Volume Title: NBER Macroeconomics Annual 1991, Volume 6

Volume Author/Editor: Olivier Jean Blanchard and Stanley Fischer, editors

Volume Publisher: MIT Press

Volume ISBN: 0-262-02335-0

Volume URL: http://www.nber.org/books/blan91-1

Conference Date: March 8-9, 1991

Publication Date: January 1991

Chapter Title: Growth, Macroeconomics, and Development

Chapter Author: Stanley Fischer

Chapter URL: http://www.nber.org/chapters/c10986

Chapter pages in book: (p. 329 - 379)

Stanley Fischer
MIT AND NBER

*Growth, Macroeconomics, and Development**

When Keynes solved "the great puzzle of Effective Demand," he made it possible for economists once more to study the progress of society in long-run classical terms—with a clear conscience. (Swan, 1956, p. 334)

For most developing countries, in Africa and Latin America, the 1980s are known as the lost decade; for many it was a decade of negative growth. Developing country economic policy in the 1980s focused on *structural adjustment*, a combination of macroeconomic stabilization measures to restore domestic and external equilibrium, and structural changes in policies and institutions designed to make the economy more efficient and flexible, and thereby increase growth (World Bank, 1988, 1990a).

As the decade progressed, and the consequences of macroeconomic disequilibria became clearer, development economists and practitioners increasingly accepted the view that broad macroeconomic stability is necessary for sustained growth.[1] For instance, at the start of the new decade, heavy weight has to be placed on likely macroeconomic—particularly fiscal—developments in analyzing growth prospects in countries as diverse as the Soviet Union, India, Turkey, Côte d'Ivoire, and Brazil.

The 1980s were also the decade in which macroeconomists returned to growth theory and turned to development. The new growth theory, starting with Romer (1986) and Lucas (1988), deals explicitly with devel-

*I am grateful to Ben Cohen of MIT for research assistance, Daniel Kaufmann and Ross Levine of the World Bank for helpful comments and data, and Joseph Beaulieu, Olivier Blanchard, Jose De Gregorio, Rudi Dornbusch, Richard Eckaus, Anne Krueger, Xavier Sala-i-Martin, Lance Taylor, and Sweder van Wijnbergen for comments and suggestions.

1. See, for instance, Williamson (1990), Fischer and Thomas (1990), and the *World Development Report* (1991).

opment, seeking to account for the apparent nonconvergence of per capita income levels between developing and industrialized countries.[2] A hallmark of much of the new literature is the demonstration that distortions and policy interventions that can be shown to affect the level of income in conventional models can affect the steady-state growth rate in the new models—thereby providing analytical backing for assertions that had routinely been made by development economists. Although existing models, such as the Harrod–Domar model[3] or its multisector fixed coefficient extensions, or the Solow model without the Inada condition,[4] also produce such results, it is clear that the new growth theory is responsible for the recent interest in the determinants of long-run growth among macroeconomists.

The new growth theory has also returned to some of the classic themes of the development literature, among them the roles of technology, international trade, human capital, economies of scale, and the possible need for a coordinated big investment push to break out of a low-income equilibrium.[5]

The empirical work associated with the new growth theory consists largely of cross-country regressions, typically using the Summers–Heston (1988) ICP data.[6] Those results have been reviewed and their robustness examined in an extremely useful paper by Levine and Renelt (1990b); the strongest results are that investment in physical capital and either the level or the rate of change of human capital increase the rate of growth.

The new growth theory is production function driven and primarily concerned with steady states. There has been remarkably little focus on the influence of macroeconomic policies on growth; for instance, it is striking that measures of political stability, but not macroeconomic policy, have been included in new growth theory-based regressions.[7]

2. While it is a convenient problem on which to deploy the new theories, their aim is more ambitious than to account for nonconvergence, which can in any case be explained in the Solow framework (Mankiw, Romer, and Weil, 1990).
3. Since a version of this model has been used as the standard model in World Bank country analyses, many development economists had routinely been assuming that the saving rate affects the growth rate.
4. For the latter, see Solow (1956), Jones and Manuelli (1990), and Raut and Srinivasan (1991).
5. See, for example, Romer (1990), Grossman and Helpman (1990), and Murphy, Shleifer, and Vishny (1989).
6. For examples, see Barro (1989a,b), Mankiw, Romer, and Weil (1990), and Romer (1989).
7. Grier and Tullock (1989) do include macroeconomic variables in cross-country growth regressions, but their work is not inspired by the new growth theory, taking off rather from an earlier paper by Kormendi and Meguire (1985). Levine and Renelt (1990b) also include macroeconomic variables in their growth regressions; so does De Gregorio (1991) in a study of Latin America. A valuable start in analyzing the links between short-

Swan's (1956) excuse for concentrating on the long run—that with the help of Keynes we know how to control short-run macro problems—is less plausible now than it was in the 1950s and 1960s, especially for the developing countries.

The aim of this paper is firmly to establish—or reestablish—that macroeconomic policies matter for economic growth and development. In Section 1 I discuss the relationships between macroeconomic policies and growth. In Section 2 I present several types of evidence suggesting that macroeconomic policies do matter for growth: that countries that manage short-run macroeconomic policies better, tend to grow faster. In addition to extending the conventional cross-country regressions to include macroeconomic indicators, I include the results of pooled time-series cross-sectional regressions that support the basic findings.[8] In Section 3 I present and discuss evidence on the mechanisms through which macroeconomic policies matter, examining whether they have any independent influence on growth, or whether instead they operate almost entirely by affecting investment. In Section 4 I draw on the evidence from major case studies to examine and amplify the conclusions on macroeconomic policy drawn from the previous sections. Conclusions and issues for future research are presented in Section 5.

1. *Macroeconomic Policies*

By macroeconomic policies I mean monetary, fiscal, and exchange rate policies that help determine the rate of inflation, the budget deficit, and the balance of payments. In particular, I will be examining partial correlations between growth and inflation and growth and the budget deficit. I expect that countries that permit high inflation rates and large budget deficits grow more slowly.

The potential links between inflation and growth are discussed and developed in Fischer (1983) and by implication in Fischer and Modigliani (1978). While the Mundell-Tobin effect[9] implies that an increase in expected inflation increases capital accumulation, a variety of other mecha-

run macroeconomic management and growth, and in attempting to draw policy implications from the new growth theory, has been made by Vittorio Corbo and his associates at the World Bank; see for instance World Bank (1990a).

8. Because the focus of the paper is on the role of macroeconomic policy, I do not address in any detail questions of alternative development strategies—for example, outward versus inward orientation—that are frequently analyzed using cross-country regressions of the type that are presented in this paper.

9. As noted in Fischer (1988), the mechanisms producing the Mundell and Tobin effects actually differ, though both imply that an increase in expected inflation increases capital accumulation.

nisms produces the opposite correlation. The negative effect of inflation on the efficiency of the exchange mechanism suggests that higher inflation reduces the level of income; by extension through the new growth theory mechanisms, this interaction would produce a negative relation between inflation and growth. Similarly, all the costs of inflation detailed in Fischer and Modigliani (1978)—including the impact of inflation on the taxation of capital—would imply a negative association between the level of income and inflation, and through the new growth theory mechanisms, between inflation and growth. This paper also discusses the positive association between the level and variability of the inflation rate, and the likely positive association between inflation and uncertainty about future price levels. This uncertainty too is likely to reduce inflation.

Probably as important as the above mechanisms is the role of inflation as an indicator of the overall ability of the government to manage the economy. Since there are no good arguments for very high rates of inflation, a government that is producing high inflation is a government that has lost control. Economic growth is likely to be low in such an economy.

This same argument is the main reason to expect a negative association between budget deficits and growth. Governments that run large budget deficits are likewise out of control. In addition, in many models budget deficits crowd out private investment.

In the short run, neither the inflation rate nor the budget deficit is unaffected by the growth rate. A supply shock will both reduce the growth rate and raise the inflation rate; and given government spending a reduction in growth will increase the deficit. The length of time period in the regressions in this paper is 15 years. The government can certainly set the inflation rate and the deficit independently of the growth rate over such a long period.

Nonetheless, the possible endogeneity of monetary and fiscal policies has to be dealt with. That is done both through instrumental variable estimation and through the case studies presented in Section 4.

2. *Cross-Sectional Evidence*

Forty cross-sectional growth studies published since 1980 are listed by Levine and Renelt (1990a).[10] Each study regresses the growth rate over a

10. Their list is necessarily incomplete; in particular, it does not include the comparative cross-country analysis by Morris and Adelman (1988), which is based on work dating back to the 1960s. Several other earlier cross-country studies are listed by Chenery (Chapter 2 in Chenery, Robinson, and Syrquin, 1986, p. 27). Reynolds (1986, p. 101) also presents a cross-sectional growth regression, despite his general preference for time-series studies.

given period against a variety of variables; well over 50 regressors have been used in these studies (Levine and Renelt, 1990b). Among the regressors are variables relating to trade and trade policy, and exchange rates, fiscal policy, political and social stability and rights, human capital, and macroeconomic policy and outcomes. Early studies tended to focus on trade policy and investment; studies associated with the new growth theory typically include initial real income and some measure of human capital as well as investment.

For a sample of 101 countries, over the period 1960–1989, Levine and Renelt (1990b) present a basic regression

$$\begin{array}{cccccccc} GYP = & -0.83 & -0.35\,RGDP60 & - & 0.38\,GN & +3.17\,SEC & + & 17.5\,INV \\ & (-0.98) & (-2.50) & (-1.73) & (2.46) & (6.53) & & (1) \end{array}$$

$$\bar{R}^2 = 0.46; \qquad t\text{-statistics in parentheses,}$$

where GYP is the growth rate of real per capita income (from the World Bank data base), RDGP60 is (Summers–Heston) real income in 1960, GN is the rate of population growth, SEC is the 1960 rate of secondary school enrollment, and INV is the share of investment in GDP. Applying Leamer's extreme bounds analysis to Equation (1), the robust relationships are shown to be those between growth and initial income, and between growth and investment.[11]

They then extend the analysis to include a variety of other variables. Their two broad findings are, first, that several measures of economic policy are related to long-run growth; and second, that the relationship between growth and almost every particular macroeconomic indicator other than the investment ratio is fragile.

There are two standard interpretations of such regressions. First, they can be interpreted as attempts to estimate a time-differenced production function of the general form

$$Y_t = F[A_t, a(\,)K_t, b(\,)H_t] \tag{2}$$

where A_t is an overall efficiency factor, including not only the level of technology, but also for example representing the quality of government management of the economy, or institutional factors; K and H are physical and human capital respectively; and $a(\,)$ and $b(\,)$ are efficiency factors. Except for some initial conditions, the regressions deal with averages of the variables over long periods, treating countries as the population from which the observations are drawn.

11. De Long and Summers (1990) present evidence that growth is linked primarily to the share of manufacturing investment in GNP.

Differentiating Equation (2), we can interpret the coefficients in (1):

$$GY = \eta_1 A\dot{}/A + \eta_2 (a\dot{}/a + K\dot{}/K) + \eta_3 (b\dot{}/b + H\dot{}/H) \quad (3)$$

where η_i is the elasticity with respect to argument i in Equation (1), and GY is the growth rate of aggregate output. The coefficient on investment in (1) should be related to the average marginal product of capital over the nearly three decades represented by each observation; this coefficient—which is very robust—is typically in the range of 10–20%.[12] The negative coefficient on population growth in (1) is (noisily) related to the growth rate of the unaugmented stock of human capital, H; if population growth were equal to labor force growth, then the coefficient on labor in an equation for aggregate growth would be 0.62. In any case, Equation (1) suggests that per capita income grows less rapidly the more rapidly population grows.

An alternative interpretation starts from the assumption that the economy is tending toward a steady-state income level, Y^*. The steady-state income level is determined by the rate of saving (or investment), investment in human capital, and the rate of population growth. Thus

$$Y^* = f(\text{INV, SEC, GN}).$$

Then, given some initial level of income, Y_0, and some final income level Y_τ

$$Y_\tau - Y_0 = \phi(Y^* - Y_0) \quad (4)$$

where $\phi > 0$ is related to the returns to scale properties of the underlying production function with respect to the variable factors. If $\phi < 1$, the coefficient on Y_0 in a regression like (1) will be negative, indicating convergence of income levels among economies with the same rates of investment, human capital, and population growth.

Equation (4) makes clear the role of initial income in Equation (1). An interpretation of cross-country regressions based on Equation (3) has the benefit of not requiring that the economy be approaching a steady state—and given the fluctuations seen in growth rates and income levels in many developing countries in the period since 1970, it is hard to take the steady-state interpretation seriously.[13]

12. However, the investment coefficient falls to 6% in some regressions in Barro (1989b) that also include measures of political instability.
13. Despite some theoretical papers dealing with growth among open economies, e.g., Grossman and Helpman (1990), new growth theory regressions typically treat each country as a single closed economy tending toward its steady-state income level.

