Governance and Structural Adjustment Programs:

Effects on Investment, Growth, and Income Distribution

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To my Parents

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"That's nothing to what I could say if I chose, the Duchess replied in a pleased tone."
Lewis Carroll – Alice's Adventures in Wonderland

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Stockholm, April 1999

Tove Strauss

Contents

Introduction and summary of dissertation

Background and purpose

The last decades have witnessed large differences in the performance of various developing countries. Much of East and South East Asia experienced "miracle" growth rates until the advent of the recent economic crisis. Since then, growth rates have been negative in many countries. While the 1980s were "a lost decade" for Latin America, the 1990s have been more successful, with more than twice as high average growth rates. However, growth rates in many African countries have remained low or even negative and there are significantly fewer cases of sustained success. What can explain the different experiences?

While the importance of good governance for growth has been emphasized in the international debate, not least by international organizations such as the World Bank and the IMF, the role of these organizations for developing country policy making has also been questioned. In particular, there has been some discussion about the economic and social costs of World Bank supported structural adjustment programs.

In this dissertation an attempt is made to explain the role of good governance and World Bank economic reform programs for growth, poverty reduction and investment. The dissertation consists of three separate essays within the field of development macroeconomics. Chapter two examines the role of government for growth in industrialized and developing countries, considering both expenditure and financing aspects of government. One of the primary objectives of the essay is to investigate whether the role of government differs between the two groups of countries. In chapter three, the effects of specific economic reforms for different

income groups, particularly the poor, are tested. The impact of reforms in countries that have undertaken World Bank financed structural adjustment is enlightened. The fourth and final chapter analyzes the effects of economic reforms on private investment behavior. Again, reform packages are decomposed but here the set of countries is reduced to developing countries undertaking World Bank financed structural adjustment reforms. In all essays the empirical problems are investigated using the tools of formal econometric analysis.

Previous empirical findings

The existing empirical literature on the effects of government on growth is vast but inconclusive. To put the present thesis in its context, the following paragraphs will summarize some of the findings of relevant earlier studies.

The literature has mainly focused on the expenditure side of government activity and very few studies cover the effects of government financing comprehensively.[1] Most studies test standard macroeconomic hypotheses and the effects of fiscal policies on growth for a single set of countries encompassing both industrialized and developing countries, without distinguishing between the two groups. Among the government-related variables that turn out to have significant effects on economic growth are the budget surplus, government consumption, public investment and inflation. However, the conditioning set of information often proves to be of importance for the results.

A few authors have made attempts at investigating the relation between structural adjustment and poverty reduction.[2] When effects of fiscal, monetary and exchange rate policies are evaluated, it is found that sound macroeconomic policies in

[1] See e.g. Kormendi and Meguire (1985), Barro (1991), Levine and Renelt (1992), Easterly and Rebelo (1993) and Devarajan *et al.* (1996).

reforming countries have generally favored growth and poverty reduction. Successful stabilization signaled that the government had both the commitment and the ability to sustain economic reforms. The studies look specifically at the effects of policy reforms in countries undertaking World Bank financed structural adjustment reforms, and do not use other developing countries or industrialized countries as control groups.

Structural adjustment efforts have, however, also been associated with a reduction in investment levels.[3] The empirical evidence suggest that aggregate investment rates observed in developing countries declined sharply after the 1982 debt crisis and remained low throughout the rest of the decade, although private investment rates started a slow recovery after 1987. Investment often appears to go through two or three phases during adjustment: initial contraction, inertia and, possibly, revival. During the first one or two years of implementation, investment falls and then tends to remain at a low level. To the extent that investment takes off again, it does so with a considerable lag, and the revival is far from automatic. Few economies appear to be able to jump directly from contraction to revival. Again, these studies look specifically at the effects of policy reforms in countries undertaking World Bank financed structural adjustment reforms, and do not use other developing countries or industrialized countries as control groups.

There also exists a long list of authors who attempt to estimate investment equations empirically.[4] Most studies find that macroeconomic policy variables such as the real exchange rate, the real interest rate, the debt service to export ratio, the level

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[2] See e.g. Jayarajah *et al.* (1996) and Demery and Squire (1996).

[3] See e.g. Bleaney and Fielding (1995), Serven and Solimano (1993a) and Solimano (1992).

[4] See e.g. Cardoso (1993), Cohen (1993), Greene and Villanueva (1991), Levine and Renelt (1992), Oshikoya (1994) and Pindyck and Solimano (1993).

of public investment as well as the growth rate in the economy are important determinants of the level of investment.

