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Inequality and Growth Reconsidered: Lessons from East Asia

Nancy Birdsall, David Ross, and Richard Sabot

East Asian economies have experienced rapid growth over three decades, with relatively low levels of income inequality, and appear to have also achieved reductions in income inequality. We argue that policies that reduced poverty and income inequality, such as emphasizing high-quality basic education and augmenting labor demand, also stimulated growth. Closing two virtuous circles, rapid growth and reduced inequality led to higher demand for, and supply of, education. Moreover, low levels of income inequality may have directly stimulated growth. We present cross-economy regression results that are consistent with a positive causal effect of low inequality on economic growth and with low inequality of income as an independent contributing factor to East Asia's rapid growth. We conclude that policies for sharing growth can also stimulate growth. In particular, investment in education is a key to sustained growth, both because it contributes directly through productivity effects and because it reduces income inequality.

It has long been the conventional wisdom that there is a tradeoff between augmenting growth and reducing inequality. Two explanations are given for the view that an unequal distribution of income is necessary for, or the likely consequence of, rapid economic growth. The first, following Kaldor (1978), is that because a high level of savings is a prerequisite of rapid growth, income must be concentrated in the hands of the rich, whose marginal propensity to save is relatively high. The second, following Kuznets (1955), is that as labor shifts from sectors with low productivity to sectors with high productivity, aggregate inequality must initially increase substantially and only later decrease; Robinson (1976: 437) observed that this pattern had "acquired the force of economic law."

The conventional wisdom has in fact been repeatedly questioned. Twenty years ago, prior to the fulfillment of East Asia's remarkable potential, Ahluwalia

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(1974: 13) concluded, on the basis of the cross-country data then available, that “[T]here is no strong pattern relating changes in the distribution of income to the rate of growth of GNP. . . . This suggests that there is little firm empirical basis for the view that higher rates of growth inevitably generate greater inequality.” Anand and Kanbur (1993) demonstrate the sensitivity of the U-shaped relation between inequality and per capita income to changes in functional form and choice of observations. Alesina and Perotti (1994), Alesina and Rodrik (1994), Fields (1989), and Persson and Tabellini (1994) provide supporting evidence for why high inequality might constrain growth.

In this article we show how the recent experience of East Asia also casts doubt on the conventional wisdom. East Asian economies have had rapid growth over three decades with relatively low levels of income inequality, and although evidence on changes in income inequality is fragile, these economies appear to have also achieved reductions in income inequality. Our argument is straightforward: policies that reduced poverty and income inequality, such as emphasizing basic education and augmenting labor demand, also stimulated growth. Moreover, low levels of income inequality may have stimulated growth.

The rapid growth in the East Asian region has been unparalleled. Eight “high-performing Asian economies”—labeled HPAES in World Bank (1993)—are Hong Kong, Indonesia, Japan, the Republic of Korea, Malaysia, Singapore, Taiwan (China), and Thailand. Not only have the HPAES outperformed the industrial economies since 1960, but they have grown at higher rates than other developing economies (see table 1). They have also grown at higher rates than the current industrial economies did during their earlier periods of most rapid growth: the annual average compound growth rate of GDP per capita of industrial economies was 1.1 percent for 1820–70 and 1.4 percent for 1870–1913 (Maddison 1982). The HPAES also stand out for persistence of rapid growth: although other developing economies have experienced rapid growth for several years, few have managed to sustain such growth over three decades (Easterly and others 1993).

The decline in poverty in East Asia has been equally remarkable. The percentage of people below the poverty line has fallen far more rapidly in East Asia than in other regions. For example, in the period from 1970 to 1987, the percentage of people below the poverty line in Indonesia fell from 58 percent (among the highest of all developing economies for which measures are available) to 17 percent (among the lowest of all developing economies) (World Bank, various years b). As would be expected, the absolute number of poor people has also declined significantly in the HPAES (World Bank, various years b). Although declines in income inequality are more difficult to document, measures such as the Gini coefficient show improvements in each of the HPAES from 1965 to 1990 (World Bank 1993). Findlay and Wellisz (1993); Kuo, Ranis, and Fei (1981); and Leipziger and others (1992) also cite evidence suggesting that, unlike in many other developing economies during this period, income distribution in East Asian economies either improved or, at the very least, did not worsen. (However, for some years

Table 1. *Average Annual Growth in Per Capita GNP, Selected Economies, 1960–80 and 1965–90*

Country	1960–80	1965–90
<i>High-performing East Asian economies</i>		
Hong Kong	6.8	6.2
Indonesia	4.0	4.5
Japan	7.1	4.1
Korea, Rep. of	7.0	7.1
Malaysia	4.3	4.0
Singapore	7.5	6.5
Taiwan (China)	—	7.2
Thailand	4.7	4.4
Average	5.9	5.5
<i>Selected developing economies</i>		
Argentina	2.2	–0.3
Bangladesh	—	0.7
Botswana	—	8.4
Brazil	5.1	3.3
Cameroon	2.6	3.0
Chile	1.6	0.4
El Salvador	1.6	–0.4
Guatemala	2.8	0.7
Ghana	–1.0	–1.4
India	1.4	1.9
Kenya	2.7	1.9
Mexico	2.6	2.8
Morocco	2.5	2.3
Nigeria	4.1	0.1
Pakistan	2.8	2.5
Panama	3.3	1.4
Peru	1.1	–0.2
Senegal	–0.3	–0.6
Zimbabwe	0.7	0.7

Source: World Bank (various years b) and Taiwan, China (1994).

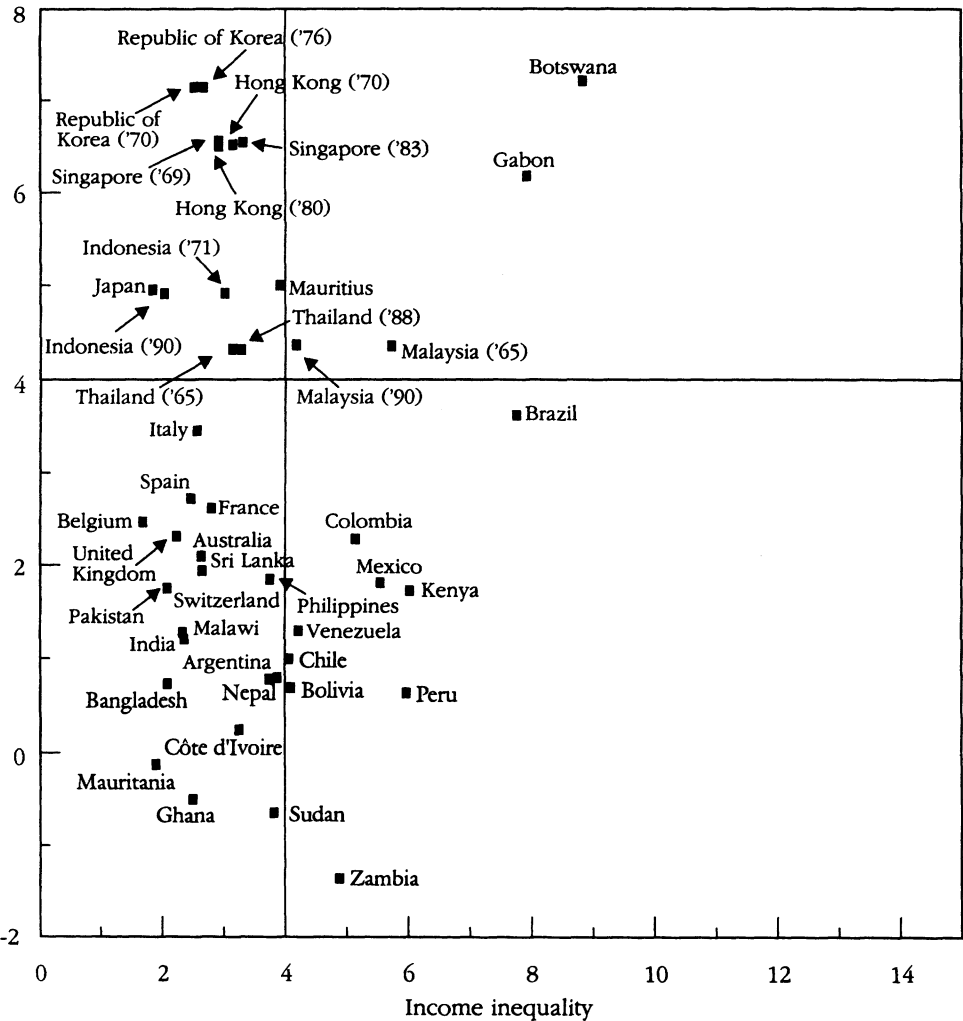
within this period, some East Asian economies show evidence of worsening inequality. See, for example, Bruton 1992 and figure 1.)