Returning to regression (1), the negative coefficient on the initial level of real income provides evidence of convergence; it indicates some type of diminishing returns for the production function expressed in terms of per capita output.[14] The variable SEC in (1) is included as a proxy for the country's ability to implement technical change; however, the 1960 secondary school enrollment rate must be a noisy measure of a country's ability to implement technical change over the period 1960–1989. Note further that since it is the rate of technical progress rather than the level of technical sophistication that matters for growth, we would under the Equation (3) interpretation expect some measure of the change in human capital to affect growth.[15]

The range of RDGP60 is from 0.21 ($208) to 7.38 ($7380). The implication is that the poorest country in the group would catch up in 142 years if it had the same secondary school enrollment ratio [and other variables in (1)] as the richest country.[16] A country starting at $1000 in 1960 would catch up in 90 years, ceteris paribus. Initial real income and secondary school enrollment would be strongly negatively correlated if social and religious factors did not intervene; probably these two large coefficients between them isolate a particular group of countries, for example, countries where females typically did not receive a secondary education, whose growth experience differs from the average.[17]

The significant divergences in economic performance across countries that underlie regression (1) are summarized in Table 1.[18] The growth rates are for GDP, with countries weighted by their relative GDPs mea-

14. As argued by Romer (1989), measurement error in initial income will bias its coefficient to be negative (since positive measurement error in RGDP60 reduces the level of the dependent variable); he also presents some evidence suggesting this problem may be present.
15. The change in enrollment is typically not included in growth regressions because of mutual causation between it and the growth of income, and the unavailability of instruments to deal with that problem. However Romer (1989) shows that the coefficients on both literacy and the change in literacy are significant when instrumented using the consumption of newsprint and the number of radios per capita. In this case initial income becomes insignificant.
16. This calculation (1) assumes a growth rate difference of 3.5% per annum, and (2) does not present the confidence interval around the estimate.
17. Levine and Renelt (1990b), Table 1, show that the secondary school enrollment ratio becomes insignificant if an Africa dummy is included; De Gregorio (1991) finds that school enrollment (primary or secondary) is insignificant in growth regressions for Latin America alone.
18. The similarities of experiences across countries within regions call for explanations; among them must be the common influence of particular industrialized country partners (e.g., Japan in Asia, the United States for Latin America), similarities of historical experiences, and learning from neighbors. There are of course also real differences among countries within a region, for instance, the development strategies and growth performance of Kenya and Tanzania, or Korea and India, differ greatly.

Table 1 SUMMARY STATISTICS, BY REGION

	Africa			*Asia*			*Latin America*[a]		
	60–73	*73–80*	*80–88*	*60–73*	*73–80*	*80–88*	*60–73*	*73–80*	*80–88*
GDP growth rate	4.5	3.2	0.3	5.6	5.7	7.8	6.0	5.1	1.2
Popn. growth rate	2.6	2.8	3.2	2.4	1.9	1.7	2.7	2.4	2.2
Inflation	5.8	14.1	25.7	2.0	6.0	6.9	5.7	24.1	111.2
Budget deficit/GDP			6.3		3.9	3.7	2.4	2.0	5.5
Real exchange rate		82.6	98.6		64.7	90.3		83.0	91.9
Current account/GDP	−3.6	−3.4	−6.1	−1.7	−1.1	−0.8	−2.6	−3.1	−2.4
Export growth (real)	7.0	4.4	−1.9	5.2	8.0	13.0	5.4	3.0	5.5
I/GDP (real)	14.0	21.5	15.6	19.4	26.5	30.1	18.9	23.5	18.6
External debt/XGS		96.6	365.0		89.8	98.9		196.2	316.6

[a]Latin America and Caribbean.

Note: Growth rates are percent per annum; inflation rate, of GDP deflator, is calculated on a continuous (logarithmic) basis; all ratios are expressed as percentages; base year for all indices is 1980; increase in exchange rate index indicates devaluation; external debt/XGS (exports of goods and services) ratios are for 1980 and 1988, respectively.

sured in dollars in 1980. Over the period since 1960, economic growth has accelerated in Asia while slowing in Latin America and Sub-Saharan Africa (SSA); the slowdown in the 1980s was greater in Latin America than in Africa, even when measured on the basis of the growth of per capita GDP.

The association between growth and investment in Table 1 is broadly positive, across both time and regions. However, in each region there was a sharp increase in the rate of investment between the first two periods without an increase in the growth rate.[19] Inflation increased between periods in each region, but the increases were much greater in SSA and particularly in Latin America than in Asia; there is a predominantly negative relationship between inflation and growth in Table 1. However, low growth Africa has generally not had the very high inflation rates of Latin America; in part this is because the fixed exchange rate among the Francophone countries belonging to the franc zone in Africa (CFA zone) has been maintained throughout. The negative relationship between growth and inflation is prima facie evidence that the quality of macroeconomic management affects growth. Supporting evidence comes from the apparently negative relationship between growth and the increase in the size of the budget deficit, although here data for SSA are incomplete.

The data suggest, but only weakly, that countries that grow faster do better on the current account of the balance of payments; the weakness of the association derives in part from variations in the tightness of constraints on borrowing. The association between the growth of exports and GDP growth is striking: rapid growth in Asia in the 1980s is associated with an extremely rapid rate of export growth, which can with further disaggregation be tracked down not only to the newly industrialized economies (NIEs), but also to the increase in exports from China during its growth spurt in the 1980s. The relationship between export and GDP growth supports the argument that outward orientation is a route to growth.[20] Each region shows depreciation of the exchange rate in the 1980s relative to the 1970s; but it is striking that the depreciа-

19. The inverse of the incremental capital–output ratio (ICOR) is frequently used as a measure of the efficiency of investment, but because of depreciation is seriously biased for this purpose. Conventionally measured ICOR is $(I/Y)/(\Delta Y/Y)$. "True" ICOR, designated ICOR*, is equal to $(\Delta K/Y)/(\Delta Y/Y)$. Let δ be the rate of depreciation, and $g \equiv \Delta Y/Y$ the growth rate. Then ICOR = ICOR* + $(\delta/g)(K/Y)$. Measured ICOR exceeds ICOR* by an amount that is inversely related to the rate of growth. Accordingly the inverse of measured ICOR tends to be higher the more rapid the growth rate. This argument would have to be modified to take account of the nonhomogeneity of capital.

20. Although there is much evidence that outward orientation is positively associated with growth, as noted above I will not pursue that relationship in this paper.

tion was greatest in Asia. Nominal devaluations were greater in other regions, but their real impact was not maintained as well as in Asia.

Table 1 is suggestive of the role that macroeconomic factors and policy may play in determining aggregate performance. Further evidence comes from Table 2, reproduced from Levine and Renelt (1990b). The black market exchange rate premium is the average premium over the official exchange rate, as measured from Pick's *Currency Yearbook*. The black market premium is an indicator of the extent of trade distortions, capital controls, and expectations of devaluation, and must be correlated with the degree of overvaluation of the currency.

Dervis and Petri (1987) obtain similar results, based on the growth performance of 20 middle-income developing countries. They show that countries that grow faster than average tend to invest more than average, have smaller current account deficits, have lower shares of government spending, and had more rapid export growth than other countries. The rapid growers did not have particularly small budget deficits, and the extent of their real depreciations and terms of trade changes were average.

Indicators of macroeconomic performance enter cross-sectional regressions with significant coefficients. Regressing per capita real (Summers–Heston) growth over the period 1970–1985[21] against the standard new growth theory variables, plus indicators of macroeconomic performance, yields

$$GY = \underset{}{1.38} - \underset{(-5.90)}{0.52\,RGDP70} + \underset{(2.69)}{2.51\,PRIM70} + \underset{(3.91)}{11.16\,INV} - \underset{(-2.70)}{4.75\,INF} \quad (5)$$
$$(1.75)$$

$$+ \underset{(4.34)}{0.17\,SUR} - \underset{(-0.79)}{0.33\,DEBT80} - \underset{(-3.71)}{2.02\,SSA} - \underset{(-3.76)}{1.98\,LAC}$$

$$\bar{R}^2 = 0.60, \quad n = 73, \quad t\text{-statistics in parentheses,}$$

where PRIM70 is the enrollment rate for primary school, INF is the average inflation rate over the period 1970–1985, SUR is the ratio of the budget surplus to GNP over the period 1975–1980,[22] DEBT is the foreign debt to GNP ratio in 1980, and SSA and LAC are sub-Saharan Africa, and

21. The period was chosen in a trade-off between the length of period and number of macroeconomic variables that could be included in the regression.
22. The period is chosen to increase the number of countries included in the sample. I have also run similar regressions for the period 1974–1989, using Levine and Renelt's (1990b) data, provided by Ross Levine. No major differences in conclusions emerge using the Levine–Renelt data.

Table 2 COUNTRY CHARACTERISTICS, BY GROWTH RATE (1960–1989)

Characteristic	*Fast growers*	*Slow growers*	*t*-statistic
Investment/GDP	0.23	0.17	5.18
Govt. C/GDP	0.16	0.12	3.26
Exports/GDP	0.32	0.23	2.31
Inflation rate	12.34	31.13	−1.74
Black market E.R. premium[a]	13.57	57.15	−3.79
Secondary enrollment (1960)	0.30	0.10	5.46
Primary enrollment (1960)	0.90	0.54	6.10

[a]Average black market exchange rate premium.
Source: Levine and Renelt (1990b, Table 2). Sample consists of 109 countries; fast growers are the 56 countries whose growth rate of per capita income exceeds the mean; slow growers are the remaining 53 countries.

Latin America and the Caribbean dummies, respectively. The sample includes all countries for which data were available.[23]

The rates of investment and inflation, and the budget surplus enter regression (5) significantly. The signs of all variables are as expected. When the continent dummies are excluded,[24] the coefficient on inflation and the debt rise.[25] Recalling that several of the mechanisms relating inflation to growth that were discussed in Section 1 operate by affecting investment, it should be noted that the coefficients on both inflation and investment in Equation (5) are statistically significant. This implies that inflation has effects other than those that operate through investment. For instance, inflation could affect the efficiency of operation of the given factor inputs. Regression (5) strengthens the argument that macro-

23. It can be argued that the developing countries are sufficiently and systematically different from the industrialized countries that the latter should be excluded from the regressions. While it is easy to agree with this view at the extremes, it is hard to know where to draw the line, and I therefore worked mostly with all countries for which there were data. For some regressions (not reported here), I excluded all countries that in 1970 had an income level above Italy's; if anything, this gave stronger results with respect to macroeconomic variables, particularly for debt.
24. Continent dummies enter most growth equations significantly. Lance Taylor has suggested that the negative coefficients for Africa and Latin America may reflect their particularly adverse terms of trade shocks in the 1980s.
25. There was relatively little experimentation in arriving at Equation (5). In some versions, the variance of inflation was entered along with the rate of inflation; it was not significant and was excluded because it is highly correlated with the rate of inflation (R=0.94). The SEC70 variable was initially included but was dropped since its exclusion made little difference and since PRIM70 was generally more significant. The budget surplus variable is available for the period 1975–1985 for a smaller sample of (56) countries; the t-statistic on the budget surplus is smaller in that sample, but the coefficient is still significant at the 5% level. However in those regressions the significance level on the inflation rate drops below 5%, while that on the debt rises. The inclusion of the black market foreign exchange premium is discussed below.

economic indicators are correlated with growth, at least over the period 1970–1985.[26]

As discussed in Section 1, the macroeconomic indicators included in (5) cannot be regarded as truly exogenous. In this respect their status is no different than that of investment. Instruments are difficult to find; for instance, such candidates as measures of political instability not only cause but also are caused by inflation. Instrumental variable estimation of Equation (5) using as instruments initial GDP and primary enrollment, the frequency of crises and riots, military spending, foreign aid, and the debt in 1980 resulted in a regression in which no coefficient was significantly different from zero. Instrumental variable regression using the above instruments plus the variance of inflation, the frequency of constitutional changes, and government consumption spending produced results very similar to (5), except that primary education lost its statistical significance.

The instrumental variables regression, which does not include the continent dummies, is

$$GY = \underset{(0.28)}{0.55} - \underset{(-4.33)}{0.33}\,RGDP70 + \underset{(1.31)}{2.32}\,PRIM70 + \underset{(3.51)}{12.79}\,INV - \underset{(-4.45)}{7.10}\,INF \quad (6)$$

$$+ \underset{(3.06)}{0.28}\,SUR - \underset{(-0.04)}{0.03}\,DEBT80$$

$\bar{R}^2 = 0.41$, $n = 54$, t-statistics [with White (1980) correction] in parentheses.

Given both the similarity between Equations (5) and (6), and the difficulties of choosing instruments, I will focus in the remainder of this section on Equation (5).

Relatively little of the cross-sectional variance in growth rates is accounted for by the macroeconomic variables alone. When only the inflation rate, debt, and the deficit are included, the (corrected) squared correlation coefficient is only 0.16. When the continent dummies are added, 32% of the variance is accounted for.

Table 3 presents the correlation matrix of the variables in (5), as well as their means and ranges. Several of the simple correlations are of interest: the simple correlation between investment and growth is high; the corre-

26. Regressions in Dervis and Petri (1987) show that the macroeconomic variables are less significant in cross-country regressions for the period 1960–1973 than subsequently. As suggested by the discussant of that paper, Arnold Harberger, this may be a result of their smaller variability in the earlier period.

Table 3 MEANS, RANGES, AND CORRELATIONS OF VARIABLES[a]

	GY	*RGDP70*	*PRIM70*	*INV*	*INF*	*SUR*	*DEBT80*
Mean	1.76	2.99	0.87	0.20	0.14	−0.05	0.19
Max	8.21	9.46	1.29	0.39	0.39	0.01	2.02
Min	−4.15	0.27	0.13	0.05	0.05	−0.18	0.00
RGDP70	0.11						
PRIM70	0.38	0.55					
INV	0.46	0.55	0.54				
INF	−0.35	−0.21	0.04	−0.29			
SUR	0.25	0.19	0.14	−0.09	0.05		
DEBT80	−0.23	−0.27	−0.16	−0.06	0.15	−0.33	
SSA	−0.37	−0.48	−0.54	−0.39	0.10	−0.09	0.19
LAC	−0.23	−0.12	0.16	−0.15	0.28	0.07	0.14

[a]GY, INV, INF are for the period 1970–1985; RGDP70, PRIM70, and DEBT80 are for the specified dates; SUR is the average budget surplus over the period 1975–1980. Correlation coefficients that exceed 0.23 are significant at the 5% level.

lation between the primary school enrollment rate and the share of investment in GDP is high; the correlation between the budget surplus and inflation is nonnegative; the correlation between investment and inflation is negative; that between external debt and the budget surplus is negative. Because investment levels in Latin America are relatively high, the debt–investment correlation is low.[27]

The external debt to GNP ratio serves in (5) as an indicator of the exchange rate overvaluations of the late 1970s. The average black market foreign exchange premium could serve as another such (partial) indicator, and Table 2 suggests it might be strongly related to growth. The simple correlation between the average growth rate over the period 1970–1985 and the average black market premium for the same period, for a group of 40 countries for which the data are available, is −0.24. The simple correlation between the premium and investment is −0.36, and between the premium and the budget surplus −0.34.[28] However, the coefficient on the average black market premium is never significant in

27. The simple correlations among the nondummy variables in Table 3 are sensitive to the inclusion of the high-income countries. For instance, debt and income are more negatively correlated in Table 3 than they are in the same sample excluding industrialized countries.

