introduced starting from 1935. Military coup by General Pérez Jiménez restored military control in 1948, which was then destroyed in 1958. Civilian rule has been established since then and Venezuela even served as the model of stability and progress for the rest of Latin America for a period of time.

Oil Shocks and Debt Crisis: Fortune and Misfortune (1970s-1988)

Venezuela has rich natural resources, and petroleum has been a pillar for the Venezuelan economy since the 1920s. Oil has brought fortune to Venezuela but poor management has led Venezuela into crisis. When the price of oil soared in the world market over 1973-74, the government nationalized the petroleum firms, used the revenue for an ambitious development program, and invested in hydroelectric power and other no-oil industries. The inward looking policy under highly rigid central government control caused the poor performance of the economy. Mismanagement wasted the benefits of the oil boom. The economy stalled in 1978 and the government was accused of corruption. Facing the deteriorated economic situation, the government responded by further tightening controls on prices, foreign exchange, and credit allocations. This resulted in a low competitiveness of non-oil sectors. Public accounts had to continue its dependence on oil export, and thus they were highly sensitive to external shocks. The second oil price increase over 1979-80 only helped the economy at a margin. When the Latin American debt crisis erupted in August 1982, massive capital flight and closure of international capital markets led to a foreign exchange crisis in Venezuela in 1983. The Venezuelan economy was in declining from 1979 to 1985. The per capita GNP in 1985 was 19 percent lower than the level of 1972. In 1986 the world oil prices collapsed, the revenue earned from oil export shrank, the government needed funds to sustain the economic development. Still being reluctant to reform the economic system, the government pursued an expansionary policy from 1986 to 1988, which only pushed up the growth temporarily. The negative effects quickly overshadowed the short-term gain. Deficit gap widened up and cumulated the pressure for inflation. By the end of 1988, the country's international reserves almost exhausted, and the government had to reform the economy.

Reforms and Risks (1989-1995)

A new government that took office in February 1989 started far-reaching reforms. Both the International Monetary Fund (IMF) and the World Bank joined the efforts. An orthodox stabilization plan was introduced to maintain external and internal balances, and a structural reform program was embarked upon with the aim of creating a condition for sustainable economic development based on non-oil exports. The reform was backed by a loan of Extended Fund Facility worth of SDR3.7 billion (Special Drawing Rights) from the IMF and a series of

quick-disbursing policy loans from the World Bank. With widespread shortage of basic food items, the domestic political environment was very risky. When the retail gasoline price doubled from about $.12 to $.24 per gallon, the bus divers doubled their fares even though the gasoline price change only increased their cost by 10 percent. This spurred widespread riots, more than 300 people died. The government was determined to implement the reforms despite the risks of temporary instability. As a precaution the fuel price reform was slowed down.

The reforms included the following major aspects: dismantling government agencies that used to control the allocation of economic resources, moving from government fixed foreign exchange rate and interest rate to market-determined systems, moving from high and variable tariffs to low and more uniform tariffs. Several public firms, most notable one being the telecommunication company, were privatized. In 1990, Venezuela also negotiated debt re-structuring agreement with the commercial bank creditors under the initiative of the Brady Plan, which is named after then US Treasury Secretary Nicholas Brady. The reforms achieved several positive results. The government reduced fiscal deficit from 9.4 percent of GDP in 1988 to 1.4 percent of GDP in 1989 and obtained fiscal surplus of 1.1 percent and 0.7 percent of GDP in 1990 and 1991 respectively. The shock of the major adjustments required by the reforms caused a temporary recession in 1989, GDP fell by 8.6 percent. Then the GDP grow at an average rate of 7.4 percent a year from 1990 to 1992. The 1989 recession helped the decrease of import, and the international reserves increased by revenue of non-oil exports, this made the balance of payment back into surplus right in the year of 1989. Sharply increased oil export during the Gulf crisis also helped Venezuela to gain a massive current account surplus and a $4.4 billion surplus of international reserves in 1990. Buoyant oil revenue was fed into spending plan. Similar to the GDP growth pattern, the investment fell 53 percent in 1989, and a further 8 percent in 1990, then rose 81 percent in 1991 and further 37 percent in 1992.

In 1992, two military coups were organized against the government. The military coups did not succeed, but they put the reforms into a pause. The government had to increase spending to buy stability. Unfortunately, oil price declined after the Persian Gulf war and consequently the revenue from oil exports was decreased. These factors led to a fiscal crisis in 1992. Not until March 1994, a reform program--the Sosa plan--was created and implemented, and this plan successfully increased non-oil revenue through tax measures. However the 1994-95 banking crisis ruined the achievement of the Sosa plan. The cost of intervention was more than 12% of GDP. Public expenditure remained high. In 1995, the government started negotiations with the IMF for a stand-by loan agreement.

Agenda Venezuela (1996)

The Agenda Venezuela, a new stabilization plan, was announced in April of 1996. The IMF endorsed a $1.4 billion stand-by loan agreement. This plan courageously introduced a fivefold increase of fuel price, increased the luxury and wholesale goods tax (LWT) from 12% to 16.5%, removed controls on exchange, interest rate, and most price, and floated the exchange rate. A relatively high monthly inflation rate of 12.6% occurred in May, and then the inflation rate dropped to 3% at the end of the 1996. Both the volume and the price increase of oil exports also increased revenue. The government altered its fiscal account deficit of 8% of GDP in 1995 to a healthy surplus in 1996. The economic performance boosted confidence of investors, as a result, buoyant international capital flow into Venezuela. The government obtained so large amount of international reserves that it decided not to use the second trench of the IMF loan after receiving the first $500 million.

Remained Issues

A successful reform requires the government to minimize the impact of oil price shocks on the economy. (1) In order to cut the public expenditures, the government has to streamline the staff in the civil service where 1.3 million people are employed. This is also a troublesome political issue. (2) Under the term of the IMF agreement, the Venezuelan government is obligated to set aside the surplus oil revenue, when the oil price received by the state oil producer, Petréleos de Venezuela (PDVSA), exceeds $14.7 per barrel. The surplus oil revenue will be put into two accounts: a debt rescue fund and a macroeconomics stabilization fund. The debt rescue fund is used for clearing overdue internal and external debt and for prepaying outstanding external liability. The stabilization fund first collects money while the oil price is high and then finances the government budget when the oil price drops to low levels. (3) Venezuela's public expenditure on education has been managed poorly, which is extremely biased toward high education, more than 50% for universities and only 47% used for the primary and secondary education. Only one third of the student population continue education beyond the 9th grade due to a high school dropout rate.

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