World Bank financed structural adjustment programs

Two out of the three essays in this dissertation are concerned with economic reforms and World Bank financed reforms in particular. Hence, a brief presentation of World Bank structural adjustment lending is called for.

The first World Bank supported adjustment loan was signed in early 1980 and lending reached its peak in the fiscal year of 1988 when adjustment lending constituted almost 25 per cent of the World Bank's total lending (Thomas and Chhibber, 1989). The objective of structural adjustment lending is to provide support for member countries experiencing serious balance of payments difficulties, or countries faced in the years ahead with the prospect of unmanageable deficits arising from external factors not likely to be easily or quickly reduced (Wright, 1980). In order to qualify for World Bank supported adjustment lending, a country must be willing to adopt appropriate changes in its policies and programs. Primarily, this means reducing the current account deficit.

Although neither the contents nor the form of structural adjustment programs are guided by a preconceived model, most of the programs typically include measures such as trade policy reform, exchange rate reform, debt management, fiscal restructuring, financial sector development, institutional strengthening, public enterprise restructuring, specific sector policies and anti-poverty policies (Landell-Mills, 1981 and Thomas and Chhibber, 1989).

An overview of chapters two to four is presented below.

Growth and government

The purpose of the second chapter is to analyze how the role of government for growth in developing countries differs from that in industrialized countries. Because allocation mechanisms for private capital are assumed to be less efficient in developing countries, there is reason to believe that the role of government is different. The study tests the significance of variables identified as possible determinants of growth in previous empirical literature. It is distinguished from earlier literature inasmuch as it focuses on the differences between the two groups of countries and because it considers both the expenditure as well as the financing aspects of government.

The general conclusion is that the means of government financing matter more for economic growth than do government spending, as the role of government expenditure for growth is generally insignificant. The signs and levels of expenditure variable coefficients are similar for both industrialized and developing countries, the only exception being the significant complementary effects between public and private investment that is found in the group of developed countries. However, even though there appears to be no systematic relationship between expenditure and growth, the role of good governance may still be important. One must keep in mind that other objectives besides promoting economic growth, such as e.g. redistribution of income and infrastructure maintenance, may lead governments to maintain high levels of expenditure.

Looking at the role of government financing, capital revenue, seigniorage and the government budget surplus are significant determinants of economic growth. These results seem to be driven by differences between the two groups of countries. Worth noting is that seigniorage is a negative determinant of growth in the developing

countries, while it plays no role in the industrialized countries. The same holds true for the average government budget surplus, but with the opposite sign of the coefficient.

Studying only the developing countries, the coefficient for foreign aid is negative. This result is most likely a consequence of reverse causality due to the underlying fact that unrequited transfers are generally given to capital constrained economies experiencing low growth. In view of the "Heavily Indebted Poor Country Debt Initiative", recently announced by the World Bank and the International Monetary Fund, it is somewhat surprising to find that only the level of indebtedness but not the debt service to export ratio seems to be significantly related to growth in the analysis. With the above results at hand, the policy implications for the developing countries are first and foremost to reduce the amount of external debt, try to balance the budget and not to turn to the printing presses when government funding is scarce.

Economic reforms and the poor

Chapter three analyses how economic reforms affect different income groups in the economy. Particular focus is placed on the effects of World Bank supported adjustment lending.

As an extension of earlier research, the effects of specific reform variables are evaluated. Increasing the degree of openness, raising the level of investment and lowering the rate of inflation are policies that are often included in structural adjustment programs, and that appear to raise the income levels of the poor significantly. One must, however, keep in mind that structural reforms may also aim at reducing government consumption, which affects the income levels of the poorest quintile negatively.

Looking at the separate income groups, openness has the largest impact on the poorest income group with lower but similar effects on all the higher income quintiles. This implies that although increasing openness will raise income for all income groups, relative income inequality may actually fall. The coefficient for government consumption is larger for the first quintile than for the second, indicating that a reduction in government consumption may increase income inequality. The coefficient for inflation is highest for the middle income group with slightly lower effects on the second and fourth quintiles. The investment variable also has its largest impact in the third income group with falling effects both with higher and lower incomes.

Despite the heavy criticism of World Bank supported structural adjustment, World Bank financed reforms *per se* appear to have contributed to higher than predicted income levels for all groups in society, including the poorest quintile. Moreover, the effect of World Bank support appears to benefit the poorer quintiles more than the rich, which may contribute to a reduction of the income inequality. Hence, some allegations against World Bank reforms are not supported by the empirical evidence.