28. The premium is available for 67 countries for the period 1970–1985, but there are only 40 countries for which the variables in Equation (5) plus the premium are all available. The weakness of the simple correlation between growth and the black market premium may be a result of the wide range of the premium, from zero to an average of 717% (for Nicaragua). The premium is high for African countries, excluding those in the CFA zone, and for Latin America. Nicaragua aside, the highest premia, frequently exceeding 100%, are found in North and Sub-Saharan Africa.

any regression that includes the other macroeconomic variables, and this applies also to various nonlinear transformations of the premium. Its major impact seems to be to reduce the coefficient on the external debt, but because its inclusion also changes the sample size, not much can be deduced from any such effect. We return to the role of the black market premium in Section 3.

Cross-sectional regressions such as (5) ignore information that might be available in the time series of data within each country. Running a pooled cross-section time-series regression of the general form of (5), for the period 1972–1985, and including lagged as well as current values of the rates of investment and inflation, we obtain

$$GY_{it} = \textit{Year Dummies} - \underset{(-2.82)}{0.23\, RGDP70_i} + \underset{(1.64)}{1.40\, PRIM70_i} + \underset{(5.53)}{36.5\, INV_{it}} \qquad (7)$$

$$- \underset{(-0.49)}{3.83\, INV_{i(t-1)}} - \underset{(-4.27)}{19.9\, INV_{i(t-2)}} - \underset{(-3.19)}{3.55\, INF_{it}}$$

$$+ \underset{(2.55)}{2.22\, INF_{i(t-1)}} - \underset{(-2.26)}{2.08\, DEBT80_i} + \underset{(1.13)}{4.30\, SUR_{it}}$$

$\bar{R}^2 = 0.207$, $n=1059$, t-statistics in parentheses.

Investment variables retain their strong statistical significance in the pooled regression, which also gives some evidence on the dynamics of the relation between output and investment. The large contemporaneous coefficient, 36.5 (percent), must represent primarily the demand effect in which an increase in investment demand causes a more rapid increase in output. The coefficients on the investment rates can also be expressed in the form ($12.8\,\mathrm{INV}_{it} + 23.7\,\Delta\mathrm{INV}_{it} + 19.9\,\Delta\mathrm{INV}_{i(t-1)}$), suggesting that increases in the investment ratio have a large temporary effect on growth, which can be associated with the demand effect, leaving 12.8% as the estimate of the longer-term impact of investment on growth.

Both the regression evidence presented in this section and the data presented in Tables 1 and 2 demonstrate the existence of suggestive correlations between macroeconomic policy-related variables and growth over periods as long as 15 years. The evidence supports the view that the quality of macroeconomic management, reflected in these regressions in the inflation rate, the external debt ratio, and the budget surplus, matters for growth.

It would be logical at this point to try to tie down precisely which

macroeconomic indicators are most robustly associated with growth in the cross-country regressions. However, that exercise is unlikely to be instructive, as the results of Levine and Renelt (1990b) show. There are at least two reasons for this. First, none of the standard indicators—the budget surplus, the current account, the inflation rate, the real exchange rate—is truly exogenous with respect to growth. Nor is the instrument problem readily soluble. Second, cross-country regressions such as (5) have no clear structural interpretation. While they are very useful ways of summarizing the correlations in the data, and they suggest that countries that manage the macroeconomy will grow faster, they do not explain how.

3. *Why Do Macroeconomic Variables Matter?*

Suppose we accept the argument that inflation and other factors related to short-run macroeconomic management affect economic growth. In terms of the production function (1), there are two possible routes of influence. First, macroeconomic management may affect the rate of investment, and thus the rate of change of K.[29] For example, large budget deficits may crowd out physical investment; or high and uncertain inflation may both reduce investment and induce capital flight. In addition, macroeconomic factors may affect the efficiency with which factors are used, i.e., by affecting $A(\,)$, $a(\,)$, and $b(\,)$ in Equation (1): for instance, by distorting price signals, inflation may reduce the rate of return on physical investment; or inflation may produce distortions that reduce the real wage.

New growth theory-based cross country investment regressions are presented in Barro (1989a,b) and Romer (1989), and their robustness examined in Levine and Renelt (1990b). These regressions generally show that some measure of initial human capital has a positive impact on investment, that measures of political instability have negative impacts, that investment is higher the lower the relative price of investment goods, and the more the price of investment goods diverges from the world level. In addition, government investment appears to be complementary with private investment. The robustness tests by Levine and Renelt (1990b) show that none of the relationships in the basic regression equation—which does not include the relative price of investment goods—is robust: the cross-sectional results provide little guidance on the determinants of investment.

Table 4 presents estimates of a number of cross-sectional investment

29. Short-term macroeconomic management will also affect the number of employed, H, but is less likely to affect the rate of growth of population over long periods.

Table 4 CROSS-COUNTRY INVESTMENT REGRESSIONS[a]

	Equation				
	(8)	*(9)*	*(10)*	*(11)*	*(12)*
Constant	0.097	0.077	0.087	0.236	0.214
	(4.40)	(3.17)	(2.96)	(13.70)	(9.70)
GY	1.23				
	(3.19)				
RGDP70	0.012	0.009	0.008		
	(4.48)	(2.98)	(2.32)		
PRIM70	0.052	0.115	0.118		
	(1.72)	(3.94)	(3.77)		
INF		−0.174	−0.148	−0.133	0.075
		(3.05)	(2.61)	(2.33)	(1.79)
SUR7580		−0.345	−0.305	−0.174	−0.546
		(2.02)	(1.69)	(0.78)	(2.45)
DEBT80		0.013	0.018	0.010	−0.008
		(0.98)	(1.30)	(0.73)	(0.59)
BLAV					−0.018
					(3.95)
PINV					−0.043
					(2.63)
SSA			−0.016	−0.080	
			(0.90)	(4.65)	
LAC			−0.030	−0.044	
			(1.67)	(2.14)	
$\bar{R}^2$	0.46	0.44	0.45	0.21	0.21
N	73	73	73	73	40

[a]Dependent variable is INV, average share of investment in GNP over the period 1970–1985, in the Summers–Heston data. BLAV is the average black market premium (as a multiple of the offical rate) over the period 1970–1985; PINV is the average price of investment goods in the country (relative to the United States) over the period; other variables are as in Table 3.

regressions, all for the average share of investment in GNP over the period 1970–1985.

Equation (8) in Table 4 is both simple and has the highest explanatory power for cross-country variation in investment. There are no clear causal reasons that the initial level of per capita GDP and school enrollment enter the equation. The significant coefficient on the growth rate is consistent with the typical finding that accelerator type investment functions perform well (Clark, 1979). However, the direction of causation in this equation is difficult to establish.[30]

30. Of course, the same can be said for the cross-country growth regressions that include investment as an explanatory variable.

When the macroeconomic variables are added and the growth rate of output removed, inflation and the budget *surplus* are significantly negatively related to investment. The negative relationship between inflation and the share of investment is robust. Equations (10) and (11) suggest important interactions between the initial level of outcome and primary enrollment, and the SSA continent dummy.[31] Finally, in Equation (12), we see strongly statistically significant coefficients on the black market premium (BLAV) and the relative price of investment goods; the inclusion of these variables leaves the budget surplus as the other macroeconomic variable that is significant at the 5% level, but in the a priori wrong direction, if the surplus is interpreted as a measure of the quality of macroeconomic measurement, or if deficits are thought to crowd out investment.[32]

The relationship between the investment share and the black market premium is reasonably robust, in the sense that the black market premium remains large and statistically significant in most permutations of investment equations that are based on the 40-country sample.[33] The coefficients on the other macroeconomic variable are not stable. The coefficient on the debt is typically not significant, and it is frequently (though not significantly) positive, implying that countries that borrowed more in the 1970s generally invested more, ceteris paribus.

The black market premium can be interpreted both as a measure of expectations of depreciation of the currency (and therefore also of currency overvaluation), and as a crude index of distortions. Expectations of depreciation may affect investment through several channels: first, it is more attractive to hold foreign assets when depreciation is expected[34]; second, economic uncertainty is higher under such conditions; but third, for those who can obtain foreign exchange at the official rate, foreign capital goods are cheap to import. While the first two factors suggest a negative relationship between the black market premium and investment, the third suggests the opposite. To the extent that the black market premium serves as a general index of dis-

31. It can be seen from Table 3 that the simple correlations between the SSA dummy and PRIM70 and RGDP70 are high.
32. Sweder van Wijnbergen has suggested that the negative coefficient on the budget surplus may reflect the role of government investment, which increases the overall rate of investment but decreases the budget surplus. The coefficient on the surplus is reduced when the dependent variable becomes private rather than aggregate investment, but it does not become positive.
33. Solimano (1989) finds, using quarterly data from 1977:I to 1987:IV, that the black market premium is strongly negatively associated with investment in Chile.
34. This assumes domestic interest rates have not adjusted, which is implied by the presence of a black market premium.

tortions and therefore of an unsustainable situation, it is likely to be negatively correlated with investment.

The black market premium is both strongly negatively correlated with investment, and in Section 2 does not appear to affect the rate of growth significantly. The explanation would seem to be simple: that the black market premium affects the rate of investment directly and thereby the rate of growth indirectly. In terms of Equation (5), the black market premium can be interpreted as affecting the rate of investment but not the efficiency of investment.

Unfortunately, this argument does not stand up to further examination. A priori, it is difficult to see why an index of distortions would affect the rate of investment but not the rate of return on investment. More important, there is direct evidence that the black market premium is correlated with the efficiency of investment. Table 5 presents estimated rates of return on investment projects in developing countries, cross-categorized against measures of distortions and macroeconomic variables including the real interest rate, the black market premium, and the inflation rate.[35]

The interpretation of the role of the black market premium must therefore be left as something of a mystery: it is negatively associated with the rate of investment; it is not clearly associated with the growth rate, except perhaps in extreme cases;[36] but there is direct evidence that it appears to affect the rate of return on investment. Whether these results can be explained by the relationship between the black market premium and other measures of macroeconomic policy or microeconomic distortions remains to be seen.

Although none of the regressions in Table 4 presents a satisfactory account of the determination of investment, this evidence as well as that in Levine and Renelt (1990b) again shows that macroeconomic variables—particularly the black market premium and inflation—affect investment. But because the relationships between investment and macroeconomic indicators, except the black market premium and, to a lesser extent, inflation, are not robust, it is unlikely that further cross-sectional regressions

35. The data are from Kaufmann (1991); Kaufmann's preliminary regressions suggest that the black market premium is the main macroeconomic variable that affects project rates of return. This presumably means that it is the best summary indicator of macroeconomic distortions.

36. The qualifier is based on results reported in Chapter 2 of the 1991 *World Development Report*. In that study rates of total factor productivity growth for 68 countries are regressed against several variables, including the black market premium, which is interpreted as a measure of macroeconomic instability. The authors find that TFP growth is significantly lower for countries for which the lagged black market premium exceeded 500%, but that total factor productivity growth was otherwise unaffected by the premium.

Table 5 RATES OF RETURN ON INVESTMENT PROJECTS[a]

	Public sector	*Private sector*
Black market premium		
High (> 200%)	4.5	11.7
Medium (20–200%)	8.4	
Low (< 20%)	12.2	14.7
Real interest rate		
Negative	8.7	10.9
Positive	12.6	16.0
Inflation rate		
High (> 100%)	6.5	13.9
Medium (20–100%)	7.9	
Low (< 20%)	11.2	13.5
Trade price distortions		
High	8.9	9.4
Low	11.7	16.1

[a]From Kaufmann (1991): rates of return on public sector projects based on a sample of estimated ex post rates of return on 1400 World Bank projects; private sector projects are IFC financed, and their rate of return is the so-called reappraisal rate of return, which differs from the ex post rate of return; sample size is 150. All data are preliminary.

of this type will pin down the transmission mechanism between macroeconomic variables and growth.

Time series evidence for individual countries may help do so. For the industrialized economies, investment equations generally show investment being affected by the cost of capital and by demand variables. The theoretical literature has emphasized the option value of waiting as a factor that makes investment especially sensitive to uncertainty; quantity of credit impacts have also been identified.[37]

The same variables that affect investment in industrialized countries should also affect investment in developing countries.[38] In addition, foreign exchange and credit rationing may be more prevalent in developing countries. Investment equations for developing countries have also paid considerable attention to possible complementarities between public and private sector investment.[39] Rama (1990) summarizes the results

37. On irreversible investment and the value of waiting, see Bernanke (1983) and Pindyck (1988); on finance and investment, see, for example, Fazzari, Hubbard, and Petersen (1988).
38. Serven and Solimano (1989) survey theories and evidence on investment, particularly with respect to the implications for developing countries.
39. This issue is also examined in Barro (1989a), who finds that private investment is higher, the higher is government investment.

of separate investment regressions for 39 developing countries, 19 of them Latin American. Aggregate demand variables are almost always positively associated with investment, as are measures of the availability of credit; measures of uncertainty or instability are negatively associated with investment. Cost of capital variables usually enter investment equations with the right sign, but are typically not statistically significant. Public investment more often appears as a substitute for private investment than a complement in the studies he reports, though this result in not typical of the investment literature.