Figure 1 shows the relationship across economies between percentage growth in GDP (1965–89) and average income inequality (1965–90) as measured by the ratio of the income share of the richest 20 percent to that of the poorest 40 percent. The East Asian economies stand alone in the northwest corner; they achieved a combination of rapid growth and low inequality over the twenty-five-year period.

In part, the association of rapid growth and low inequality is explained by policies and programs adopted by governments in East Asia that helped ensure widespread sharing in the benefits of economic growth. In addition to the post-war land reforms in Korea and Taiwan (China), a variety of other policies and programs had the effect of ensuring shared growth: public housing in Hong

Figure 1. *Income Inequality and Growth of GDP, 1965–89*

Growth of GDP per capita
(percent)



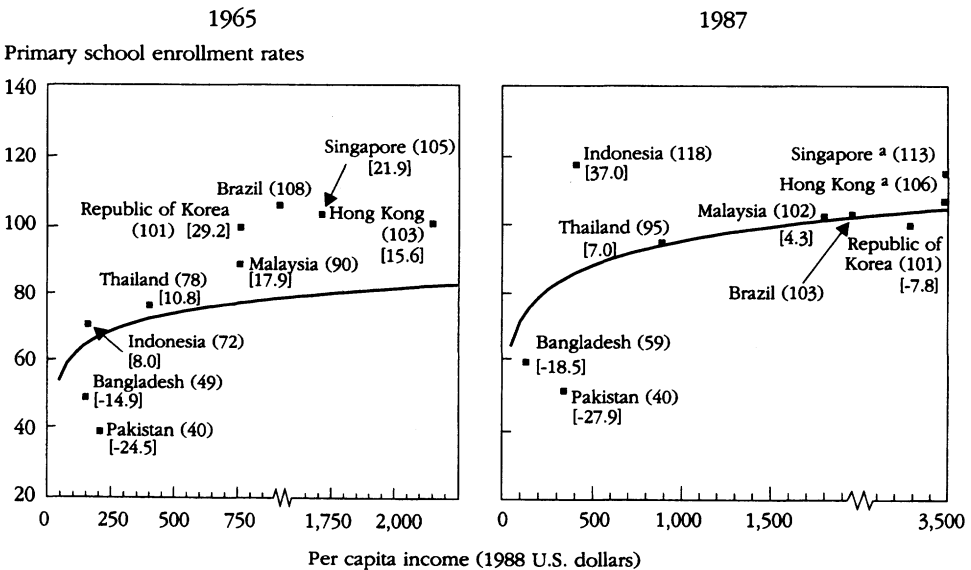
Note: Income inequality is measured as the ratio of the income shares of the richest 20 percent to the poorest 40 percent of the population. For the East Asian economies, the change in that ratio is shown using the earliest and the latest year for which that ratio is available. For all other economies, the average of that ratio is taken using all years in the period 1965–89 in which that ratio was available.
Source: World Bank (1994).

Kong and Singapore, extensive investment in rural infrastructure in Malaysia and Thailand, and, most common, widespread access to high-quality basic education and health services (World Bank 1993; Campos 1994). Equally important, the export-oriented, labor-demanding development strategy adopted in East Asia increased employment opportunities and wages. These policies and their

successful implementation were the result of some combination of historical circumstances, wisdom, political design, and good luck. With regard to their replicability elsewhere, it may not matter why they were implemented. What matters is that policies for sharing growth seem to have also stimulated growth.

The educational dimension of this shared growth is the most easily measured. Figures 2 and 3 present a stylized summary of the results of regressing both primary and secondary school enrollment rates on per capita national income for more than ninety developing economies for the years 1965 and 1987. The figures indicate that, for the most part, economies in East Asia had significantly higher primary and secondary school enrollment rates than predicted by cross-economy comparisons. Where enrollment rates are low, poor children and girls are the least likely to be enrolled. Where enrollment rates are high, there is a corollary: a reduction in the inequality of access by socioeconomic background and by gender. In contrast to other developing regions, in which increases in the quantity of schooling resulted in the erosion of quality, particularly for the poor, in East Asia increases in quantity were associated with improvements in quality. Repetition and dropout rates—which are negatively correlated with school quality—have remained low in comparison with those in other developing regions, and East Asian children have consistently scored better in internationally com-

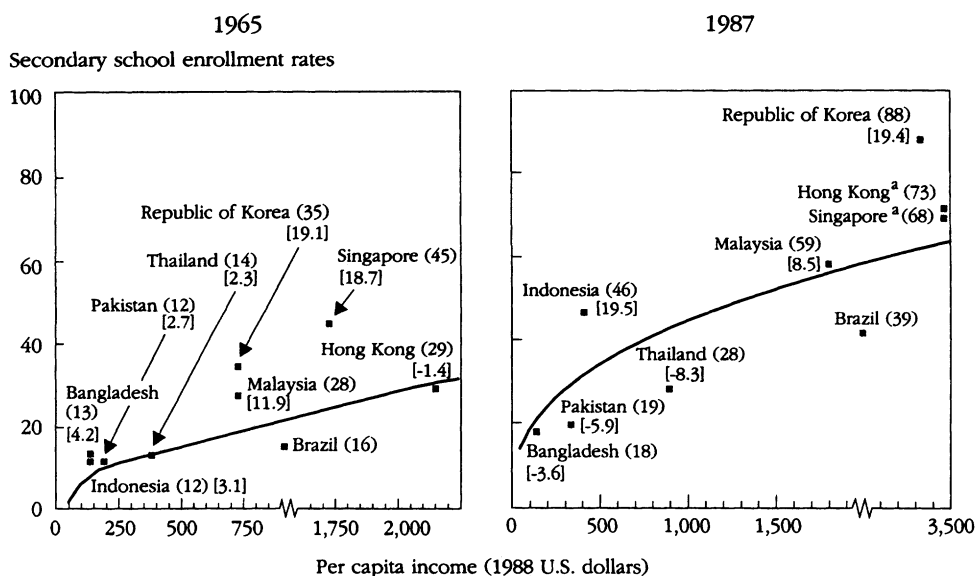
Figure 2. *Cross-Economy Regression for Primary School Enrollment Rates, 1965 and 1987*



Note: Figures in parentheses are enrollment rates; bracketed numbers show residuals.

a. Per capita income substantially exceeds US\$3,500.

Source: Singapore and Hong Kong from World Bank (1994); all others from Behrman and Schneider (1992).

Figure 3. *Cross-Economy Regression for Secondary School Enrollment Rates, 1965 and 1987*

Note: Figures in parentheses are enrollment rates; bracketed numbers show residuals.

a. Per capita income substantially exceeds US\$3,500.

Source: Singapore and Hong Kong from World Bank (1994); all others from Behrman and Schneider (1992).

parable tests than children from other developing economies (Birdsall and Sabot 1994).

In the first two sections of this article, we focus on two “virtuous circles” in East Asia. Section I describes a process of cumulative causation, in which education contributed to economic growth, which, in turn, stimulated investment in education. Section II shows how education contributed to low levels of income inequality which, in turn, stimulated investment in education. In section III we discuss how low inequality of income can have a direct, positive effect on economic growth, over and above its effect through education. We present cross-economy regression results that, contrary to the predictions of Kaldor and Kuznets, are consistent with a positive causal effect of low inequality on economic growth and with low inequality as an independent contributing factor to East Asia’s rapid growth. We conclude that investment in education is a key to sustained growth, both because it contributes directly through productivity effects and because it reduces income inequality.

Throughout this article we invoke a variety of different results—from theory, microeconomic studies, and cross-economy studies—to piece together and illustrate our story. None of these alone would constitute an airtight case. In particular, the results of cross-economy statistical work must be interpreted with

caution;¹ the statistical difficulties of working with cross-economy regressions—a high level of aggregation, substantial measurement error, inconsistencies in data collection and definition, and specification and omitted-variable bias—are well documented (for example, Levine and Renelt 1992). However, only by looking across economies is it possible to generate the level of variation in key indicators of growth, inequality, and policy needed to capture the effects hypothesized here. The cross-economy regression results reported below complement, and are consistent with, theory and with the microeconomic evidence we present.