Structural reforms and private investment

The rules of thumb for investment decisions are strongly contingent on the amount of information available about the future. Hence, the level of uncertainty prevailing in the economy will be an important determinant for private investment. A government that initiates structural reform makes a statement of a new course of action.

In chapter four, the primary concern is how the design of structural reforms influences private investment behavior. It is clear that the reform process can differ in

several dimensions and these dimensions are referred to as scope, speed and magnitude. Magnitude and scope of the reform process are found to be particularly important for the private investment response.

Focusing on the specific reform components, actions such as devaluing the real exchange rate and keeping down the level of inflation play a significant role for determining private investment growth during structural reform. Surprisingly, reducing the current account deficit does not prove to be a prerequisite for increasing private investment. On the contrary, a liberalization of the trade sector, which may increase imports and it turn increase the current account deficit, may still be perceived as a success by the private sector and thus improve credibility. The main point is, of course, that these imports are used productively.

Looking at the scope of reforms, an all-encompassing reform with policy components from different categories encourages private investment growth in the sample of reforming countries. Moreover, support from the World Bank, measured by the size of the loan amount, is of importance for investment growth. Previous economic recovery loans also contribute to broad economic rehabilitation, as predicted by e.g. Rodrik (1989a). Surprisingly, the speed of reform does not seem to have a significant effect on private investment. This may, however, be due to contradicting effects of some observations with big bang reforms, where high speed is important and other observations with gradually implemented reforms, where a lower speed is preferred.

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Growth and Government: Is There a Difference between Developed and Developing Countries?*

Tove Strauss**

Abstract: We examine the role of government for growth in 64 industrialized and developing countries, considering both expenditure and financing aspects of government. Recognizing that there are differences between the two country groups leading to severe heteroskedasticity, we use weighted least squared estimations. The general conclusion is that the means of financing matters more for growth than do government spending. We find that seigniorage and budget surplus are important for growth in LDCs but not in industrialized countries, while capital revenue matters only in the latter group. Moreover, the level of indebtedness is a negative determinant of growth in LDCs.

JEL: C210; E620; H540; H630; O400

Key words: Growth, Government, Public expenditure, Public financing.

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1. Introduction

Government is controversial. The role of government for economic growth has been widely discussed in economic literature, particularly in the early 1990s. The "East Asian miracles" were referred to as examples of what has been called "good governance" (although the recent Asian crisis has challenged this), while several governments in Sub-Saharan Africa have appeared to be counter-productive in their efforts to foster long-term development. The purpose of this paper is to examine if there are systematic differences between industrialized countries (that have managed to grow rich) and developing countries that often suffer from low levels of public infrastructure and have little or no access to domestic capital. In what follows, we will study the relations between growth and total government expenditure, government consumption expenditure and public investment. The recent resurgence in the debate about debt relief for the most severely indebted countries (the Heavily Indebted Poor Country Debt Initiative) motivates a discussion of the role of government financing for growth.[1]

Actions taken by the government are often assumed to have considerable effects on macroeconomic performance. For instance, the composition and credibility of government policies may influence private capital formation and the rate of growth in the economy. The level of public expenditure may have external effects on private investment and may also affect the long run growth rate. There exists a rich empirical literature on the effects of public expenditure on growth. The existing studies, however, give quite contradictory results for different types of public expenditures. Some studies, e.g. Ashauer (1989), Baffes and Shah (1993) and Shah (1992) find a

growth enhancing role of public expenditure, while other, such as Kormendi and Meguire (1985) and Levine and Renelt (1992), find the opposite, namely that public expenditure reduces the rate of growth. It may also be the case that even though government spending has a positive impact on growth by enhancing the marginal productivity of private capital, this effect may be offset by the negative effect of distortionary taxation.[2]

This paper adds a novelty to earlier research by explicitly comparing developing and industrialized countries, correcting for heteroskedasticity between the two groups using the method of weighted least square analysis (WLS), and by including both disaggregated expenditure and financing measures of government activity in the regression analysis. The role of government for growth is of particular interest in countries undergoing structural adjustment where government expenditure is often drastically reduced while the role of the private sector is still not well defined.