Cardoso (1990) presents regressions on panel data for six Latin American countries. Changes in the terms of trade, the growth rate of GDP, and the share of public investment in GDP are all significantly correlated with investment. Public and private investment are positively associated. Other variables that might be expected to affect investment, including a measure of economic instability, the stock of internal government debt, and exchange rate depreciation, do not enter investment equations significantly; only the debt to exports ratio makes a significant entry in one equation.

Solimano (1989), in a careful study of the determinants of Chilean investment, finds strong evidence that uncertainty or instability—of output, the real exchange rate, and the real interest rate—reduce investment. His evidence also shows a complex relationship between the level of the real exchange rate and investment: an overvalued exchange rate tends to encourage investment, but the higher investment is nonsustainable.[40]

The time series studies of investment point to several macroeconomic-policy-related variables as affecting the rate of investment: increased stability of output, the exchange rate, and the cost of capital increase investment; so does the availability of credit; and in several studies, the external debt has a negative impact on investment.[41] The impact of public investment on the overall rate of investment has not been firmly tied down in investment studies. The black market premium reduces investment, as shown in Equation (10); and a reduction in the price of investment goods increases the quantity of investment. Thus the bulk of the evidence suggests an important role for macroeconomic policy in determining the rate of investment—even treating the role of income in investment equations with due circumspection.

The new growth theory has focused on the determinants of physical

40. The complexity of this relationship may account for the weak relationship between the exchange rate and investment found in Cardoso's study.

41. Schmidt-Hebbel and Mueller (1990) find the debt to GNP ratio has a significant impact on investment in Morocco; they treat the debt as an indicator of macroeconomic uncertainty.

investment, even though the theory frequently relies on the accumulation of human capital to generate endogenous long-run growth. Schultz (1988, p. 569) examines the determinants of schooling for an 89 country sample. The income elasticity of primary school enrollment is 0.31, while that for secondary school is 0.43. The relative price of teachers has a strong negative impact on enrollments. Schultz's estimates show urbanization increasing primary school enrollment but reducing that for secondary school. The teacher–student ratio also increases with income, more so for primary than for secondary school. The positive association between income and school enrollment suggests a feedback effect between growth and its determinants—including macroeconomic policy—and schooling.[42]

It would be interesting as well to examine the policy-related determinants of the efficiency with which human capital operates, and therefore how much it contributes to output and growth. Schultz (1988, p. 575) provides estimates of these returns by continent and level of schooling, which generally show the highest returns to primary education, and higher returns in Latin America and Africa than elsewhere. Taken at face value, the latter findings are hard to reconcile with the typically negative coefficients on dummy variables for those regions. Part of the explanation may be that the estimated rates of return are based on data from before the 1980s. Both the puzzle of the rate of return results, and the relationship between the return to human capital and macroeconomic performance, must be subjects of further study.

4. *Case Studies*

While the cross-sectional results on the determinants of both growth and investment rates suggest that macroeconomic factors have important effects, they do not tie down the channels of influence, nor the precise macroeconomic factors that matter most. Nor do they give any real sense of the macroeconomic policy decisions that have to be faced in practice.

An interesting alternative is presented by Scholing and Timmermann (1988), who use a path model in which the growth rate is affected by "inner" (latent) variables—physical capital, human capital, the growth of labor, international competitiveness, and political instability—that are estimated as linear combinations of measurable "outer" variables.[43] Essen-

42. Although the regressions in Section 2 show the *level* of enrollment as affecting growth, as noted there, other regressions in the literature, as well as the production function (3), suggest that increases in enrollment should affect growth.

43. The analysis allows for degrees of latency, with some latent variables being affected by other latent variables.

tially, the approach allows for the creation of an index of, for example, macroeconomic instability. Both the robustness of this approach, which is closely related to the work by Morris and Adelman (1988), and the clarity of the interpretations it provides remain to be seen.[44] But by potentially putting structure on the reasons variables enter a model, it does present one possible way out of the difficulty that a never-ending array of alternative plausible variables can be entered in cross-country regressions.

The case study approach presents another, less formal, method of drawing conclusions about the role of macroeconomic factors. Corden (1991) summarizes the results of a World Bank study of macroeconomic policies, crisis, and growth in 17 developing countries, including 9 of the 12 developing economies whose 1987 GNP exceeded $30 billion.[45]

Fifteen of the countries studied by Corden experienced a public spending boom between 1974 and 1981. Only India and Chile did not. While the timing and extent of the spending booms varied across countries, the cause appears to have been either a rapid increase in export receipts, or the increased availability of foreign financing. Many of the countries built up their foreign debt rapidly. Growth in the countries with public spending booms was high up to the end of the 1970s. For many of them, the investment ratio and growth fell in the 1980s.[46] Corden points to three lessons from the experiences of the boom period: smooth spending relative to income,[47] appraise investments carefully (this advice is offered to creditors as well), and beware of euphoria—be cautious.[48]

Almost all the countries in the sample went into a recession or crisis at the end of the 1970s or in the first years of the 1980s; Pakistan is the exception. The macroeconomic story of the eighties is the story of the policy successes and failures in dealing with the shocks that took place at

44. For example, Scholing and Timmermann include the rate of inflation as an outer variable determining international competitiveness; in this paper it has been taken as an indicator of macroeconomic performance.

45. Corden discusses Korea, which was not in the original study, and omits discussion of Argentina, which was. The larger developing economies included in the World Bank study are Argentina, Brazil, Colombia, India, Indonesia, Mexico, Pakistan, Sri Lanka, Thailand, and Turkey. Egypt, Korea, and Venezuela are the remaining three. (China is excluded because the study was confined to nonsocialist economies.)

46. Corden states that there is a negative cross-country correlation between investment booms in 1974–1980 and growth from 1982 on.

47. Corden expresses this advice in different language. It has to be recognized though that commodity exporters in the late 1970s, especially oil exporters, were in good company in believing the good times were forever.

48. Among the euphoric cases mentioned by Corden, Côte d'Ivoire, which is examined below, raised public sector investment from 11% of GNP to 21% in the 4 years following 1974.

the turn of the decade. There is no uniform pattern of success: Korea adjusted immediately and hard; Chile and Indonesia adjusted later and hard; Mexico adjusted later yet. Colombia and Thailand adjusted gradually and successfully. Turkey appeared to have adjusted well in the mid-1980s, but has still not dealt with its budget deficit, and suffers from rising inflation. Other countries in the group are still struggling. The general lesson from these episodes is that growth does not return until the adjustments—especially the fiscal adjustments—are made.[49]

A complex relationship between inflation and growth emerges from the cross-country study. The simple correlation between inflation and growth in the sample in the 1980s is weak, because the three low-growth African countries have low inflation, and because high-growth Turkey had high inflation. Brazil during the period up to the 1980s (and Israel up to 1973) is the main exhibit for the case that high inflation is not inconsistent with high growth; however there is no case of high growth being consistent for any length of time with triple digit inflation. Several of the high growth countries suffered from inflation in excess of 20% for a few years during the early 1980s, but the inflation tended to come down quickly—as Corden argues, it is important that inflationary expectations not become entrenched, and that the government's commitment to low inflation be established.

Exchange rate systems among the 17 countries in the study and over time within the countries vary widely. Periods of overvaluation associated with capital inflows were a common feature of the macroeconomic instability at the turn of the decade. Corden draws the lesson that nominal exchange rates should be adjusted frequently, and that noninflationary monetary policy should generally be attained through a commitment to fiscal discipline rather than a nominal exchange rate. He also notes that there have been many instances of ineffective, inflationary, nominal devaluations: nominal devaluations should generally be accompanied by a policy package that includes monetary and fiscal adjustments.

Most of the lessons of the comparative study are completely obvious, but were nonetheless violated not only by government officials but also by supposedly hard-nosed bankers in the late 1970s. Others, for instance the finding that a commitment to a nominal exchange rate target is not usually effective, are less obvious, and may also be less certain.[50] To

49. Corden does not specify the conclusions on the timing of adjustment that should be drawn from the study; the conclusion in the text is consistent with the examples he presents.

50. Reynolds (1986, p. 5) notes "there are hardly any general statements to which one cannot find exceptions in one country or another"—a conclusion that becomes harder to dispute the more often one tries to draw general lessons.

Table 6 MACROECONOMIC PERFORMANCE, CÔTE D'IVOIRE (1973–1989)[a]

	GDP growth	*Inv*	*Inv_G*	*Bud. def.*	*Curr. a/c def*	*Terms of trade*	*Real ER*	*Ext. debt*	*Infl*
1973–76	5.9	22.7	13.8	2.9	4.0	100.9	125.9		16.5
1977–80	5.2	28.3	18.1	6.5	11.5	141.9	156.5	55.2	14.5
1981–83	0.9	23.2	10.7	12.7	13.5	81.3	110.1	124.8	3.5
1984–87	1.4	11.6	6.3	4.5	1.8	106.5	103.0	130.7	3.0
1988	−1.8	15.2	4.7	8.4	6.2	79.7	110.9	131.5	1.5
1989	−1.3	10.3	3.1	11.3	9.7	68.6	104.3	139.0	−2.0

[a]Columns 2, 3, 4, 5, and 8 are variables as ratio to GDP; Inv_G is public sector investment, including public enterprises; terms of trade series (1984 = 100) is from BB, spliced from 1986 to World Bank (1990b); real exchange rate series is from BB, spliced from 1987 to World Bank (1990b)—increase represents *appreciation;* debt ratio is for the last year in the period; inflation rate is for the GDP deflator.
Sources: World Bank (1990b,c); Berthelemy and Bourguignon (1989) (denoted BB).

provide examples illustrating both that the lessons are nonetheless of value and the largely political economy issues they raise, I turn to two of the countries examined in the study.[51]

4.1 CÔTE D'IVOIRE

For the first 15 years of its independence, until 1975, Côte d'Ivoire was an outstanding performer among developing countries.[52] Output growth averaged 7.7% per annum, with no major macroeconomic imbalances. As a member of the CFA zone, with a fixed exchange rate against the French franc and its Francophone neighbors, it had low inflation throughout the period. Population growth averaged over 4%, one quarter of that a result of immigration from lower income neighbors.

Over the period 1980 to 1989, GDP rose by less than 1% per year, and per capita GNP fell more than 25%. Between 1975 and 1980 the economy was derailed by a massive public investment program, whose fiscal implications were for a time covered by a sharp but temporary improvement in the terms of trade. It has not yet recovered from that and subsequent shocks and policy mistakes.

Some of the developments seen in Table 6 and in Figures 1–3 are similar to those that took place in Latin America at the same time. A massive improvement in the terms of trade in 1977 combined with rapidly increasing government spending and borrowing resulted in a 14% increase in GNP in 1978. The currency appreciated as domestic prices rose more rapidly than abroad, while the exchange rate remained

51. Dervis and Petri (1987) examine the macroeconomics of two of the more successful developing countries, Korea and Turkey, pointing already then to the dangers raised by Turkey's inability to deal with its fiscal deficit.

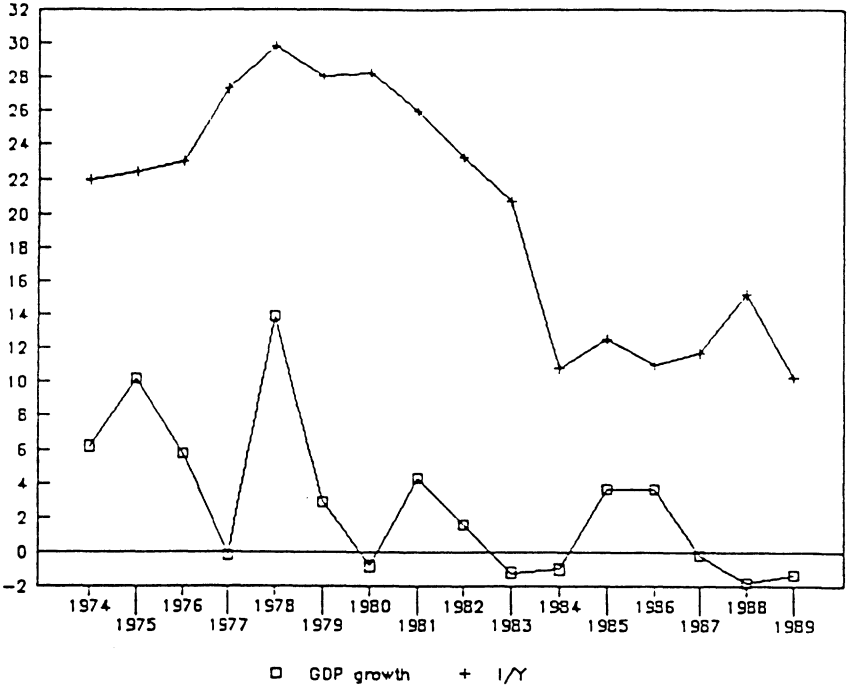
52. This account draws on World Bank (1990b) and Berthelemy and Bourgouignon (1989).

fixed—as it has been since 1946. Despite the improvement in the terms of trade, and a more than doubling of the dollar value of exports between 1974 and 1980, the current account went into large deficit. By the end of the decade, the foreign debt to GDP ratio was above 50%, making the country vulnerable to the real interest rate shock of the early 1980s.

Côte d'Ivoire was also hit very hard by the decline in commodity prices in the early 1980s, with the terms of trade in 1982 being less than half the 1976 level. Public sector investment was cut fast, but government revenues declined pari passu, leaving a double digit budget deficit. Although the appreciation of the dollar in the early 1980s produced a real depreciation of the CFA franc, the current account deficit remained in double digits in the early 1980s.