I. EDUCATION STIMULATES GROWTH, AND GROWTH STIMULATES EDUCATION

The accumulation of human capital, as measured by the educational attainment of the population, has consistently emerged as an essential feature of economic growth and development. But the direction of causality implied by the positive correlation between educational attainment and per capita output in a cross-section of economies is unclear: it could simply indicate that education is a luxury consumer good that is increasingly demanded as incomes rise. This concern has been eased by cross-economy regressions in which the characteristics of economies decades ago are used as predictors of subsequent rates of growth. A widely cited contribution to this burgeoning growth-regression literature is Barro (1991). The core regression from that paper, which we use as our base regression, appears in the first column of table 2. (Descriptive statistics for the variables used in table 2 appear in appendix table A-1.) The important contribution of education is among the most robust findings of these growth regressions, proving to be relatively insensitive to changes in either specification or sample composition (Levine and Renelt 1992).

These results are consistent with what human capital theory, the theory of investment in people, predicts. Education augments cognitive and other skills, which, in turn, augment the productivity of labor (Schultz 1961; Becker 1964). Moreover, human capital theory has been extensively tested in the microeconomic literature; Schultz (1988) and Strauss and Thomas (1995) review the evidence from dozens of studies, based on household- and firm-level data, showing that more-educated individuals receive higher wages and are more efficient in managing the health and nutrition of their households.

Endogenous growth theory also predicts that educational investments will enhance growth. A larger stock of human capital facilitates the production of new ideas and technological progress or, for an economy that is not on the

1. Cross-economy comparisons have been a prominent feature of the now fifty-year empirical search for uniformities in the process of the transformation of low-income economies into high-income economies. Clark (1940) and Kuznets (1966) were pioneers in this effort. Chenery and Syrquin (1975) provided a comprehensive description of the structural changes that accompany the growth of developing economies and analyzed their relations. More recently, Romer (1990), Barro (1991), and King and Levine (1993) have used cross-country regressions to test endogenous growth models.

Table 2. *Determinants of GDP Growth in a Cross-Economy Sample, 1960–85*

Variable	Basic regression	Basic regression with manufactured exports	Basic regression with income share	Basic regression with income share, excluding education variables
Per capita GDP, 1960 (thousands of 1980 dollars)	-0.0075 (-6.25)	-0.0069 (-5.135)	-0.0075 (-4.730)	-0.0020 (-1.801)
Primary school enrollment rate, 1960	0.0250 (4.464)	0.0271 (4.532)	0.0243 (3.024)	
Secondary school enrollment rate, 1960	0.0305 (3.861)	0.0262 (1.723)	0.0366 (2.427)	
Ratio of manufactured exports to GDP, 1965		0.0007 (1.539)		
Secondary school enrollment–export interaction, 1960 ^a		0.0005 (0.324)		
Income share ratio ^b			-0.0013 (-1.897)	-0.0018 (-2.406)
Government consumption share of GDP, 1970–85 ^c	-0.1190 (-4.250)	-0.0566 (-2.419)	-0.1229 (-4.380)	-0.1495 (-4.760)
Average annual number of revolutions, 1960–85	-0.0195 (-3.095)	-0.0168 (-1.987)	-0.0176 (-1.867)	-0.0268 (-2.493)
Average annual number of assassinations, 1960–85	-0.0333 (-2.148)	-0.0024 (-0.738)	-0.0055 (-1.526)	-0.0067 (-1.626)
Absolute deviation in investment deflator, 1960 ^d	-0.0143 (-2.698)	-0.0139 (-2.136)	-0.0086 (-1.093)	-0.0176 (-2.012)
Constant	0.0302	0.0202	0.0418	0.0706
R ²	0.56	0.57	0.54	0.36
Number of observations	98	100	74	74

Note: The first column presents Barro's (1991) results; the other columns present new results. *t*-statistics are in parentheses.

a. Ratio of manufactured exports to GDP multiplied by 1960 secondary school enrollment rate.

b. Ratio of the total income of the top 20 percent to the total income of the bottom 40 percent for the first year for which data became available in each country.

c. Average annual ratio of real government consumption (exclusive of defense and education) to real GDP.

d. Magnitude of the deviation of the purchasing power parity value for the investment deflator (U.S. = 1.0) from the sample mean.

Source: Barro (1991) and authors' calculations based on data from Barro (1991); World Bank (various years a); Clarke (1995); and World Bank data.

technological frontier, relatively rapid adaptation of new ideas and acquisition of technological capability (Nelson and Phelps 1966; Romer 1990, 1993). Moreover, rates of return to human capital may actually be increasing over some range because of spillover benefits, that is, when one more-educated worker makes an entire group of workers more productive.

The magnitude of the contribution of investment in human capital to rates of economic growth can be assessed with counterfactual simulations derived from the basic regression model in table 2. Consider an economy characterized by the average value of each of the variables in the sample of ninety-eight economies in table 2. We simulated the changes in growth in per capita GDP for that economy during the period from 1960 to 1985 by assuming that the country had achieved primary and secondary school enrollment rates each half a standard deviation above or below the means of those variables for all countries. The one-standard-deviation difference in enrollment rates translates into a nearly 1.5-percentage-point difference in the annual per capita growth rate. The cumulative effect of this annual difference in growth rates over twenty-five years is large. The simulation indicates that a country with primary and secondary school enrollments half a standard deviation above the average in 1960 would have had a GDP per capita 40 percent higher than a country with 1960 enrollments half a standard deviation below the average. Similarly dramatic results emerge from simulations pairing actual countries. With Pakistan's 1960 enrollment rates, Korea's predicted growth rate falls, resulting in a per capita GDP for 1985 that is 39.6 percent lower than the one Korea actually attained.

Allowing the impact on growth of primary school enrollment rates to vary by gender (not shown) reveals no significant difference between the coefficient values for men and women, suggesting that increasing primary school enrollments for girls will be just as effective in stimulating growth as increasing enrollments for boys. This conclusion from cross-economy data is consistent with the microeconomic evidence that the private rates of return to education among wage earners are roughly the same for women as for men (Strauss and Thomas 1995; Summers 1992).

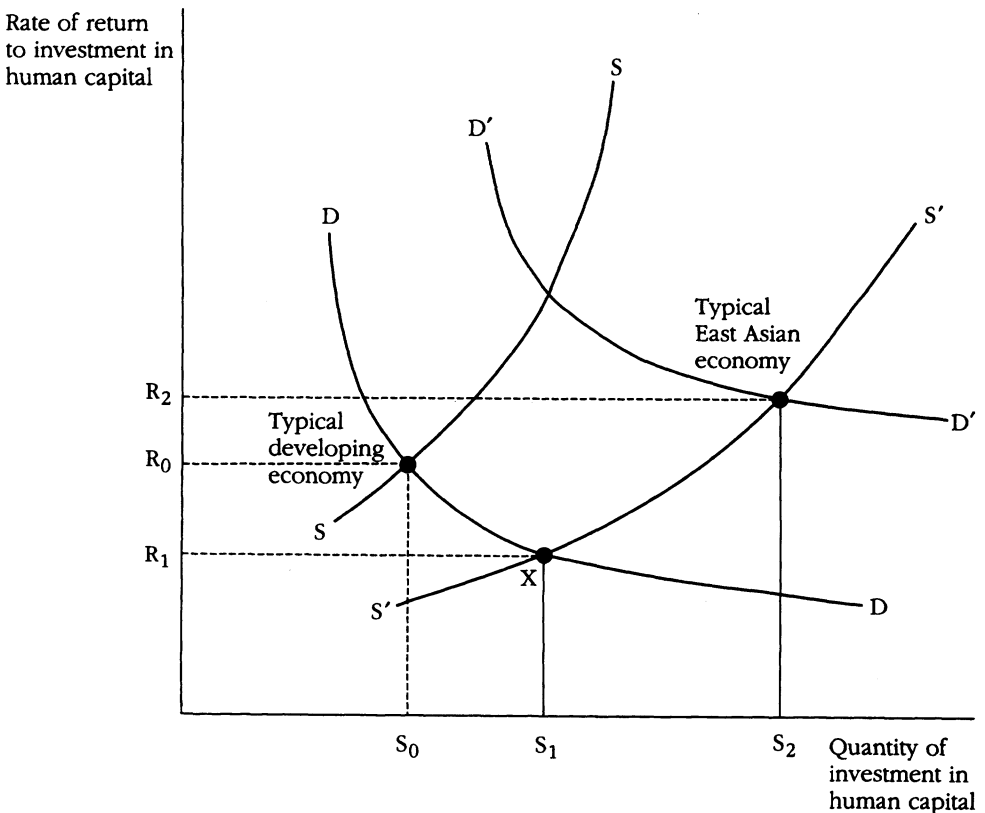
Of course, the rate of participation in the wage-labor market is much lower for women than for men. However, the economic payoff to educating girls is given not only by the increases in the productivity of wage labor but also by nonwage social benefits derived from changes in behavior within households. Fertility is a notable example: the evidence is clear that educated mothers have fewer children (Behrman 1993). Educated mothers also are more efficient users of health services for themselves and their children, send children to school who are better prepared to benefit from society's schooling investment, and are more likely to send their own daughters to school (see Birdsall, Ross, and Sabot 1993). In Asia the fertility rate for women with more than seven years of schooling is 54 percent of the rate for uneducated women (Summers 1992). Closing still another virtuous circle, the fertility decline in East Asia beginning in the mid-1960s resulted in a marked slowing of the growth of the school-age population in the 1970s. This contributed to a growth of public expenditures on basic education per eligible child that was more rapid than elsewhere, permitting more rapid increases in the quantity and improvements in the quality of schooling provided.