The paper is organized as follows. The second section provides a theoretical discussion of the role of government for growth, using the framework of the Barro (1990) model. In the third section, results from previous empirical studies are briefly presented. The analysis of the effects of government expenditure on growth is undertaken in the fourth section, while the analysis of the effects of government financing on growth is undertaken in section five. The role of aid and indebtedness for growth in developing countries is investigated in section six some conclusions are given in the seventh and final section of the paper.

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[1] See the Economist (1996) and the IMF (1996).
[2] See e.g. Barro (1990).

2. Theoretical framework

The standard neoclassical and new growth models make up the framework for empirical analysis in this paper. Using Barro-type growth regressions, these models posit that the growth rate in any given time period is determined by two categories of variables: initial values of a set of state variables and a set of environmental or control variables.[3] The resulting growth function can be summarized as:

$$\dot{y}_t = F(\mathbf{s}_{t-1}, \mathbf{e}_t), \tag{1}$$

where $\dot{y}_t$ is the per capita GDP growth rate, $\mathbf{s}_{t-1}$ is a vector of state variables and $\mathbf{e}_t$ is a vector of environmental and control variables. $\mathbf{s}_{t-1}$ consists of variables such as the stock of physical and human capital, while $\mathbf{e}_t$ consists of variables such as government activity, population growth and private investment. While the environmental and control variables determine the steady-state level of per capita output in the economy, the state variables determine the speed of convergence towards the steady state.

In order to investigate the relations between public and private capital, the analysis in this paper relies on the work by Barro (1990). Barro presents a simple model of endogenous growth, where the interaction between private and public capital is elegantly captured. The model predicts the influences on growth from imbalances between private and public capital. Public capital is in this model interpreted as a measure of public services provided in the economy.[4] Public services are considered inputs to private production and it is this complementarity between public and private

[3] The so-called Barro-type regressions were first presented in Barro (1991).

[4] In the formal model it is not clear whether the variable public capital should be interpreted as a stock or a flow variable (i.e. investment, or even incorporating consumption). In the empirical analysis that follows, data availability only permits analysis of the effects of flow data.

capital that creates a potentially positive linkage between government services and growth in the model. The point of including public capital as a separate argument of the production function is that private inputs are not always close substitutes for public inputs and in many developing countries user charges have proven difficult for private producers to implement.[5] The government therefore has a role to play as a provider of certain goods, as argued by Devarajan *et al.* (1996).

One drawback of the Barro (1990) model is the assumption that government spending is financed through income taxes, requiring a budget balance in each period. A model better suited for the empirical analysis of particularly developing countries would give room for alternative ways of public financing and relax the assumption of Ricardian equivalence. [6] [7] The government's ability to tax the domestic population is often limited in poor countries where consumption is already at or near subsistence levels. Thus, when households are facing increased taxes, they will have to reduce savings, which in turn will lower growth of private capital. Furthermore, tax administration may be inefficient. It follows that international public borrowing, as a means of financing investments, has often been the only viable alternative. Several authors have found a significant negative effect of the external debt to GDP ratio on private investment, providing support for debt overhang effects.[8] As the purpose of this paper is not to build and estimate a full-scale structural model of economic growth in developing countries, various Barro-type regression models are used to

[5] Consider e.g. public services such as national defense and the maintenance of law and order.

[6] Greiner, Semmler and Gong (1997) make such an attempt.

[7] The Ricardian Equivalence Theorem states that, for any given path of government consumption, households do not change their consumption path in response to a change in the timing of taxes. More specifically, a decrease (increase) in government savings, corresponding to an increase in government debt, is perceived as an indication of higher (lower) future taxes to finance future repayments of the debt, and hence of higher (lower) need for individual savings in the present. If Ricardian equivalence holds perfectly, changes in government savings will therefore be fully offset by changes in private savings, leaving aggregate national savings unchanged.

illustrate the empirical relation between government activity and growth, while permitting the means of public financing to take other forms than income taxation.

One alternative form of financing is public borrowing, which can be of two kinds: the government can borrow domestically, or it can borrow on the international market (Barro, 1974, 1989).[9] Following the traditional arguments of crowding out, with imperfect capital markets domestic public borrowing may raise domestic interest rates. Moreover, international public borrowing is often of importance for developing countries with a small tax base and inefficient tax collection. However, increased public indebtedness will reduce the overall solvency of a particular country. Increasing costs of borrowing imply an increasing future tax burden, which may inhibit private investment (debt overhang) and reduce growth.