Further public investment cuts and revenue measures reduced the budget deficit after 1984; together with a temporary improvement in the terms of trade, this led to a turnaround in the current account after 1984. Growth however remained slow, failing to keep up with population growth of 4.1%. In 1988 and 1989 the terms of trade worsened, government spending rose and revenues fell, and the budget deficit returned to

Figure 1 CÔTE D'IVOIRE: GDP GROWTH AND INVESTMENT

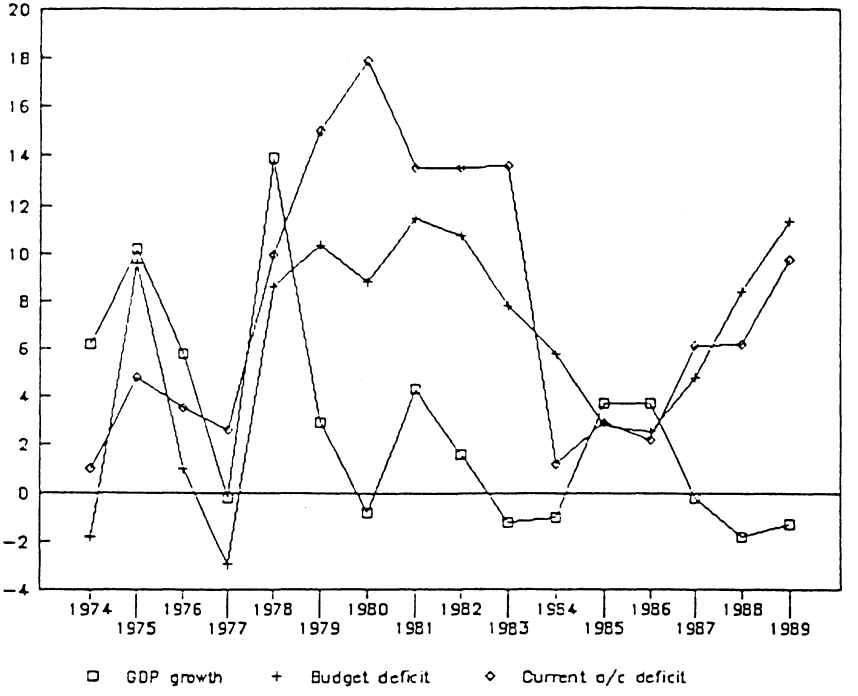


double digits. The currency continued to depreciate slowly, as tight domestic policy and massive unemployment reduced domestic prices. But the current account deficit worsened, leading to payments arrears and the suspension of debt servicing. Aggregate growth turned negative, while per capita income declined by more than 5% a year. Declining incomes and rising unemployment led to political difficulties, and the appointment of a new government in 1990.

One source of Côte d'Ivoire's budget difficulties was a government commitment to fixed CFA franc prices for the main export crops, coffee and cocoa, that by 1989 were nearly double the world level. These prices were cut in the second half of 1989. Civil service salaries are a major budgetary expenditure, amounting to 12% of GDP, which has been difficult to cut despite the need to adjust internal prices to the fixed exchange rate.

The exchange rate system is a key issue for Côte d'Ivoire and other countries in the franc zone. The 14 countries of the zone have had free capital movements within the zone and with France for over 40 years,

Figure 2 CÔTE D'IVOIRE: GROWTH, BUDGET, AND CURRENT A/C DEFICITS

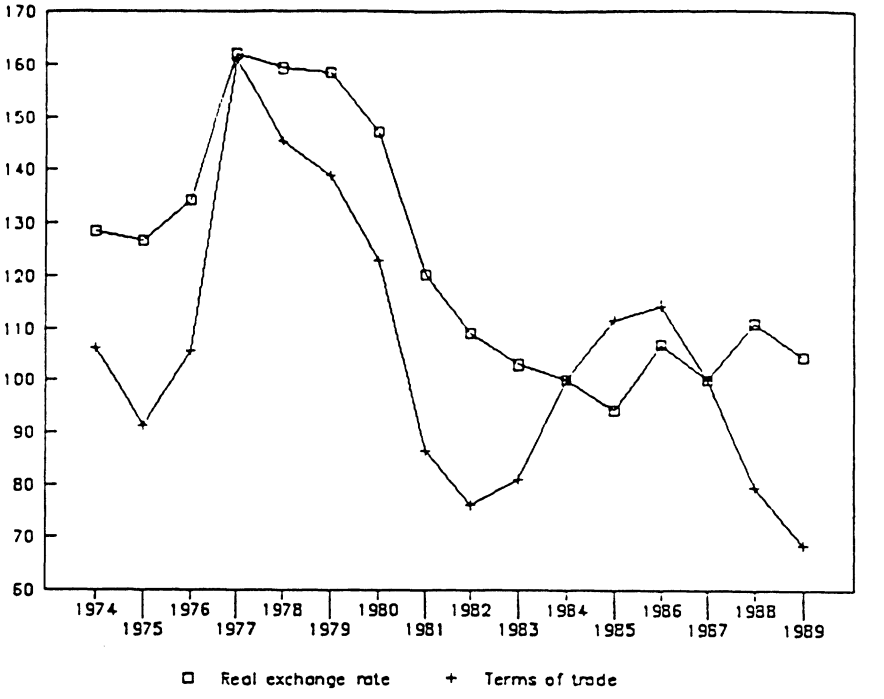


have had relatively low inflation, and until the late 1970s, grew rapidly. For most of its existence, the franc zone has benefitted its members, who are reluctant to give it up. Devaluation of the CFA franc against the French franc would be difficult, not only because of the inevitable loss of credibility of the exchange rate commitment, but also because the countries of the zone are overvalued to differing extents.

The new Ivoirian government is committed to pursuing a rigorous adjustment program. It will attempt to restore macroeconomic balance by cutting current government expenditures, including wages, and by reforming the tax system. Cutting current government expenditures is urgent, since the rate of public investment is incompatible with sustained growth. The government also intends to increase the efficiency of public enterprises, in part through privatization. It will also have to make a variety of regulatory and incentive reforms, using nonexchange rate measures to provide incentives to export.

Côte d'Ivoire provides an example of a country where macroeconomic policies and mistakes, especially the euphoria during 1976–1980, have had a major impact on growth over a sustained period. The decision to

Figure 3 CÔTE D'IVOIRE: REAL EXCHANGE RATE AND TERMS OF TRADE



stay with the fixed exchange rate has been extremely important, and may not be sustainable. The inability of the government to cut current government spending, especially civil service salaries, has been an important macroeconomic factor, with roots that lie in the political economy of the country. Of course, macroeconomics is far from being all that matters: the country's growth suffered in the first instance from terms of trade shocks, and suffers also from most of the familiar microeconomic distortions and inefficiencies, including inefficient public enterprises.

4.2 CHILE

The story of Chile's economic recovery is worth retelling, for both its negative and positive lessons.[53] Chile has been through two extremely tough adjustment periods. The first came after the military government took power in 1973, confronting an economy in near-total disarray. The government removed price controls, devalued, and moved the budget from a deficit of 30% in 1973 to a surplus by 1976. An important liberalization program reduced tariffs to a uniform 10% by 1979. Companies and banks that had been nationalized under the Allende government were privatized. The fiscal squeeze, accompanied by a nearly 40% decline in the terms of trade between 1974 and 1975, created a massive recession. Due partly to monetary tightening, the real interest rate exceeded 60% in 1976.[54]

Table 7 MACROECONOMIC PERFORMANCE, CHILE (1973–1989)[a]

	GDP growth	*Inv*	*Inv_G*	*Bud. def.*	*Curr. a/c def*	*Terms of trade*	*Real ER*	*Ext. debt*	*Infl*
1973	−5.6	7.9	8.4	30.5	2.8	187.2	70.9		418.1
1974	1.0	21.2	12.5	5.4	1.9	197.8	74.7		694.2
1975	−12.9	13.1	9.2	2.0	6.8	118.5	63.3		342.4
1976–80	7.5	16.8	6.0	−3.1	4.5	114.3	77.4	45.2	97.3
1981	5.5	22.7	5.1	−0.3	14.5	84.3	108.1	50.1	12.2
1982	−14.1	11.3	4.7	3.4	9.5	80.4	99.0	76.7	13.3
1983	−0.7	9.8	4.8	3.3	5.6	87.5	89.1	98.8	26.6
1984–86	4.8	14.3	6.9	3.0	8.6	79.8	86.6	141.6	22.1
1987–88	5.6	17.0	6.8	2.0	2.8	86.5	63.3	96.3	21.2
1989	10.0	20.4			3.6	97.3	62.5	78.3	13.2

[a]Columns 2, 3, 4, 5, and 8 are variables as ratio to GDP; Inv_G is public sector investment, including public enterprises; increase in real exchange rate index represents *appreciation;* debt ratio is for the last year in the period; inflation rate is for the GDP deflator.
Sources: World Bank (1990b,c), Corbo and Solimano (1991) and, Morgan Guaranty Trust (for real exchange rate)

53. In this section I draw on Douglas (1989), Corbo and Solimano (1991), and World Bank (1990b).
54. Corbo and Solimano (1991) examine the controversy over the stance of monetary policy in 1975, concluding that monetary policy was restrictive.

Figure 4 CHILE: GDP GROWTH AND INVESTMENT

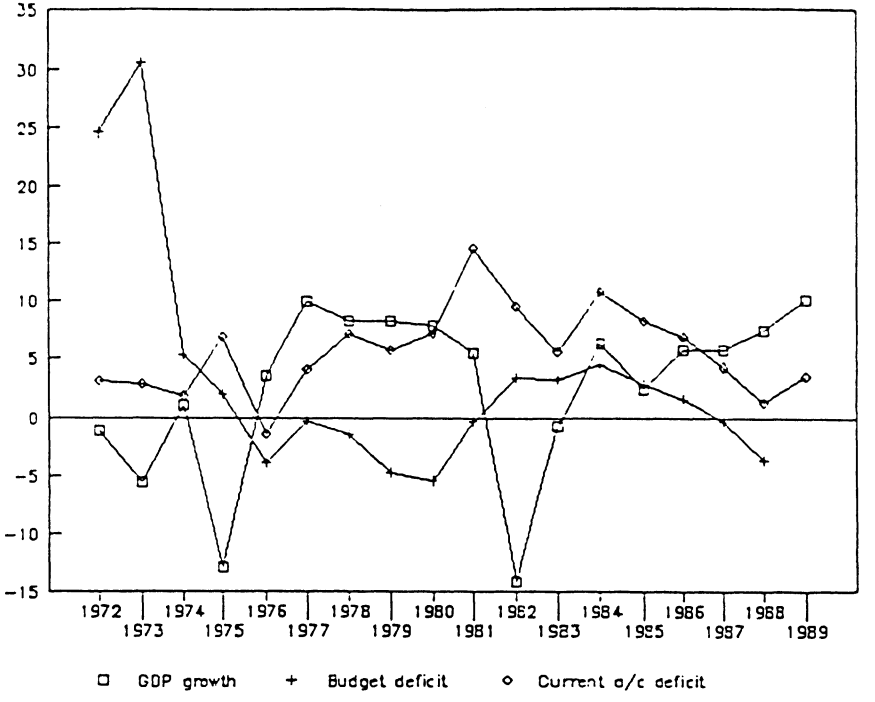
The inflation rate was however slow to come down, remaining in triple digits through 1977. Regarding the inflation as largely inertial, particularly because of the budget surplus, the government instituted a preannounced schedule of devaluations at less than the current inflation rate, in the hope of causing expectations to stabilize around the nominal exchange rate anchor. With imports liberalized, foreign competition was expected to assert a disinflationary impact, reinforcing the expectations effect of the nominal exchange rate anchor. In June 1979 the exchange rate was fixed to the dollar. While inflation came down, it did not come down fast enough; as can be seen in Figures 4–6, the real exchange rate appreciated rapidly from 1978. The terms of trade began declining after 1979. The current account worsened rapidly, reaching 14.5% of GDP in 1981; the external debt increased; and Chile had once again to adjust, even before the debt crisis struck at the end of 1982.

Chile devalued in 1982, helping precipitate a financial crisis for banks and firms that had borrowed abroad. In 1981 and 1982 the domestic real interest rate exceeded 30%. The fiscal deficit (including the quasi-fiscal

deficit of the central bank) rose to near 9% of GDP in 1982.[55] The cutting off of external lending, the adverse changes in the terms of trade, and the domestic financial crisis resulted in a 14% decline in GDP and an increase in the unemployment rate to 33%. For a time the government raised tariffs to 35%, for revenue reasons. A generally tight fiscal policy was accompanied by targeted employment programs.

It took 2 years for the recovery to begin. Between 1981 and 1986 the government succeeded in producing a real devaluation of nearly 40%. Inflation rose temporarily to more than 30% in 1985, but then came down to the low 20% range, where it has stayed since; the real interest rate has also declined to near 10%. In 1985 the government adopted an adjustment program, which not only privatized, liberalized, and began to cut tariffs again, but also provided targeted assistance to alleviate poverty. The program was designed to diversify exports and make the

Figure 5 CHILE: GROWTH, BUDGET, AND CURRENT A/C DEFICIT



55. See Corbo and Solimano (1991) for an estimate of the total deficit. The total deficit peaked at 9.8% of GDP in 1985; there was a surplus by 1987. The data shown in Table 7 and Figure 5 do not include the quasi-fiscal deficit.

economy less vulnerable to external shocks, in part by instituting a copper stabilization fund that smooths government use of funds from copper export revenues. The current account improved as exports boomed, helped in 1988 and 1989 by improving terms of trade. GDP growth increased from 1985 to 1989, reaching a probably unsustainable 10% in 1989; by 1987 GDP had returned to its 1981 level and by 1988 unemployment was below 7%.

The Chilean experience has been mined for more than its macroeconomic policy lessons. But there is little doubt that macroeconomic policy mistakes, especially in the late 1970s and early 1980s, had a major impact on Chilean growth during the last two decades. The attempt to deal with inflation through the exchange rate turned into a disaster, which was amplified by the international debt crisis. The rigorous macroeconomic policies pursued since provide a stable background against which microeconomic distortions have been effectively removed. The empirical work by Solimano (1989) suggests also that macroeconomic stability has been an essential ingredient in the recovery of investment.