Differences among countries in the demand for skills, which have been neglected in regression studies of growth that test education's contribution, are

also important. The resulting omitted-variable bias in these regressions may be a factor in the substantial overprediction of rates of growth for some countries with higher-than-predicted rates of enrollment in primary and secondary schools in the 1960s. For example, countries such as Egypt, the Philippines, Sri Lanka, and the former Soviet Union, like East Asian economies, had greater human capital endowments than predicted for their initial levels of income. Weak demand for educated labor may help explain why these countries nevertheless have tended to underperform with respect to growth.

Figure 4 illustrates the link between the demand for skills in the labor market and education's contribution to growth. The horizontal axis measures the magnitude of investment in human capital, as proxied, for example, by enrollment rates and basic education. The vertical axis measures the rate of return to investment in human capital (schooling) and, implicitly, the contribution of investment to growth for a given level of investment in human capital. S and D

Figure 4. *Demand Shifts and the Returns to Human Capital, East Asian and Developing Economies*



Note: S is the skill supply; D is the demand function; S' and D' represent the same variables for a typical East Asian economy.

are, respectively, the skill supply and demand functions of the typical developing economy; S' and D' are the skill supply and demand functions of the typical East Asian economy. We show S' as shifted to the right because, for example, there is greater public commitment to basic education in East Asia. (The supply function is more elastic because the distribution of income is more equal. There is less absolute poverty than in the typical developing economy, and families near the bottom of the distribution of income can better respond to increases in returns to investments in human capital.) D' is shifted to the right on the premise that, for any given rate of return to skill, skilled workers have been in greater demand in East Asia than in the typical developing economy.

As drawn, in East Asia high levels of demand for skilled workers have offset the tendency for educational expansion to induce diminishing returns to investment in human capital. By contrast, although enrollment rates are higher in some developing economies than others, for example economy X , the returns to education will be lower. Educational expansion (from S_0 to S_1) reduces the rate of return to education (from R_0 to R_1) because economy X has the human capital supply function of East Asia but the skill demand function of the typical developing economy. In contrast, in East Asia the net result of high demand for human capital as well as high supply is that, although skilled labor is more abundant than in the typical developing economy, the rate of return to investment in human capital (at R_2) is at least as high.

It is widely acknowledged that macroeconomic, agricultural, and, in particular, export-push policies contributed to a high demand for labor in East Asia (World Bank 1993).² Did these policies, by ensuring adequate demand for skilled as well as unskilled labor, also help ensure a high economic return to education? We assess this question using the regression shown in the second column of table 2. We control for the supply of education and test the relevance of the demand for skills using variables that measure the degree to which an economy is oriented toward manufactured exports.³ Our prediction is that, in the standard growth rate function, there will be a positive effect on growth of the interaction between the degree of orientation of an economy toward manufactured exports and the level of educational endowments in 1960. That is, the more oriented toward manufactured exports the economy is, the greater the demand for skilled labor and the greater the impact of a given educational endowment on growth will be.

2. East Asia's emphasis on exports contrasted with the import-substituting, capital-intensive strategies that primarily served the elite and labor insiders in Latin America and elsewhere and did not generate a strong demand for labor (Banerji, Campos, and Sabot, forthcoming).

3. See, for example, Pack and Page (1994) and Wood (1994). Of course, a high rate of manufactured exports may also reflect the supply of skills—a function in part of human capital accumulation (Balassa 1984). In the second column of table 2, we control for the supply-side channel by direct inclusion of school enrollment rates. And just as we mitigate simultaneity between growth and human capital accumulation by using 1960 enrollment rates, we mitigate simultaneity between growth and export intensity by using the 1965 ratio of manufactured exports to GDP.

Table 3. *Public Expenditure on Basic Education in Kenya, the Republic of Korea, Mexico, and Pakistan, 1970-89*

<i>Country and statistic</i>	1970	1975	1985	1989	<i>Percentage change, 1970-89</i>
<i>Kenya</i>					
Expenditure per eligible child (1987 dollars)	38.6	—	46.6	53.4	38.3
Expenditure as a percentage of GNP	4.0	—	4.9	4.9	22.5
Absolute expenditure index (1970 = 100) ^a	100	—	220	286	186
Number of children eligible for basic education (millions) ^b	3.8	4.6	7.0	7.9	107.1
<i>Korea, Rep. of</i>					
Expenditure per eligible child (1987 dollars)	95.3	81.6	357.1	433.4	354.7
Expenditure as a percentage of GNP	3.1	1.9	3.8	2.7	-12.9
Absolute expenditure index (1970 = 100) ^a	100	91	388	444	344
Number of children eligible for basic education (millions) ^b	10.1	10.7	10.4	9.8	-3.0
<i>Mexico</i>					
Expenditure per eligible child (1987 dollars)	68.4	124.9	113.5	111.9	63.6
Expenditure as a percentage of GNP	1.6	2.6	2.0	2.0	25.0
Absolute expenditure index (1970 = 100) ^a	100	222	255	259	159
Number of children eligible for basic education (millions) ^b	16.2	19.7	24.9	25.6	58.6
<i>Pakistan</i>					
Expenditure per eligible child (1987 dollars)	7.9	9.4	13.4	—	—
Expenditure as a percent of GNP	1.1	1.6	1.6	—	—
Absolute expenditure index (1970 = 100) ^a	100	150	277	—	—
Number of children eligible for basic education (millions) ^b	21.0	26.6	34.4	42.2	101.4

— Not available.

a. Absolute expenditures on basic education in real 1987 U.S. dollars used to calculate indexes for absolute expenditures on education.

b. Calculated using enrollment rates and number of students in primary and secondary school.

Source: UNESCO (various years) and World Bank (various years c).

Because of substantial multicollinearity, the two variables we add in the second column of table 2—the ratio of manufacturing exports to GDP and the interaction of the secondary school enrollment rate and that measure of exports—are not significant at the 5 percent level. However, joint tests reject the null hypothesis that the coefficients are zero.⁴ The results support the contention that the contribution of education to economic growth tends to be greater in countries in which manufactured exports are a higher proportion of GDP. The results are consistent with the view that in East Asia the stimulus that the greater supply of human capital gave to economic growth was augmented by the export orientation of those economies and the resulting skill-demanding growth paths they followed. Our finding is also consistent with the shift of East Asian exporters into more technologically sophisticated and more capital- and skill-intensive goods, as rapidly rising wages of unskilled labor eroded international competitiveness in labor-intensive manufactured goods.

Thus the combination of a greater supply of education and a greater demand for educated workers contributed to faster economic growth in East Asia than in other developing regions.

In the other half of the virtuous circle of education and growth, rapid economic growth and altered household behavior gave positive feedback to greater investment in education in East Asia, and resources for education expanded rapidly. In the ratio of public expenditures on basic education to the number of school-age children, in East Asia rapid economic growth increased the numerator while declining fertility (a result of earlier investments in education) reduced the denominator.

Table 3 indicates that in 1970, public expenditure on basic education per eligible child was not much higher in Korea (\$95 in 1987 dollars) than in Mexico (\$68). However, from 1970 to 1989 it more than quadrupled in Korea, to \$433, whereas in Mexico it did not even double. As a consequence, in 1989, Mexican public expenditure on basic education per eligible child was only 26 percent of Korean expenditure per eligible child.

What accounted for this divergence? It was not government commitment: public expenditure as a percentage of GNP over this period was actually declining in Korea and rising in Mexico. For other East Asian economies as well, there is no evidence that greater government commitment to education produced the extraordinary performance in the provision of education.⁵ In 1960 and in 1989, public expenditure on education as a percentage of GNP was not much higher in East Asia than in other regions. In 1960 the share of education in public expen-

4. The *F*-statistic for the restriction that secondary school enrollments, export share, and interaction coefficients are each zero is 6.42, which exceeds the critical value for 1 percent significance with three and ninety degrees of freedom. More important, the corresponding *F*-statistic for the export share and interaction coefficients (6.37) also exceeds the critical value for 1 percent significance.