A third alternative mean of financing is capital revenue through the sales of non-financial capital assets. A fourth alternative is non-tax revenues such as fees and other charges and a fifth option for developing countries is, of course, the receipt of unrequited transfers such as official grants.[10] The separate effects of these financing variables on growth will be investigated in the empirical analysis that follows.

The following identity describes the financing of government expenditure in the economy:

$$G_t = T_t + B_t + CR_t + NT_t + A_t, \qquad (2)$$

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[8] Agénor and Montiel (1996), p. 86, mention several studies of debt overhang effects.

[9] Assuming that Ricardian equivalence holds, public borrowing will lead to precautionary saving and will not affect growth. However, as noted earlier, precautionary saving may be impossible if consumption is already at a subsistence level. Moreover, without perfect capital markets, Ricardian equivalence does not necessarily hold.

[10] Seigniorage, which in the short-run may finance government spending, is one type of non-tax revenue. This has been used by some developing countries with severely negative consequences. Particularly, the resulting uncertainty may be detrimental for long-run growth rates.

where G_t is public capital, T_t are taxes collected in the economy, B_t is public borrowing and the use of reserves, CR_t is capital revenue, NT_t is non-tax revenue in the public sector and A_t are official grants.[11]

3. Previous empirical findings

The empirical literature on the effects of government on growth is vast but inconclusive. Most of the literature has covered both industrialized and developing countries, while focusing on the expenditure side of government activity. Few studies cover the effects of government financing comprehensively and the methodologies used in the different analyses also vary between authors. This study builds on previous empirical work on the effects of government on growth that is presented below. However, none of these articles focus on what this paper intends to capture, namely how the role of government differs between developing and developed economies while considering both the effects of government expenditure and government financing.[12]

In an early influential article, Kormendi and Meguire (1985) examine cross-sectional relations between economic growth and a number of macroeconomic variables in 47 countries. The study covers the period between 1950 and 1977 and uses data mainly from the International Finance Statistics (IFS). In the regression analysis, the explanatory variables are entered independently and linearly, testing whether specific variables motivated by standard macroeconomic hypotheses are related to economic growth. Their main findings of interest for the present study is

[11] In the empirical analysis that follows, public capital, G_t, is the equivalent of public expenditure, which incorporates both government consumption and government investment.

[12] Devarajan *et al.* (1996) make an attempt to capture how the role of government expenditure differs between developed and developing countries.

that growth of money supply is a positive and significant determinant of real GDP growth,[13] while the variability of monetary shocks is a substantial negative determinant of growth. Worth noting is also that the authors found no evidence that growth of government consumption would have an adverse effect on economic growth.

Barro (1991) investigates the determination of economic growth in a cross-section of countries. The study includes 98 countries and covers the period 1960-1985, using data mainly from the Summers and Heston database (Penn WT 5.6). Just like in Kormendi and Meguire (1985), the explanatory variables are entered independently and linearly. Although the study's main focus is on the role of convergence and human capital, some government-related variables are also included in the analysis. Growth of real per capita GDP is found to be negatively related to government consumption but there is no significant impact of public investment on growth.[14]

Yet another important article is written by Levine and Renelt (1992). Using the method of extreme bound analysis (EBA), the authors examine whether the conclusions of a wide range of growth studies are robust or fragile to small changes in the conditioning information set. Following Kormendi and Meguire (1985), the explanatory variables are entered independently and linearly in the cross-section growth regression analysis. Their study covers 119 countries over the period 1960-1989 using both IFS and Summers and Heston data. Among the variables included in the study are several proxies for government activity, such as government

[13] If Brazil is dropped from the sample the coefficient is insignificant, as postulated by the theory of monetary neutrality.

[14] Whenever government-related variables are introduced, the sample is reduced to 76 countries and only covers the period 1970-1985.

expenditure, government consumption, government budget surplus, inflationary financing and tax revenue. Although negative and significant in some estimations, neither total government expenditure nor government consumption prove to be robust determinants of per capita GDP growth. The government budget surplus is a positive and significant determinant of growth but also turns out to be sensitive to the conditioning set of information in the regression analyses.

Easterly and Rebelo (1993) investigate the effects of fiscal policy on per capita GDP growth in cross-section as well as pooled cross-section regression analyses.[15] The purpose of their article is to provide a comprehensive summary of the statistical relation between fiscal policy variables, the level of development and the rate of growth. The study covers a data set of about 100 countries for the period between 1970-1988 using data from Summers and Heston, IFS and the Government Finance Statistics (GFS).