Figure 6 CHILE: REAL EXCHANGE RATE AND TERMS OF TRADE

The continuing double digit inflation remains a problem, one which is common to many other countries that have stabilized from very high inflation.

Lessons can be learned also by contrasting Chilean experience with that of Argentina and Brazil. Those countries failed to deal with their macroeconomic imbalances during the 1980s, growth has not resumed, and attempts at efficiency-enhancing adjustment programs have for the most part failed as macroeconomic instability leads to frequent policy reversals.

It remains in this section to comment on Figures 1 and 4, for Côte d'Ivoire and Chile, respectively. These confirm in a time series context the very strong relationship between growth and the share of investment seen in Sections 1 and 2. However, it is difficult to see these relationships as reflecting purely the supply side impact of increased capital on output, rather than—as in Equation (7)—both a supply side effect and an accelerator effect in which increased demand leads to higher investment.

The restoration of growth in many countries requires an increase in investment. Chile is one of the few non-Asian countries badly hit by the crisis of the early 1980s in which investment has increased significantly and growth has returned. But the recovery of investment takes time, evidence of increased returns to capital, and a period of economic stability. Here too macroeconomic policy matters.

5. *Concluding Comments*

The primary aim of this paper is to establish that a country's macroeconomic policies matter for long-run growth. Provided the inflation rate, external debt, and the government deficit are accepted as macroeconomic policy indicators, both the cross-sectional regressions and the case studies support that contention. The results are less clear on the mechanisms through which macroeconomic policy affects growth, but the case studies and much other evidence suggests they have a powerful impact on investment. The separate role of macroeconomic policy variables in the growth regressions implies the existence of other channels, which need further investigation.

It could be argued that the case studies show only that macroeconomic policy affects growth in the short run, and that the effects of such policies are transitory. It is difficult to deal with this contention over very long periods—for instance, the rapid growth of the post-World War II period can be seen as a catch-up from the absence of growth in the Great Depression, so that by 1973 the world was back where it would have

been had growth proceeded smoothly since 1929. This is a unit root issue. But it would be a mistake to focus exclusively on the very long run: it was only in 1989 that Chilean per capita income recovered its 1970 level. That long period of unnecessarily low income certainly had welfare consequences for many, even if by 2010 Chile is back where it would have been.

The simplicity of the macroeconomic policy lessons that can be drawn from country studies raises the question of why those lessons are so frequently not implemented. Here is the role for political economy, both in recognizing the particular circumstances of individual countries, and in seeking to develop more general theories.[56] The theories may contribute understanding, even if they do not suggest how to change the policies.

This paper contends that macroeconomic policy matters for growth, but not that only macroeconomic policy matters. Reasonable macroeconomic stability is probably necessary for sustained growth, but beyond that the overall economic strategy pursued by the country—market and outward orientation, the size and role of government both in providing physical and social infrastructure, especially for human capital, and in limiting its role in other areas—is crucial.

The new growth theory and the associated empirical work have focused on these more structural factors. The empirical work characterizes high-growth countries: for instance, they invest a lot, they have higher school enrollment, they are more open. But it has not explored with any care the mechanisms that are central to endogenous growth theory—for instance, whether the process of human capital accumulation bears any similarity to the production functions for human capital typical in that literature. Nor has it yet succeeded in identifying the underlying determinants of investment, though the relative price effect emphasized by de Long and Summers (1990) must be an important part of the story.

Identifying the determinants of investment, and the other factors contributing to growth, will probably require a switch away from simple cross-sectional regressions to time series studies of individual countries, of the type discussed in Section 3.

Solow (1989) discusses the difficulties of integrating short-run macroeconomics with growth theory.[57] There are indeed formidable problems in constructing a tractable theoretical model of this type. But any model that includes a production function and that accounts for the accumulation of factors of production and the efficiency of their use can be used to

56. See for example Alesina and Drazen (1989).
57. See also Orphanides and Solow (1990). The same point is made in the development context by Arida and Taylor (1989).

analyze long-run growth. Each of these elements has been modeled and estimated; they can be brought together to provide a coherent empirical account of growth.

REFERENCES

Alesina, Alberto, and Allan Drazen. (1989). Why are Stabilizations Delayed? NBER Working Paper #3053.

Arida, Persio, and Lance Taylor. (1989). Short-run macroeconomics. In *Handbook of Development Economics*, Vol. 2. H. Chenery and T.N. Srinivasan (eds.). New York: North-Holland:855–884

Barro, Robert J. (1989a). A cross-country study of growth, saving, and government. NBER Working Paper #2855.

———. (1989b). Economic growth in a cross section of countries. Mimeo, NBER Working Paper #3120.

Bernanke, Ben (1983). Irreversibilities, uncertainty, and cyclical investment. *Quarterly Journal of Economics* 98 (1, February):85–106.

Berthelemy, J.C., and F. Bourguignon. (1989). Growth and Crisis in Côte d'Ivoire. Country study for World Bank project macroeconomic policy, crisis and growth in the long run. Mimeo, World Bank.

Cardoso, Eliana. (1990). Macroeconomic environment and capital formation in Latin America. Mimeo, Tufts University.

Chenery, Hollis B., Sherman Robinson, and Moshe Syrquin. (1986). *Industrialization and Growth*. New York: Oxford University Press.

Clark, Peter K. (1979). Investment in the 1970's: Theory, performance and predictions. *Brookings Papers on Economic Activity* 1:73–113.

Corbo, Vittorio, and Andres Solimano. (1991). Chile's experience with stabilization, revisited. World Bank Working Paper WPS 579.

Corden, Max. (1991). Macroeconomic policy and growth. *Proceedings of the World Bank Annual Conference on Development Economics* (in press).

De Gregorio, Jose. (1991). Economic growth in Latin America. Mimeo, IMF (March).

De Long, J. Bradford, and Lawrence H. Summers. (1990). Equipment investment, relative prices, and economic growth. Presented at NBER Conference on Economic Growth, April.

Dervis, Kemal, and Peter Petri. (1987). The macroeconomics of successful development: What are the lessons? *NBER Macroeconomics Annual*, 211–255.

Douglas, Hernan Cortes. (1989). Chile country study. For World Bank project macroeconomic policies, crisis and growth in the long run. Mimeo, World Bank.

Fazzari, Steven, Glenn Hubbard, and Bruce Petersen. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity* I: 141–195.

Fischer, Stanley. (1983). Inflation and growth. NBER Working Paper No. 1235 (published as "Inflacion y Creciemento," *Cuadernos de Economia*, December 1983).

———. (1988). Recent developments in macroeconomics. *Economic Journal* 98 (June):294–339.

Fischer, Stanley, and Franco Modigliani. (1978). Towards an understanding of the real effects and costs of inflation. *Weltwirtschaftliches Archiv* 810–832.

Fischer, Stanley, and Vinod Thomas (1990). Policies for economic development. World Bank, PRE Working Paper #459.

Grier, Kevin B., and Gordon Tullock. (1989). An empirical analysis of cross-national economic growth, 1951–80. *Journal of Monetary Economics* 24(2, September):259–276.

Grossman, Gene, and Elhanan Helpman. (1990). Comparative advantage and long-run growth. *American Economic Review* 80(4, September):769–815.

Jones, Larry E., and Rodolfo Manuelli. (1990). A convex model of equilibrium growth: Theory and policy implications. *Journal of Political Economy* 98(5, (Part 1) October):1008–1038.

Kaufmann, Daniel. (1991). The forgotten rationale for policy reform: The productivity of investment projects. World Bank (in press).

Kormendi, Roger C., and Philip G. Meguire. (1985). Macroeconomic determinants of growth: Cross-country evidence. *Journal of Monetary Economics* 16(2, September):141–164.

Levine, Ross, and David Renelt. (1990a). Cross-country studies of growth and policy: Methodological, conceptual, and statistical problems. Mimeo, World Bank.

———. (1990b). A sensitivity analysis of cross-country growth regressions. Mimeo, World Bank.

Lucas, Robert E., Jr. (1988). On the mechanics of economic development. *Journal of Monetary Economics* 22:3–42.

Mankiw, N. Gregory, David Romer, and David N. Weil. (1990). A contribution to the empirics of economic growth. Presented at a NBER Conference, October.

Morris, Cynthia T., and Irma Adelman. (1988). *Comparative Patterns of Economic Development 1850–1914*. Baltimore: Johns Hopkins Press.

Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny. (1989). Industrialization and the Big Push. *Journal of Political Economy* 97(October):1003–1026.

Orphanides, Athanasios, and Robert M. Solow. (1990). Money, inflation and growth. In *Handbook of Monetary Economics*, Vol. 1. B.M. Friedman and F.H. Hahn (eds.). New York: North-Holland.

Pindyck, Robert M. (1988). Irreversible investment, capacity choice, and the value of the firm. *American Economic Review* 78(5, December):969–985.

Rama, Martin. (1990). Empirical investment equations in developing countries. World Bank Working Paper WPS563 (December).

Raut, Lakshmi, and T.N. Srinivasan. (1991). Endogenous fertility, technical change and growth in a model of overlapping generations. Mimeo, Yale University.

Reynolds, Lloyd G. (1986). *Economic Growth in the Third World: An Introduction*. New Haven: Yale University Press.

Romer, Paul M. (1986). "Increasing returns and long-run growth. *Journal of Political Economy* 94(October):1002–1037.

———. (1989). Human capital and growth: Theory and evidence. NBER Working Paper #3173.

———. (1990). Endogenous technological change. *Journal of Political Economy* 98(5 (Part 2), October):S71–102.

Schmidt-Hebbel, Klaus, and Tobias Mueller. (1990). Private investment under macroeconomic adjustment in Morocco. Mimeo, World Bank.

Scholing, Eberhard, and Vincenz Timmermann. (1988). Why LDC growth rates

differ: Measuring 'unmeasurable' influences. *World Development* 16(11, November):1271–1294.
Schultz, T. Paul (1988). Education investments and returns. In *Handbook of Development Economics*, Chapter 13. H. Chenery and T.N. Srinivasan (eds.). New York: North-Holland.
Serven, Luis, and Andres Solimano. (1989). Private investment and macroeconomic adjustment. World Bank Working Paper WPS339.
Solimano, Andres. (1989). How private investment reacts to changing macroeconomic conditions: The case of Chile in the eighties. World Bank Working Paper WPS 212.
Solow, Robert M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics* 70(1):65–94.
———. (1989). Growth theory. Mimeo, MIT.
Summers, Robert, and Alan Heston. (1988). A new set of international comparisons of real product and price levels: Estimates for 130 countries, 1950–1985, *Review of Income and Wealth*, Series 34, No. 1 (March):1–25, and three accompanying computer diskettes.
Swan, Trevor. (1956). Economic growth and capital accumulation. *Economic Record* 32:334–361.
White, Halbert. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48(May):817–838.
Williamson, John. (1990). What Washington means by policy reform. In *Latin American Adjustment*. J. Williamson (ed.). Institute for International Economics.
World Bank. (1988). Adjustment lending: An evaluation of ten years of experience. Country Economics Department.
———. (1990a). Report on adjustment lending II: Policies for the recovery of growth.
———. (1990b). *Trends in Developing Economies 1990*. Washington, D.C.
———. (1990c). *World Tables*, 1989–90 edition. Washington, D.C.
———. (1991). *World Development Report*. New York: Oxford University Press.

Comments

ANNE O. KRUEGER
Duke University and NBER

Any economist visiting Ghana in the early 1980s would immediately have concluded that economic policies were a major factor in the country's declining level of per capita income. The exchange rate was so overvalued that the black market premium was about 900%, and most exportable commodities were smuggled out of the country. The rate of inflation was reaching the triple digit mark. The communications and transport networks functioned poorly, when they functioned at all. Overstaffed inefficient parastatal enterprises accounted for a very high fraction of nonagricultural employment, and agricultural output was

falling as the government discriminated so heavily against agriculture that farmers did not even bother to pick the cocoa.

But, having reached that conclusion, our itinerant economist would have been unable to provide a simple theoretical explanation as to why the growth rate was affected by these policies. Development economists have long been frustrated with the tension between the obvious negative contribution of poor economic policies to growth rates and the failure of economic theory to provide a framework for analysis. It has only been with the emergence of the new growth theory, focusing as it does on factors permitting persistent growth, that there was any analytical basis for discussing the contribution of policy to anything other than once-and-for all shifts in the level of output.

There is still a long way to go in reaching a satisfactory framework or understanding of determinants of growth rates. We recognize the role of factor accumulation, and indeed focus analysis of growth around a production function so that factor accumulation and increases in efficiency are, by definition, the sources of growth. But as soon as it is recognized that factor accumulation itself may be a function of economic policy (through, for example, the incentives to invest provided by a higher or lower real rate of return as influenced by policy-induced distortions) and that the rate of growth of efficiency (total factor productivity) may be affected by policies, difficulties arise.

Stanley Fischer's paper is a valuable contribution to the literature seeking to understand the interactions of policies, efficiency, and factor accumulation in affecting growth rates. First, he demonstrates convincingly the importance of macroeconomic policies as an influence on growth. Second, he provides a valuable discussion of some of the other pertinent literature. Third, his analysis of his results, and of the difficulties confronting those attempting to link policy and performance, is itself valuable.

In these comments, I want to focus on two additional issues that arise in attempting to understand the interactions of policies and other variables on growth rates, and then to point to a few minor questions where alternative interpretations of his regression results are possible.