5. Government expenditure on education, expressed as a percentage of GNP, was not significant in explaining expected years of schooling in a cross-economy regression covering fifteen Asian and Latin American economies. See Tan and Mingat (1992).

diture was 2.5 percent for East Asia, 2.4 percent for Sub-Saharan Africa, and 2.2 percent for all developing economies (Birdsall and Sabot 1994). Over the next three decades, all regions markedly increased the share of national output they invested in formal education, but in 1989, the share in Africa, 4.1 percent, was higher than the East Asian share of 3.7 percent, which barely exceeded the 3.6 percent average share for all developing economies (Birdsall and Sabot 1994).

The initial conditions, the colonial legacy, are also not decisive in explaining why enrollment rates have been so much higher in East Asia than elsewhere. Although Korea had much higher enrollment rates in 1950 than did most other developing economies, the roughly 50- and 70-percentage-point increases since then in, respectively, primary school and secondary school enrollment rates account for much of the current gap between Korea and other middle-income economies. Similar claims can be made for other East Asian economies.

Two factors permitted a faster expansion of educational systems and enrollment rates in East Asia: faster economic growth and a more rapid decline of fertility. In Korea the absolute level of expenditure on basic education rose faster than in Mexico in part because GDP growth was faster. For example, from 1965 to 1975 GDP growth averaged 9.5 percent in Korea and 6.5 percent in Mexico (World Bank, various years b). This implies that over that period, given a constant share of GDP allocated to education, the resources available to the education sector in Korea rose by almost 400 percent; they rose also in Mexico but less, by about 250 percent. (Rapid growth also raises the demand for labor, hence wages, and in particular, the wages of teachers. Because the pay of teachers accounts for a large proportion of recurrent expenditure on education in low-income economies, the tendency for rising costs to reduce the benefits of rapid growth would be strong except for an important mitigating factor. Rapid accumulation of human capital in one period increases the potential supply of teachers in the next, thereby reducing the relative earnings premium that teachers command. Although growth induces increases in average wages, the wages of more-educated workers, including teachers, tend to rise at a slower rate. For example, in part because of low relative salaries, the per-pupil operating costs of primary schools are about 13 percent of GNP per capita in Indonesia and Malaysia, whereas they are almost 30 percent in francophone Africa; Tan and Mingat, 1992.)

Over the two decades from 1970 to 1989 there was also a divergence between Mexico and Korea in the number of school-age children. Although in Mexico the number of children eligible for basic education increased by nearly 60 percent, in Korea the number actually declined by 2 percent (Birdsall and Sabot 1994). The difference in fertility rates, of which these diverging trends are a reflection, was in part caused by earlier differences in educational attainment, in particular, in the educational attainment of women.

Figure 4 illustrates another feedback mechanism. In the absence of the skill intensification of labor demand, educational expansion (from S_0 to S_1) reduces the rate of return to education (from R_0 to R_1) in the typical low-income economy.

This lower return then slows further investment in education. Investment in education by households is greater in East Asia because the demand for educated workers is greater, and consequently the returns to investment in schooling are higher. $S_2 - S_1$ is the difference between the East Asian economy and the typical developing economy in the level of investment in human capital induced by the greater demand for educated labor in the East Asian economy. A stronger demand for educated workers elicits a greater supply.

II. EDUCATION LOWERS INEQUALITY, WHICH STIMULATES INVESTMENT IN EDUCATION

In a cross section of more than eighty economies, there is a clear correlation between basic-education enrollment rates and lower levels of income inequality (Birdsall and Sabot 1994). There is evidence that causality runs in both directions in this relationship—in a virtuous cycle of greater education as a cause and a consequence of lower inequality.

Because educational expansion increases the number of workers holding high-wage jobs, income inequality can increase rather than decline; the change in the educational composition of the labor force causes a disequalizing effect analogous to that identified by Kuznets. With educational expansion, however, the relative abundance of educated workers increases, and another factor kicks in: the scarcity rents that the educated earn are eroded. The result is a compression of the educational structure of wages. This compression effect can offset the composition effect, leading to a reduction in the inequality of pay and hence in total income inequality (Knight and Sabot 1983, 1991).

Differences between Brazil and Korea in educational opportunities in the 1970s and 1980s illustrate how, if education expands rapidly to all segments of a population, the inequality of pay can be reduced by the dominance of the compression effect. In 1980, Brazil and Korea had similar levels of per capita income. Both countries had achieved universal primary education, and in both countries secondary and tertiary enrollment had increased. However, there was a large and widening gap between Brazil and Korea in the extent to which enrollment rates for secondary and tertiary education grew. In Korea between the mid-1970s and mid-1980s the proportion of high school and postsecondary graduates in a large random sample of the wage-labor force increased so sharply that the proportion of workers with an elementary education or less declined from nearly 20 percent to under 8 percent. By contrast, for the Brazil sample, the comparable proportion fell from over 70 percent to just over 60 percent (Park, Ross, and Sabot, forthcoming).

Table 4 presents the results of estimating a standard Mincerian log wage regression on the Korean and Brazilian samples using 1976 and then 1985 data. In Korea, with the spread of high school and postsecondary education, the extra earnings of graduates at these levels fell. In 1976, workers with a high school education earned 47 percent more than primary school graduates; by 1986 that

Table 4. *Male Wage Structure in Brazil and the Republic of Korea, 1976 and 1985*

Variable	Brazil		Korea, Rep. of	
	1976	1985	1976	1986
Premium to	0.488	0.449	—	—
primary schooling	(55.68)	(67.23)		
Premium to	0.958	0.886	0.176	0.092
secondary schooling	(85.70)	(110.53)	(19.66)	(7.54)
Premium to	—	—	0.473	0.296
high school			(48.19)	(23.40)
Premium to	1.593	1.508	0.969	0.655
higher education	(100.22)	(127.40)	(71.48)	(42.06)
Experience	0.045	0.048	0.067	0.078
	(64.97)	(83.91)	(61.90)	(69.61)
Experience ²	-0.0006	-0.0007	-0.001	-0.001
	(61.41)	(79.27)	(39.13)	(50.27)
Constant	1.149	7.043	10.231	11.779
R ²	0.546	0.562	0.532	0.449
Number of observations	85,106	118,000	23,838	24,486
Mean log of wages	1.864	8.095	11.363	12.895

— Not available.

Note: Dummy variables were included to control for region, occupation, industry, and head of household (Brazil only); *t*-statistics are in parentheses.

Source: Authors' calculations.

premium had declined to 30 percent. Similarly, the extra earnings of workers with higher education fell from 97 percent to 66 percent. In Brazil, where the expansion of enrollment rates in secondary and tertiary education was less marked, the premia to workers with secondary and tertiary schooling barely changed.

In Korea the compression effect shown in table 4 offset the composition effect of increased education; the net effect of educational expansion was to reduce the log variance in wages by 22 percent. By contrast, in Brazil the composition effect dominated; the net effect of the smaller educational expansion over the decade was to increase that measure of wage inequality by 4 percent. By 1985, 25 percent of the gap between Brazil and Korea in the inequality of pay could be explained by differences in the educational attainment of the labor force (Park, Ross, and Sabot, forthcoming). The reduction in the wage premium to educated workers in Korea between the 1970s and 1980s and the lack of any such decline in Brazil suggest that the more rapid spread of education in Korea, and elsewhere in East Asia, contributed over time to the below-average levels of income inequality there compared with those in Latin America.

Closing the second virtuous circle, there has been a feedback effect from low inequality of income to high enrollment rates and thus greater education. Low inequality of income increases household demand for education and probably increases the public supply.

On the demand side, it is likely that budgetary constraints combined with poor access to capital markets mean that poor households do not invest in their

children's human capital even when the returns are high. The pressing need to use income simply to subsist crowds out high-return investments and constrains the demand for education. Table 5 pairs East Asian economies with other economies having similar levels of average per capita income but with considerably higher levels of income inequality and hence lower absolute incomes of the poor. For example, although the per capita income of Brazil (in 1983) slightly exceeded average income in Malaysia (in 1987), the bottom quintile received only 2.4 percent of total income in Brazil compared with 4.6 percent of total income in Malaysia. The per capita income of the bottom quintile in Brazil was thus only 54 percent of the per capita income of the bottom quintile in Malaysia. Given an income elasticity of demand for basic education of 0.50 (a conservative figure), if the distribution of income were as equal in Brazil as in Malaysia, enrollments among poor Brazilian children would be more than 40 percent higher.

Low levels of income inequality may have an influence on the supply side as well as the demand side of the market for education. For the government to provide subsidized basic educational opportunities for a large segment of the school-age population when the distribution of income is highly unequal, the tax burden on the rich has to be heavy. High-income families are likely to resist, for example, by trying to channel public spending for education into subsidies to higher education where their own children will be the beneficiaries (Birdsall and James 1993). If incomes are more equally distributed, the incidence of taxes to finance mass education need not be as concentrated, and resistance to such programs by high-income families is likely to be weaker.

Although public expenditure on education as a share of GNP is not higher in East Asia than in other developing regions, the share of public expenditure on education allocated to primary and secondary, as opposed to higher, education has been consistently larger in East Asia. Korea and Venezuela are extreme examples. In 1985, Korea allocated just 10 percent of its public education budget to higher education, but Venezuela allocated 43 percent (Birdsall and Sabot 1994). As a result, although both countries spent a similar percentage of GDP on education, Korea spent more than twice as much as Venezuela on primary and secondary education, a fact that surely helps to explain Korea's more abundant and higher-quality educational opportunities. Birdsall and Sabot (1994) present similar data for other East Asian economies.

Findings of analyses across economies are also consistent with the likelihood that more equality in the distribution of income leads to more investment in education. In a study of the determinants of secondary school enrollment rates, Williamson (1993) found that more egalitarian societies (measured using the ratio of the share of total income of the bottom 40 percent to the share of the top 20 percent) had higher secondary school enrollment rates. Using his estimated equation to decompose the difference in enrollment rates between Brazil and Korea, we found that none of the 27-percentage-point difference in enrollment rates could be explained by the difference in GNP per adult. Nearly all of that portion of the gap that could be explained was caused by the greater

Table 5. *Absolute Income Share of Lowest Quintile in Selected Economies and Years*

<i>Economy</i>	<i>GNP per capita (U.S. dollars)</i>	<i>Population (millions)</i>	<i>Poorest 20 percent of households</i>			
			<i>Total GNP (millions of U.S. dollars)</i>	<i>Income share (percent)</i>	<i>Absolute income (U.S. dollars)</i>	<i>Per capita income (U.S. dollars)</i>
Botswana, 1986	840	1.1	924	2.5	23	115
Brazil, 1983	1,880	129.7	243,836	2.4	5,852	226
Costa Rica, 1986	1,480	2.6	3,848	3.3	127	254
Indonesia, 1976	240	135.2	32,448	6.6	2,141	79
Indonesia, 1987	450	171.4	77,130	8.8	6,787	251
Kenya, 1976	240	13.8	3,312	2.6	86	31
Korea, Rep. of, 1976	670	36.0	24,120	5.7	1,375	191
Malaysia, 1987	1,810	16.5	29,865	4.6	1,374	416
Philippines, 1985	580	54.7	31,726	5.5	1,745	160

Source: World Bank (various years b).

inequality in the distribution of income in Brazil. Were income distributed as equally in Brazil as in Korea, Korea's secondary school enrollment rate, instead of being 27 percentage points higher, would be only 6 percentage points higher.

III. LOW INEQUALITY OF INCOME STIMULATES GROWTH

Levels of educational attainment above those predicted for economies having similar income levels help explain why, contrary to the conventional wisdom, we observe in East Asia both rapid growth and low levels of income inequality. Investment in education augments growth and reduces inequality and, closing a virtuous circle, rapid growth and low inequality induce higher investment in education. The adoption of a labor-demanding growth strategy that was in accord with factor endowments and comparative advantage also contributed to both rapid growth and low inequality (World Bank 1993; Banerji, Campos, and Sabot, forthcoming). Banerji, Campos, and Sabot (forthcoming) argue that in East Asia the incomes of those in the bottom half of the distribution of income were pulled up by the rapid growth of demand for wage labor. They show that in Korea from 1970 to 1990 wage employment in manufacturing grew at an annual rate of 19 percent and real wages in manufacturing increased at an annual rate of 9 percent. By contrast, in India over the same period both wage employment and real wages in manufacturing grew at less than 2 percent a year.

But does low inequality stimulate growth independently of its effect on education? In this section we first present some cross-economy evidence that it does. We then suggest some reasons why. We point out how public policy in East Asia counteracted the Kaldor and Kuznets effects, thereby weakening the tendency for rapid growth to be associated with high inequality.

Econometric Results

Recent cross-economy studies of growth suggest a negative relationship between income inequality and average annual growth in per capita GDP (Alesina and Rodrik 1994; Persson and Tabellini 1994). For the period 1970–88, Clarke (forthcoming) found this relationship to be robust to the choice of (five) inequality measures and alternative specifications of the explanatory variables. We modified the Clarke regression because we wanted estimates for the period 1960–85 for comparability with our other growth regressions and because in Clarke's data set inequality observations for some countries are as recent as 1980. Current inequality, arguably, is simultaneously determined with growth. We assembled economy-by-economy observations from a variety of sources on the ratio of the income shares of the top 20 percent of population and the bottom 40 percent. We chose the earliest available observation and dropped observations where the measure postdated 1970. This procedure yielded a data set with seventy-four observations.⁶

6. The list of economies and earliest year for the inequality variable is available from the authors.

The addition of the inequality measure to the basic growth rate function reported in column 3 of table 2 does not much change the parameter estimates. The education variables remain significantly positive. The inequality variable is negative and significant (at the 10 percent level). Controlling for other determinants of growth, we find that inequality and growth are inversely related.

But might the negative correlation between initial inequality and growth be spurious? The correlation might reflect regional variation in omitted characteristics, as reflected in figure 1, with HPAES concentrated in the northwest quadrant and Latin American countries in the southeast (Fishlow, forthcoming). Indeed, adding an HPAE or a Latin America dummy variable makes the inequality variable insignificant. Of course, the existence of regional effects does not in itself mean the relationship between inequality and growth is spurious; the use of dummy variables begs the nature of the heterogeneity they capture. In any event, given such problems as the comparability across economies of measures of inequality (Bruno, Ravallion, and Squire 1995), and the other weaknesses of cross-economy analysis noted above, we can only view the results as suggestive.

How much might low inequality stimulate growth? For our sample of low- and middle-income economies, the average annual growth in per capita GDP from 1960 to 1985 was 1.8 percent. A one-standard-deviation increase in primary school and secondary school enrollment rates raises growth rates by 0.62 and 0.34 percentage points, respectively. A one-standard-deviation decrease in the level of income inequality raises the predicted growth rate by 0.32 of a percentage point. The effect of reducing inequality is substantial; for example, other things being equal, after twenty-five years, GDP per capita would be 8.2 percent higher in an economy with low inequality than in an economy with inequality one standard deviation higher.

Korea's GDP grew at an average annual rate of 5.95 percent from 1960 to 1985 (World Bank 1993). We conducted two sets of simulations of would-be growth in Korea, with the inequality variables and then the enrollment variables varying from their actual values. Using the same equation that was used to calculate the regressions in the third column of table 2, we set the inequality and the enrollment rate variables first to the average for all economies in our sample, then to the average for all low- and middle-income economies, and finally to the level for Brazil, while holding other variables at the level for Korea. The predicted growth rates we thus obtained are presented in table 6.

If, in 1960, Korea had had Brazil's level of inequality, Korea's predicted growth rate over the following twenty-five years would have been reduced by 0.66 percentage points each year, implying that after twenty-five years, GDP per capita in Korea would have been nearly 15 percent lower. In 1960 the percentage gap between Korea's and Brazil's enrollment rates was smaller than the gap in their levels of inequality; as a consequence, the impact on Korea's predicted growth of substituting Brazilian enrollment rates is smaller than the impact of substituting Brazilian inequality.

Table 6. *Actual and Simulated Growth Rates for the Republic of Korea, 1960–85*

<i>Simulation values</i>	<i>Inequality variable</i>	<i>Enrollment variables</i>
Actual for Korea	5.95	5.95
Average of all other countries	5.76	5.68
Average of all low- and middle-income countries	5.67	4.77
Brazil	5.29	5.39

Source: Authors' calculations.

Moreover, low enrollment rates in Brazil probably in part resulted from the constraint on the demand for schooling imposed by high inequality. If in 1960 Korea had had Brazil's inequality, Korea's actual enrollment rates would have been lower, suggesting a still larger total constraint of high inequality on economic growth. Conversely, to the extent that low inequality stimulates growth by inducing increased investment in education, the coefficient on the inequality variable in the third column of table 2 captures only the direct effect of inequality on growth net of the effect of inequality on enrollments. This implies that deleting the education variables from the growth regression should increase the parameter value on the inequality variable. The fourth column of table 2 indicates that this prediction is correct: deleting the education variables raises the parameter value on the distribution variable by roughly 40 percent. In addition to its direct effects, an indirect effect of high inequality is that it appears to constrain growth by constraining investment in education.