The first issue is conceptual, and has to do with the base from which a "growth rate effect" should be measured. One of the many problems that are confronted when attempting to explain growth rates is that they are a function of several variables. For example, countries that experience improving terms of trade should, on economic grounds, be able to realize more rapid observed growth than countries with deteriorating terms of trade. Thus, over Fischer's period of observation (which ends in 1985), oil exporters should have been able to experience more rapid

recorded growth than oil importers. Likewise, if there are internal differences among countries (for example, in the existing stock of human capital, or in the nature of the terrain affecting the productivity of investment), these *might* affect the rate of growth. The debate about convergence points to another such issue: perhaps the growth rate is affected by the level of per capita income.

A second set of variables pertains to determinants of the rate of factor accumulation: it may be partly a function of policy, but partly also a function of, for example, the level of per capita income, or even "cultural differences" that affect savings behavior. In addition, some countries are recipients of large inflows of foreign aid for political reasons, which should also permit more rapid growth than would otherwise be feasible.

The third set is policies. In a sense, what one would like to know is how rapid growth might be in the presence of "best policies," whatever they are, and how slow (i.e., negative) it might be in the presence of "worst policies." Such a range might differ between countries because of the first two factors mentioned. The real question for analysis of the impact of policies is how much the policy stance contributed to a reduction in the growth rate contrasted with what it might otherwise have been. Yet, we are far from being able to answer that question.

Moreover, there are a number of policies that probably impact adversely on growth (or that favor more rapid growth) in addition to macro policies. These include the trade and payments regime, credit rationing and its impact on resource allocation, intervention in the labor market, policies toward agriculture, and the efficiency of the public sector in providing infrastructure. Ideally, what is needed is an understanding of the interaction of policies, and a means for estimating the contribution of each to accelerating or reducing the rate of economic growth. A question that arises is that "goodness" of macroeconomic policies is clearly correlated with "goodness" of these other policies. For this reason, what is really needed is a full specification of the set of policies that impacts on growth, and a model that permits the simultaneous estimation of these effects related to the gap between the observed growth rate and the "potential" growth rate, the "worst possible" growth rate, or the "best possible" growth rate.

The second issue has to do with the relationship between observed growth rates and the underlying phenomenon we seek to observe. It is inevitably confronted by those attempting to do any empirical work on determinants of growth. We all know that fluctuations in weather, positive and negative transitory shifts in the terms of trade, and other factors affect observed year-to-year growth rates, and, thus, we use longer time periods. When examining the influence of policies on growth, however,

there is an additional problem: over periods much longer than a year, growth rates can be observed that are not in the longer run sustainable. Countries can (as Fischer notes Latin America did) maintain growth rates over considerable periods of time by borrowing from abroad, or otherwise offsetting low real rates of return to domestic factors of production. But, barring exceptional good fortune, growth rates based on external borrowing at real interest rates above the real rate of return on investment, are not sustainable, and there is an important issue as to how to treat, e.g., the Brazilian growth rate over the 1970–1985 period. In 1985 Brazil had a large stock of foreign debt that would inevitably result in smaller increases in real income in some future years than would have happened without that borrowing. For this reason, Brazil's observed growth rate—and that of other heavily indebted countries—over the 1960–1989 period covered by Fischer's regressions was above the sustainable rate.

Let me now turn to some minor issues that arise when estimating the impact of policy on growth rates, and interpreting the results. First, use of standard time period, such as 1960–1989 for all countries, requires the use of average values for indicators of policies and other variables. Even among the countries included by Fischer, there have been large differences in policies. For example, Brazil between 1968 and 1974 was a reasonably low-inflation, outer-oriented economy and experienced rapid growth, and Turkey changed policies markedly in 1980 as Fischer notes. Ideally, one would like to single out periods during which policies were of a particular kind, using the period when the policy stance was fairly stable as the unit of observation.

Second, as I already noted, policy stances are highly correlated across countries: countries with large fiscal deficits are likely to have large black market premia, discrimination against agriculture, and highly restrictionist trade regimes. This makes interpretation of the regression results for *any* single policy somewhat less robust than might otherwise be the case. Fischer's black market results are an example of this. I share his puzzlement at the results, noting only that a large black market premium may reflect a highly distorted trade regime, and while investment goods may in those circumstances be cheap for those obtaining licenses, such regimes typically result in smaller export earnings and thus a smaller overall level of imports of capital goods than would be feasible with a lower black market premium.

Third, there is reason to question the "continent" dummy variables. While Korea's growth rate is more like Taiwan's growth rate than like Sudan's, it is also true that Korea's policies are more like Taiwan's than Sudan's. Since policies among the rapidly growing Asian countries are

similar, as were those for the period covered by Fischer among the African and Latin American countries, it is not clear what the continent dummy variable is in fact representing, if not average differences in policies.

Finally, there are interesting questions about the relationships between macroeconomic policies and microeconomic policies. Fischer notes that inflation and large fiscal deficits are indications of governments out of control. There are important questions as to why, however, which center on political economy issues. One naive model might be as follows: governments pursue inappropriate microeconomic policies that, for given resources, incipiently reduce the growth rate. If, however, the growth rate falls below some acceptable level, there are likely to be political repercussions. To offset that, governments embark on unsustainable deficit financing to offset the incipient decline in the growth rate. When inflation accelerates to the point where it, too, is politically costly, foreign borrowing is used as a means to sustain growth. Only when foreign creditors will no longer extend credit is action undertaken to alter micro- and macroeconomic policies. In this model, it is microeconomic policies that are a drag on the growth rate, and expansive macroeconomic policies are used in the shorter term to offset their negative effect.

If that is the case, some minimally rational microeconomic policies are a necessary condition for stable macroeconomic policy. However, other interpretations are equally possible. All that seems certain at this stage is that policies do matter, and that any theory of growth that ignores them will miss an essential part of the explanation for differences in performance among developing countries in the years since the Second World War.

Comments

XAVIER SALA-I-MARTIN
Yale University

1. Introduction

It is widely accepted in the economic growth literature that microeconomic distortions can affect the long-run rate of economic growth. There are models (and empirical papers) on the role of the trade regime, financial development and financial repression, education, research and development, property rights, externalities, congestions of public goods, political fights, relative price distortions, income inequality, and a hetero-

geneity of other factors that are shown to have long-run growth effects. Most of these things are not obviously macroeconomic even though in most of these stories, governments can affect the steady-state growth rate of the economy through policy interventions. There are also models where the growth rate of the economy is affected by investment distortions, government spending and public investment, or distortionary taxes and subsidies.[1] Even though these variables are macroeconomic in nature, they do not seem to be what Fischer has in mind. The question asked in this paper is whether *short-run macro management*, "defined as monetary, fiscal and exchange rate policies and reflected in the inflation rate, the budget deficit, and the balance of payments, [also] affect the long-run growth rate of the economy".[2]

To answer this question Fischer first presents a few plausible stories of why and how that may be the case. He then provides some evidence on the cross section partial correlation between the rates of growth rate and investment and the inflation rate, the budget deficit, the ratio of foreign debt to GDP debt, and the black market premium. Finally, he provides two case studies for Côte d'Ivoire and Chile to further support his case. I will discuss the theoretical and empirical parts of the paper separately. When discussing the theoretical part I will assume that the data say that short-run macro policy affects growth, and when discussing the empirical part I will assume that there is a theory behind it. As it will be apparent from my latter discussion, I think that the plausibility of these two assumptions can be defended with a limited degree of success.

2. *The Theory*

When one asks the question of whether macro policies matter for growth, the first thing that comes to mind is: how would they? As Fischer suggests in the paper, most of the elaborated theories on the relation between growth rates or steady-state GDP levels and inflation (all of which can be found in Blanchard and Fischer, 1989) predict either no relation—superneutrality of money (Sidrauski, 1967)—or a positive relation[3] (Tobin, 1965; Romer, 1987; Weil, 1987).

1. See Barro and Sala-i-Martin (1990) for a survey on the role of public finance in models of endogenous growth.
2. It is hard to see how the real exchange rate can be misaligned in the long run without the introduction of tariffs or other microeconomic distortions. The existing theories of nominal rigidities suggest that the effects of monetary policy on the real exchange rate will last, if at all, only a few years and, therefore, will not affect the long-run growth rate of the economy.
3. These models predict a positive relation between inflation and *growth rates* along the transitional path towards a *higher steady-state level* of income or product.

Hence, in order to argue that inflation is bad for growth, he calls on some unelaborated yet plausible old mechanisms through which the inflation rate reduces the long run *level of income*. He suggests that changing the production function along the lines suggested by endogenous growth theory will transform these stories that in normal neoclassical models have *level effects*, into *steady-state growth* theories of the negative consequences of inflation. As a result, and I suppose that by the laws of continuous compounding, inflation will become a large and very costly problem worth worrying about. The proposed mechanisms are "the negative effect of inflation on the efficiency of the exchange mechanism," and "all the costs of inflation detailed in Fischer and Modigliani (1978)."[4]

My reaction to this is twofold: first, if what we want is to explain the correlation between the growth rate over a period of 15 to 25 years and inflation or any other variable, we do not need this variable to affect the *steady-state growth rate*. If the economy finds itself in the transition towards a *higher steady-state level* of income in a neoclassical type of model, the growth rate along such transition will also be correlated with the relevant variable. In other words, cross country regressions involving 15 or 25 years worth of growth have little to say about the steady-state growth rate.[5]

And second, things that have small or negligible effects on the levels of income and welfare in neoclassical models will have small or negligible effects in the growth rate and welfare in endogenous growth models. It is true that if the growth rate is 0.000001 percentage points larger from now to infinity, the level of income in a few hundreds of years will be very far away from the level that would otherwise have been. Yet once we properly discount the difference, the effect on welfare will still be negligible. Thus, if these effects were not worth worrying about before endogenous growth theory, they are still not worth worrying about now.

The relation between budget deficits and growth also lacks solid foundation. Theories of infinitely lived households suggest that budget defi-

4. Some of the costs of larger expected inflation highlighted in Fischer and Modigliani (1978) are (1) the losses due to changing price more often, "menu costs," (2) the shoe leather costs of going to the bank more often, and (3) an increase in the cost of capital due to a nominal tax system. As pointed out by the authors, the first two are very small and the third is ambiguous. They also highlight (4) the offsetting "Tobin effect" and the redistributional effects due to the asymmetric holding of nominal assets.

5. This of course does not mean that we should not be interested in the determinants of the long-run growth rate. I think that the interesting endogenous growth models are the ones that explore these determinants. On the other hand, I do not think that old fashion models that emphasize distortions that have level effects in neoclassical models and that are amended with Ak technologies are interesting growth theories (or at least they are no more interesting than their neoclassical counterparts).

cits have no effects on the level of income (Barro, 1974) while theories of stochastically extinguishable individuals suggest that they have a negative effect on income through higher real interest rates and the crowding out of investment (Blanchard, 1985). Both the transitional dynamics and the endogenous growth extension of this latter model would predict a negative relation between growth and budget deficits. The problem is that they would also predict that the effect would disappear once we hold constant investment (as Fischer does in all his growth regressions) and that the relation between government surplus and investment would be positive, while Fischer finds it to be negative (see Fischer's Table 4, any column). Again, we do not have a good theory that explains this relation directly.

In the absence of theories that explain how inflation and deficits affect economic growth directly, we could think that the existing correlation is either spurious or the direction of causation is reversed: reverse causation is especially plausible for the budget deficit since low growth periods will be associated with low tax revenues and high deficits. If governments find it hard to change tax rates and spending, they may also resort to seigniorage to finance the larger gap between revenue and spending, thereby drawing a negative association between inflation and growth.

As far as the spurious correlation is concerned, there are several possibilities. First, inflation could be symptomatic of financial repression. Some governments may not want to allow the financial system to develop for seigniorage reasons: when the level of financial sophistication is low, the money demand elasticity will be small (as people cannot substitute away from currency) thereby increasing the possibility of large inflation tax collection. To the extent that the level of financial development matters for growth, the growth rate will be negatively associated with the inflation rate, even though inflation does not have any direct real effect on growth (Roubini and Sala-i-Martin, 1991).

Second, the level of inflation may be proxying for the volatility of inflation. Inflation would then be symptomatic of uncertainty and it would be correlated with growth even though it does not matter directly. This argument runs into trouble since, as Fischer notes in footnote 25, when one holds constant the level of inflation in a growth regression, the coefficient of variation does not matter. Barro (1990) finds that the *change* in the inflation rate is actually more relevant.

Third, large inflation rates (and/or budget deficits) are proxying for general trouble: governments, like alcoholics, do not know when to stop and when they screw up, they screw up big time! Thus, even though only "micro" distortions and policies have long-run real effects, macro variables are correlated with growth rates only because they are proxying for

the former. In Fischer's own words "a government that is producing high inflation . . . [or] runs large budget deficits is a government that has lost control."

3. *The Empirical Evidence*

In Fischer's Table 1, the economic performance of three sets of areas—Africa, Latin America, and Asia—is analyzed through the averages over three periods of 13, 7, and 8 years, respectively. It is observed that, across the *nine data points* originating from this experiment, the relation between inflation and growth is "predominantly negative," between the budget deficit and growth is "apparently negative," and between investment and growth "broadly positive." This is presented as "prima facie evidence" that the quality of macroeconomic management affects growth.

First, I already mentioned my worries about the endogeneity of all of these macroeconomic variables. I agree with Fischer that most of the variables used by him and by other empirical growth researchers are largely endogenous. But if the concept of "different degrees of endogeneity" exists, the budget deficit should get a high mark on it; using it as a right-hand side variable is, therefore, especially dangerous. Second, and more importantly, we should remember that the assertions made are based on nine data points (six in the case of budget deficits!). They should therefore be taken as *indications*, not as prima facie evidence, of the importance of macro policy. Third, I am not sure what is it that we learn from the average growth performance over a period of 8 or 9 years: is it something about long-run growth and development or about recessions, booms, and stabilization programs? We should think that the negative relation between inflation and growth at these rather high frequencies sheds more light on the right way to think about business cycles.[6]

The next pieces of evidence presented are some "long"-term growth regressions similar to those found in Barro (1991). It is interesting to see that, despite the criticisms on the robustness of these regressions raised by Levine and Renelt (1990) and subscribed by Fischer in this paper, most of the evidence presented comes from the same type of regressions. I should say that I think that the Levine and Renelt (1990) test of robustness is too strong. They classify a variable as "nonrobust" if they find *one* combination of right-hand side variables that turns the sign of the relevant variable around. I would say that the estimated coefficients must follow some distribution as we use different combinations of inde-

6. Believers in Phillips curves may find this inverse relation puzzling.

pendent variables. It would be surprising to find that all of this distribution has an either positive or negative domain, but it never includes a bit of both. Hence, it would be surprising if they did not find that most variables are not robust.