Why Might Low Inequality Stimulate Growth?

Using income transfers to reduce income inequality is unlikely to be good for growth for a number of reasons: transfers often result in the diversion of scarce savings from investment to the subsidization of consumption; the targeted group is often not the one to benefit from transfers, reducing the effectiveness of transfers as a means of raising the standard of living and hence the savings and investment rates of the poor; and transfers tend to distort incentives and reduce both allocative efficiency and x-efficiency—x-efficiency is a measure of workers' productivity holding constant all other inputs to the production process, including the workers' skills (Leibenstein 1966). However, policies that increase the productivity and earning capacity of the poor might be good for growth. Low inequality can stimulate growth in four ways: by inducing large increases in the savings and investments of the poor; by contributing to political and macroeconomic stability; by increasing the x-efficiency of low-income workers; and, with higher rural incomes, by increasing market demand for domestic producers.

Increased savings and investments of the poor. Low inequality can stimulate growth by inducing large increases in the savings and investments of the poor,

assuming there are not offsetting reductions in the savings of the nonpoor. Liquidity constraints can keep the poor from investing even when expected returns are high, but reducing inequality can increase investment in education by easing such constraints. Reducing inequality can have a similar impact on other dimensions of human capital investment, such as health and nutrition. Although the increased investment in health and nutrition is in part a consequence of education, particularly of mothers, part is independent of the education link. Lower income inequality implies higher absolute incomes for the poor for any given level of average country income per capita. Nutritious food and preventive and curative health care are superior goods and services. Therefore the impact of lower inequality on the consumption by the poor of these goods and services is likely to be larger than the impact of lower inequality on the incomes of the poor. Among the poor, the productivity of labor is adversely affected by inadequate nutrition and ill-health. Greater equality, through its effect on the health and nutrition of the poor, can imply higher-than-proportionate increases in productivity and thus in growth.

We are suggesting that the higher the absolute income of the poor, the smaller the negative impact on their investment rate of the capital market imperfection that prohibits borrowing to finance investment in human capital. This implies that where income inequality is low, the positive association between income and savings rates may not be as strong as Kaldor (1978) presumed or national income data indicate. The data capture only savings channeled through financial intermediaries, not the increased investments in human capital that result from eased liquidity constraints. (There may be a similar effect on other investments of the poor, for example in agriculture or small enterprises, although this effect is more likely to be reflected in measured investment rates.)

Of course, the higher nonfinancial savings rates of the poor where income inequality is low may be offset by lower financial and nonfinancial savings rates of the rich (who are in effect less rich for a given average country income); whether this is so warrants empirical study. However, note that the link of savings to growth depends on the efficiency of the resulting investment; if the savings of the poor are in the form of human capital and other investments they choose and closely monitor, we can expect the marginal returns to be relatively high compared with investments financed through traditionally intermediated savings. It may not be a coincidence that the fastest-growing East Asian economies have had not only unusually high rates of saving and private investment, but also high rates of return to investment compared with those of other developing regions (World Bank 1993).

Political and macroeconomic stability. Low inequality can stimulate growth by contributing to political and macroeconomic stability. For example, low inequality can reduce the tendency for fiscal prudence to be sacrificed to political expediency, discourage inappropriate exchange rate valuation, and accelerate the adjustment to macroeconomic shocks. The likelihood that fiscal, monetary,

and other economic policies will swing between the extreme of serving the narrowly defined and myopic interests of the elite and an equally myopic populist extreme is lower where lower levels of income inequality narrow the distance between the interests of the elite and the poor. In contrast, growth is constrained when policies at each extreme create pressures for higher fiscal expenditures that divert scarce public resources from high-return investments to consumption. Moreover, by increasing economic uncertainty, such policy swings, much more common in Latin America and Africa than in East Asia, are likely to discourage private investment.

The allocation of limited fiscal resources for tertiary education, so common in Latin America, is an example of a fiscal policy that reflects pressure for public spending on favored groups. Such spending, from which the children of the elite disproportionately benefit, contributes little to growth (Birdsall and James 1993; Birdsall and Sabot 1994). Because private returns to, and the resulting demand for, tertiary education are high, the private sector would have undoubtedly provided this schooling for the children of high-income families in the absence of government subsidies. The government thus enables the elite to increase their consumption by providing a service at subsidized rates for which they would otherwise be willing and able to pay full cost. For example, despite the fact that Korea spends a lower proportion of public funds on higher education than Venezuela does, enrollment rates for higher education are higher in Korea than in Venezuela (37 percent compared with 26 percent), in part because of higher enrollment in private universities in Korea (United Nations 1994).

At the other extreme, the provision by the government of make-work jobs in the public sector in an attempt to satisfy the excess demand for high-wage employment is an all too common example of populist policies. Because in these circumstances wages in the public sector are generally higher than the marginal product of labor, which may be zero or even negative, this excess employment is heavily subsidized and diverts scarce savings from high-return investments to consumption (Gelb, Knight, and Sabot 1991).

Low inequality can also contribute to macroeconomic stability by strengthening the resolve to avoid exchange rate overvaluation. A myopic, self-serving elite that is not concerned with the welfare of the poor will tend to overvalue the exchange rate (Sachs 1985). Overvaluation will reduce the price of imports (which the urban elite has a high propensity to consume) at the expense of agriculture (in which the poor are concentrated) and other export-oriented sectors. In addition, overvaluation is likely to exacerbate external imbalance, a common cause of macroeconomic instability. East Asian economies have maintained relatively stable exchange rates over the last two to three decades, avoiding the rapid appreciation so common elsewhere. Stable exchange rates eased the task of containing inflation and of limiting internal and external debt to manageable proportions.

The ability to respond quickly to unanticipated shocks may be another link between low levels of income inequality and macroeconomic stability. Lower inequal-

ity is likely to be associated with more policy flexibility in responding to a negative shock, because the negative effects on consumption will be seen as more widely shared and are less likely to erode the absolute incomes of the poor. In an economy where inequality has been declining, the short-run consequence of a negative shock for those in the bottom half of the distribution of income is more likely to be a decline in the rate of growth, rather than in the absolute level, of their incomes. Mazumdar (1993: 361) notes that as part of Korea's adjustment to the first oil shock "the unit cost of labor was reduced by a massive 25 percent," largely accounted for by currency devaluation. He goes on to observe that "even this amount of decline of the real share of labor did not imply a fall in the real wage. Rather, the wage increase in 1975 was held down to 1.4 percent, compared with the annual wage increase in excess of 10 percent from 1966 to 1973." If the burden of a negative shock is shared more equally across income groups, the government will be better able to adjust domestic absorption by reducing consumption while protecting investment. In contrast, an absolute reduction of the incomes of the poor as a means of reducing domestic absorption—more likely if inequality is rising—even if to promote long-term growth, may provoke a strong negative reaction and lead to political and economic disruption.

Low and declining levels of inequality are also likely to reinforce political stability directly. For example, when the incomes of the elite are extremely high or are increasing rapidly while the incomes of non-elites stagnate, the risk is that a large proportion of the population will become politically alienated. Low or declining inequality implies, in contrast, that non-elites are sharing in the benefits of economic growth. This reduces the risk of their political alienation, legitimizes the government in the eyes of the mass of the population, and helps build broadly based political support. A more stable political environment is conducive to economic growth: investment is likely to be higher where the risk of economically disruptive political upheaval and the expropriation of private assets is reduced.

Increased x-efficiency of low-income workers. High inequality may reduce growth by reducing the x-efficiency of low-income schoolchildren and low-income workers (Leibenstein 1966). High inequality in developing countries is often associated with real barriers to upward mobility for those at the bottom. Limited access to good schooling and credit and the racial and ethnic discrimination that are sometimes correlated with low income are examples of a nonlevel playing field that can discourage effort. In the competition for scarce places in the university system, children from low-income households learn from experience that no matter how great their effort, it will be insufficient to compensate for the low quality of the schools they attend. By contrast, poor children in high-quality schools who see tangible rewards for effort are more likely to make such an effort.