Leaving the problem of robustness (from which the macroeconomic variables used by Fischer are not excluded) aside, the regressions (5) and (6) in the paper show that inflation and deficits are negatively related to growth and the ratio of foreign debt to GDP is not significant. Notice that the regressions reported include the investment rate as one of the explanatory variables. Thus, the partial correlations between inflation, deficits, or any other variable reflect the effects of this variable on growth above and beyond the effect that this variable may have on the investment rate. In particular, these correlations are not reflecting crowding out phenomena.[7]

The deficit variable used is the average over the period 1975 to 1980, 5 of the 6 years following the first oil shock. I would tend to think that this short-run variable is especially problematic both because of endogeneity and because it reflects business cycles rather than long-run growth performance. If, for instance, one uses the Levine and Renelt (1990) central government deficit as a ratio to GDP for the period 1974 to 1989 and reproduce regression (5) using the Barro (1991) data set, one gets the following:

$$
\begin{array}{llllll}
GY = 1.50 - & 0.51\ RGDP70 + & 1.71\ PRIM70 + & 11.8\ INV - & 1.01\ INF & \\
\quad (-6.2) & \quad (2.5) & \quad (3.6) & & \quad (-.94) & \\
+ .147\ SUR - & 2.4\ LAC - & 2.87\ SSA & & & \\
\quad (3.6) & \quad (-5.0) & \quad (-5.6) & & &
\end{array}
$$

$\bar{R}^2 = 0.6$, $n = 80$.

Paralleling Fischer, the t-statistics in parentheses have been estimated using White's (1990) heteroscedasticity consistent covariance matrix. Thus, the difference between regression (5) in the paper and this one is that I use a deficit variable that involves a larger time span, that I exclude the foreign debt variable (because it is not significant in any of the regressions reported in the paper), and that my sample size is a bit larger.[8] We see that the coefficients on initial income, school enrollment,

7. This would be exactly true if the data available reflected the true investment rate. The effects of these variables on growth once investment is held constant could reflect their effects on the nonmeasured part of investment.

8. The number of countries for which all the data were available was 85. To achieve comparability with the equations I present below, I use the same sample of 80 countries.

investment, and budget surplus do not change in a significant manner. The coefficient on the inflation rate, however, is no longer significantly different from zero. My conjecture is, therefore, that the inflation rate in Fischer's regression is significant because it interacts with the debt variable in a funny way.

To see whether macroeconomic policy affects growth directly or through the investment rate, Fischer next presents some evidence on the relation between that rate and the macroeconomic policy variables in Table 4.[9] The main finding is that the inflation rate is negatively correlated with the investment ratio and that the black market premium and the average price of investment goods relative to the United States affect investment negatively. Surprisingly, the surplus variable is negatively related to the investment ratio in all regressions. Again this suggests that, if we believe that there is a relation between deficits and growth, this is not through the crowding out channels suggested by the finite horizon theories of the budget deficit. The debt variable is again insignificant in all the equations.

I do not know why the sample size drops to 40 when the black market premium is introduced (this change in sample makes comparisons across regressions difficult to make). I could reproduce regression (12) in Fischer's Table 4 using Levine and Renelt's (1990) black market premium, and Barro (1990) inflation rate for a sample of 80 countries. The results are reported in my Table 1. Again, because the debt variable is not significant, I dropped it from the regression. In column one I regress the investment ratio to initial GDP, primary school enrollment, the inflation rate, and the government surplus. The first thing to note is that neither inflation nor budget surplus is significant (and the inflation has the "wrong" sign). The same is true when I hold constant the African and Latin American dummies in column 2. Hence, changing the definition of deficit and excluding the debt variable substantially changes the

9. In some sense we already know that part of the effects do not come through investment given that the regressions reported by Fischer have the investment rate as one of the explanatory variables. If we exclude the investment rate, Equation (5) becomes

$$GY = \underset{(-4.9)}{2.78} - \underset{(4.6)}{0.43}\,RGDP70 + \underset{(-0.4)}{2.86}\,PRIM70 + - \underset{(3.5)}{0.40}\,INF + \underset{(-5.2)}{0.167}\,SUR - 2.9\,LAC - \underset{(-5.4)}{3.23}\,SSA.$$

$\bar{R}^2=0.5$, $n=80$.

As we can see, the inflation rate is still insignificant and the surplus is still significantly positive.

results on the relation between macro policy and growth but leaves the rest of the coefficients unchanged.

In columns 3 and 4, I follow Fischer and combine the macroeconomic variables with the black market premium (BMP) and the price of investment. Notice that the number of observations is 80, about twice as many as Fischer's Table 4, column (12). The two price variables are significantly negative while the two macro variables are not significant and have the "wrong" sign. The same is true if we hold constant regional dummies in Equation (4). The adjusted R^2 drops to 0.14 so the fraction of growth actually explained by these variables is rather small. As suggested by Lee (1991), the relation between the BMP and the investment rate may be nonlinear. In Equation (5) I exploit this nonlinear relation and find that the level of significance of the BMP variable increases a lot. The macro variables, however, remain insignificant.

Table 1 CROSS COUNTRY INVESTMENT REGRESSIONS

	Equation				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
RGDP70	.010	.007			
	(4.8)	(2.6)			
PRIM70	.101	.097			
	(4.6)	(4.6)			
INF	.002	.052	.032	.071	.067
	(.06)	(1.5)	(.92)	(1.9)	(1.8)
SUR7485	.006	.131	−.085	−.063	−.124
	(.06)	(.81)	(−.7)	(−.4)	(−1.0)
BMP			−.0004	−.0004	
			(−3.6)	(−3.6)	
ln(1+BMP)					−.018
					(−4.6)
PINV			−.070	−.049	−.058
			(−3.6)	(−.2)	(−3.6)
SSA		−.030		−.064	
		(−2.7)		(−3.5)	
LAC		−.048		−.058	
		(−1.7)		(−3.3)	
$\bar{R}^2$	.44	.48	.14	.29	.22
N	80	80	80	80	80

Notes: The inflation rate is from Barro (1990), PINV is the value of the investment deflator from Barro (1991), and SUR7489 (central government surplus as a ratio of GDP) and BMP (black market premium) are from Levine and Renelt (1990). The values in parentheses are *t*-statistics, which have been calculated using White (1980) heteroscedasticity consistent covariance matrix.

My reading of the evidence from this section is that the relation between the two macro variables suggested in the paper and the growth and investment rates is not as clear as Fischer seems to suggest. The relation between inflation and growth is not significant. Budget deficits seem to affect growth negatively but they do not seem to do so through the normal channels of investment crowding out. If anything, budget deficits seem to have a positive effect on investment. The effect of the black market premium and the price of investment goods seem a bit stronger, although I am not sure we can think of these two variables as intrinsically macroeconomic.

The final section of the paper reports the results of two case studies: one for Côte d'Ivoire and one for Chile. I applaud the idea of trying to find sources of evidence alternative to the Heston and Summers data set, since there are only so many regressions that can be run with that data set, and they seem to have been run already. Case studies could potentially be useful alternatives. However, I would have liked to see Fischer's thoughts on why and how these case studies can provide useful evidence. As suggested by the references to Corden (1991), it seems to me that case studies end up being used to compare experiences across countries: Each of them ends up representing one data point that some clever economist uses to run a regression in his head. If this is the case, their potential usefulness will be confined to being observations in a Barro-like cross country empirical study so we are back to where we started. A second and perhaps more serious problem is that case studies seem to be a collection of facts or stories organized according to some prior model. Hence, the priors of the researcher will be very important in deciding what is important and what is not. In particular, if the researcher believes that macroeconomic policy matters for growth and the country under study did not grow much, the case study is likely to conclude that some macro policy of some sort went wrong.

4. Conclusions

So what did we learn? I am not more convinced than before that macroeconomic policy (as defined by Fischer in the paper) directly matters for the long-run performance of countries. The empirical evidence presented is at best weak and some of the findings—like, for example, the negative relation between growth and deficits but the positive relation between investment and deficits—are puzzling.

Even if the correlations were robust, the alternative interpretations of reverse causation and, especially, spurious correlation seem more appealing to me. The most plausible interpretation of the apparent correlation

between macroeconomic mismanagement and growth is that governments that do bad, do bad on all fronts. Hence, even though macroeconomics does not matter directly, macroeconomic variables signal the overall performance of the public sector.

Does this mean that we should not worry about macroeconomics? I think the answer is not at all. If one believes that, above and beyond microeconomic distortions, there is a correlation between short-run macro management and long-run growth, the main contribution of the paper is to bring attention to the fact that we do not have theories to explain why that may be the case. The paper suggests at least three lines of research: first, theories that explain qualitatively and quantitatively the direct effect of inflation and deficits on growth, without really affecting investment. Second, (political?) theories that argue that some macroeconomic stability is necessary to implement the microeconomic policies suggested by the existing growth literature. This is an important message for growth theorists since the value of their policy advice would be zero if it cannot really be implemented. Third, theories of why macroeconomic variables may be quick signals of microeconomic trouble. I think that the possibility of macroeconomic disarray being a *leading indicator* of long-run growth trouble is worth investigating.

REFERENCES

Barro, R. J. (1974). Are government bonds net wealth? *Journal of Political Economy* 82(6, December):1095–1117.

Barro, R. J. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics* 106(2, May):407–444.

———. (1990). Comment on R. Dornbusch, F. Sturzenegger, and H. Wolf, "Extreme Inflation: Dynamics and Stabilization." *Brookings Papers of Economic Activity* 1990(2):68–75.

Barro, R.J., and X. Sala-i-Martin. (1990). Public finance in models of economic growth. NBER Working Paper 3362, May.

Blanchard, O.J. (1985). Debt, deficits, and finite horizons. *Journal of Political Economy* 93(2, April):223–247.

Blanchard, O. J., and S. Fischer. (1989). *Lectures on Macroeconomics*. Cambridge, MA: MIT Press.

Corden, Max. (1991). Macroeconomic policy and growth. Proceedings of the World Bank annual conference on development economics (in press).

Fischer, Stanley, and Franco Modigliani. (1978). Towards an understanding of the real effects and costs of inflation. *Weltwirtschaftliches Archiv* 810–832.

Lee, Jong-Wha. (1991). International trade, distortions and long-run economic growth. Mimeo, Harvard University, April.

Levine, Ross, and David Renelt. (1990). A sensitivity analysis of cross-country growth regressions. Mimeo, World Bank.

Romer, D. (1987). The monetary transmission mechanism in a general equilibrium version of the Tobin-Baumol model. *Journal of Monetary Economics* 20:105–122.

Roubini, N., and X. Sali-i-Martin. (1991). The relation between the trade regime, financial repression and economic growth. Mimeo, Yale University, May.
Sidrauski, M. (1967). Rational choice and patterns of growth in a monetary economy. *American Economic Review* 57(2, May):534–544.
Tobin, J. (1965). Money and economic growth. *Econometrica* 32(October):671–684.
Weil, P. (1987). Permanent budget deficits and inflation. *Journal of Monetary Economics* 20(2, September):393–410.
White, H. L. (1980). A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica* 48:483–499.

Discussion

David Romer suggested that the simultaneity bias in the cross-sectional regressions is important. The likelihood that poor micro policies and bad shocks are tied with bad macro policy means that identifying cause and effect is difficult. Further analysis using case studies to sort this issue is needed.

Robert Barro offered that while the individual variables in the cross-sectional regressions were not robust, he was not bothered because they should be thought of as proxies for a more general effect. After accounting for initial income, modeling growth as converging to some target position is robust. The variables Fischer considers are just further elements in modeling this target position. On a related topic he doubted the efficacy of time series evidence, citing the poor performance using U.S. data. Fischer responded by noting that across countries one would get greater dispersion in macroeconomic policies.

Rodolfo Manuelli suggested that many government policies work through changing the effective rate of return. A lower rate of return means a lower rate of growth. He asked whether one could use this link to measure the effect of macro policies on growth. Fischer pointed out that there is a set of rates of return in the paper.

Larry Ball suggested a couple of instruments to sort out the direction of causality. One is some measure of central bank independence, which is plausibly a result of historical accident. A second set of instruments involves the monetary regime. He noted that the paper points out that many countries in Africa have low rates of inflation because they are tied to the French franc.

Robert Gordon asked what is the meaning of the results on the continent dummies. He was struck by the fact that the coefficients on Latin America and Africa are similar as compared to Asia. Moreover, he asked why Fischer combines the Far-East with the subcontinent countries of

India, Bangladesh, and Pakistan. Fischer responded that he was also surprised that they were significant even after including other variables one would think would account for them. In Africa he suggested that a lack of administrative ability was partly responsible and measuring that variable is difficult. Latin America, on the other hand, suffers from political instability. As far as grouping Asia into one, he stated that India, until recently, has been more like the rest of Asia with a higher rate of growth.

Sweder van Wijnbergen commented that running total investment on the government budget surplus was just picking up the influence of public investment on both sides, and it would be hard to imagine getting anything but a minus sign. He suggested separating public and private investment. The results on the black market premium may involve mismeasured investment. A high black market premium may mean that a large fraction of investment is surreptitious.