Similarly, extra effort is unlikely to be forthcoming from low-income workers or farmers who, because of policy biases, face economic arrangements that

do not reward effort. They are more likely to shirk and to become resentful and alienated. For example, in agricultural settings with a highly unequal distribution of land, workers (be they wage workers or sharecroppers) and owners cannot capture the full productivity effects of their activities. Productivity-enhancing behavior such as hard work and risk taking is impossible to specify contractually and is costly to monitor—a form of the principal-agent problem (Bowles and Gintis 1994). Although difficult to quantify, the increases in productivity associated with low inequality may, nevertheless, be large. Timmer (1993), for example, argues that the observed link between agricultural growth and increases in national total factor productivity is the result in part of the increased work effort and investments made by the rural poor in response to improved incentives to the agricultural sector. The work ethic for which East Asian children and labor are well known may be less an exogenous cultural trait than an endogenous response to incentives that reward effort.

Land reform is the most straightforward example of an agricultural policy, implemented in Korea and Taiwan (China), that both reduced inequality and increased productivity. Labor intensity and yield tend to increase as farm size decreases: value added per hectare on small farms (three hectares or less) tends to be three to five times greater than the average for large farms (500 hectares or more) (Squire 1981; Berry and Cline 1979).⁷ This implies that the reduction in the inequality of landholding and in the average size of farms that resulted from the land reforms in Korea and Taiwan (China) also increased agricultural output and labor demand. In Indonesia, Korea, and Thailand, both the average size of farms and the Gini coefficient of farm size distribution are much smaller than in Argentina, Brazil, Mexico, and most other countries in Latin America (Squire 1981).

Increased rural incomes. Low levels of income inequality can stimulate growth by raising rural incomes, which limits intersectoral income gaps and the rent seeking associated with such gaps and increases the domestic multiplier effects of a given increase in per capita income. Societies with low levels of income inequality are more likely to have policies that contribute to, rather than sap, the dynamism of the agricultural sector. A larger share of public investment was allocated to rural areas in East Asian economies than in other low- and middle-income economies. Equally important, levels of direct and indirect taxation of agriculture were lower in East Asia than in other regions (World Bank 1993). Those societies will tend to have a smaller gap between rural income and urban income. A relatively better-off rural population will in turn generate less pressure for make-work jobs in the high-wage urban public sector. The small rural-urban income gap also implies a relatively weak Kuznets effect; differences in the

7. Benjamin (1995), however, considers the possibility that the relationship between productivity and labor intensity and farm size is a statistical artifact resulting from omitted land-quality variables. He provides supporting evidence from Indonesia.

productivity and incomes of labor in the low- and high-productivity sectors are smaller, so the intersectoral transfer of labor generates less income inequality.

Low levels of income inequality, associated with higher income in the rural and agricultural sectors, also mean higher demand for the agricultural inputs and consumer goods that can then stimulate the growth of labor-intensive nonagricultural output. In Taiwan (China), for example, in the 1950s and early 1960s, agriculture—not manufacturing for export—was clearly the leading sector, and roughly 60 percent of the increment to aggregate demand was domestic (Kuo, Ranis, and Fei 1981). More generally, among Asian economies there is a strong positive correlation between the rate of growth of the agricultural sector and the rate of growth of the nonagricultural sector (Mellor 1990). The relationship suggests that the multiplier effects of agricultural growth on manufacturing, construction, and services are large. A 1 percent increase in agricultural growth is associated with a 1.5 percent increase in the growth rate of the nonagricultural sector, implying that the faster agriculture grows, the faster its share of total output declines. With the exception of the East Asian city-states, those Asian economies with the fastest rates of growth of agricultural output over the last thirty years have tended to experience the biggest declines in the share of agricultural output in GNP. Ironically, a dynamic agricultural sector was on their path to industrialization.

Because the relatively simple manufactured inputs and consumer goods demanded by rural residents are generally more efficiently produced with labor-intensive techniques, the employment effects of these increases in demand are amplified (Ranis and Stewart 1987). Detailed study of these backward and forward linkages in the Muda River region of Malaysia provides microeconomic confirmation of the magnitude of this intersectoral multiplier (Bell, Hazell, and Slade 1982). By contrast, when the incomes of the urban elite increase, the tradables on which they spend their increased income tend to be capital-intensive goods.

It is not necessary to be a structuralist to believe that these demand and multiplier effects matter. Even in fully open economies, the multiplier effects of external demand, especially at early stages of development, may not be as great as the effects of local demand. Moreover, vibrant local markets and competition may be critical to producers' developing the expertise and efficiency required to enter external markets (Porter 1990). Strong domestic demand gave East Asia's early manufacturers a competitive advantage in international markets by giving them the opportunity to test-market labor-intensive goods and achieve economies of scale.

IV. CONCLUSION

In East Asia, the system of basic education expanded rapidly in the postwar period and improved in quality. By increasing labor productivity, changing household behavior, and facilitating the acquisition of technological capability, the

rise in education levels stimulated growth. The positive effect of rising education on growth was reinforced by macroeconomic and trade policies, including an emphasis on manufactured exports, that generated demand for labor and increasingly for skilled labor. In a virtuous circle, rapid economic growth in turn led to a higher demand for, and supply of, education. At the same time, the growing abundance of educated labor eroded the scarcity rents of the more educated; thus, broadly based educational expansion reinforced low initial levels of inequality. Closing a second virtuous circle, lower levels of income inequality further increased the supply of, and demand for, education.

Educational performance alone does not explain the extraordinary combination of rapid growth and low inequality observed in East Asia. We have suggested that such other dimensions of the East Asian development strategy as promoting a dynamic agricultural sector and a labor-demanding, export-oriented growth path also stimulated growth and reduced inequality. Finally, we have suggested that low inequality may not only stimulate growth indirectly, by augmenting investment in education, but may also have a direct, positive effect on the growth rate. The direct effect would come from increasing investment in dimensions of human capital other than education, from increasing political and macroeconomic stability, and from reducing intersectoral income gaps and increasing the domestic multiplier effects of a given increase in income. Econometric evidence, crude though the data and methods may be, lends support to the possibility of this direct effect of lower inequality on growth. Other things being equal, economies with lower inequality near the start of the period 1960–85 grew faster. Moreover, our results suggest that the stimulus to growth of low inequality may be quite large.

In summary, the East Asian experience appears sufficient to reject the conventional wisdom of a necessary link between high levels of income inequality and rapid growth. Although our analysis has not been sufficient to confirm the opposite (and might be vulnerable to omitted-variable bias), we hope others now seriously consider the hypothesis that low inequality and well-designed inequality-reducing policies stimulate growth. This is not an argument for income transfers, which tend to be growth-constraining, but for policies that reduce inequality by eliminating consumption subsidies for the rich and by increasing the productivity of the poor. Whether by political design, luck, or foresight, East Asian leaders were successful in identifying and implementing such policies. It does not matter now what their motives were in doing so; what matters is that leaders in other regions now benefit from the lessons of the East Asian success.

(Appendix table starts on the following page.)

Table A-1. Means and Standard Deviations of Variables Used in the Growth Analysis for the Cross-Economy Sample, 1960-85

Variable	Basic regression		Basic regression with manufactured exports		Basic regression with income share		Basic regression with income share, excluding education variables	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
GDP growth, 1960-85	0.02	0.019	0.0209	0.019	0.0230	0.018	0.0230	0.018
Per capita GDP, 1960 (thousands of 1980 dollars)	1.92	1.81	1.8104	1.745	2.0173	1.771	2.0173	1.771
Primary school enrollment rate, 1960	0.78	0.31	0.7489	0.337	0.8254	0.288		
Secondary school enrollment rate, 1960	0.23	0.21	0.2078	0.207	0.2365	0.220		
Ratio of manufactured exports to GDP, 1965			4.2022	6.836				
Income share ratio ^a					4.2650	2.458	4.2650	2.458
Government consumption share of GDP, 1970-85 ^b	0.107	0.053	0.1776	0.064	0.1757	0.062	0.1757	0.062
Average annual number of revolutions, 1960-85	0.18	0.23	0.1520	0.189	0.1466	0.191	0.1466	0.191
Average annual number of assassinations, 1960-85	0.031	0.086	0.2164	0.458	0.2430	0.478	0.2430	0.478
Absolute deviation in investment deflator, 1960 ^c	0.23	0.25	0.2065	0.223	0.2192	0.210	0.2192	0.210
Number of observations	98	98	100	100	74	74	74	74

Note: The first and second columns present Barro's (1991) results; the other columns present new results.

a. Ratio of the total income of the top 20 percent to the total income of the bottom 40 percent for the first year for which data became available for each country before 1970.

b. Average annual ratio of real government consumption (exclusive of defense and education) to real GDP.

c. Magnitude of the deviation of the purchasing power parity value for the investment deflator (U.S. = 1.0) from the sample mean.

Source: Barro (1991) and authors' calculations based on data from Barro (1991); World Bank (various years a); Clarke (1995); and World Bank data.

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