Among the fiscal policy variables included in their study are government the budget surplus, aggregated as well as disaggregated measures of government revenue, and aggregated as well as disaggregated measures of government expenditure. The main findings of relevance for this study are that most fiscal variables are not significantly related to economic growth. Moreover, the results depend heavily on the control variables included in the regression analyses. In their sample, there is also a serious problem of multicollinearity, where the fiscal variables are highly correlated with initial income and among themselves. Nevertheless, public investment in transport and communication turns out to be a positive and the only robust determinant of growth.

[15] Decade averages of all variables are used in the pooled regressions.

Devarajan *et al.* (1996) investigate how a change in the composition of government expenditure may affect economic growth. Using panel data with five-year forward-moving averages, the analysis covers 43 developing countries from 1970 to 1990 using data from the GFS and the IFS. Their main findings are that, when controlling for total government expenditure, current public expenditure has a positive effect on economic growth, while the relation between the capital component of public expenditure and growth is negative in their sample of only developing countries.[16] This result stands in sharp contrast to the findings of previous studies that cover both industrialized and developing countries. However, for a sample of 21 industrialized countries, both variables change sign.

From the above, it can be concluded that the empirical evidence concerning the impact on growth of most forms of public spending has so far been ambiguous. Evidence by Baffes and Shah (1993), Devarajan *et al.* (1996) and Diamond (1989) also shows that the impact of government spending may be contingent on what the government spends its resources on.

4. The analysis

The focus of the analysis in this paper is on less developed countries (LDCs). There is reason to believe that the role of government in such countries may differ from that in the developed countries (DCs), where allocation mechanisms for private capital are more efficient. Hence, in the regression analysis that follows, we will investigate whether the role of government for growth is significantly different in the industrialized and the developing countries. A list of the countries included is

[16] In Devarajan *et al.* (1996) current and capital expenditure are expressed in shares of total government expenditure rather than in shares of GDP. Total government expenditure is expressed as a share of GDP and the coefficient is insignificant for the sample of developing countries.

presented in Appendix 1. Unlike earlier studies, we also correct for severe heteroskedasticity between the two groups using WLS and we consider both expenditure as well as financing aspects of the government.

The regression analysis examines the impact on growth of several variables measuring government activity and the financing of such activities will be investigated. Government activity is measured along several disaggregated dimensions, such as total government expenditure, government consumption expenditure, public investment and the interaction between public and private investment. External public borrowing, capital revenue, official grants, taxation, non-tax revenue and a change in the monetary base measure government financing.[17] A more detailed description of the data is presented in Appendix 2.

In order to investigate whether developing countries in fact differ from developed countries, in Table 1, a few variables of interest for economic growth have been compared for the two groups. The two independent samples are tested for differences between the population means, using the Students t-test. The bold numbers distinguish cases where the means are different between the two groups at the ten per cent level of significance. Looking at Table 1, it appears that all the selected variables except the budget surplus differ between the two groups of countries.

Now, does the government play a different role for growth in countries that are poor and capital constrained? Through a systematic disaggregation of government expenditure and financing variables this paper will, given the available data, analyze

[17] Optimally, disaggregated data on domestic public borrowing, expenditure on defense and education, public enterprise investment and general government investment would have been incorporated in the analysis. Due to lack of data for these variables, however, they have not been included.

the role of government for growth in 21 developed and 43 developing countries between 1970 and 1992, following the structure of Levine and Renelt (1992).[18]

The method of analysis

In the regression analysis, like in many other cross-country growth regressions, the explanatory variables are primarily entered independently and linearly:[19]

$$\dot{Y} = \beta_i \mathbf{I} + \beta_m \mathbf{M} + \beta_z \mathbf{Z} + u, \qquad (3)$$

where $\dot{Y}$ is the per capita rate of GDP growth, **I** is a set of base regressors (the conditioning set of information), **M** are the government-related variables of particular interest, and **Z** is a subset of control variables measuring government deficit financing.

In the analysis, the dependent variable, $\dot{Y}$, is measured as the average annual growth rate of per capita GDP (GYP). Proxies for four variables identified in earlier studies as important determinants for economic growth were used as the conditioning set of information (the **I**-variables). The four variables are: average total investment share of GDP (INV), the natural logarithm of per capita real GDP in 1970 (LNY70), the average annual rate of population growth (POP), and the average years of secondary schooling in the population above 25 years of age (SYR). Using the log form of the initial per capita GDP, the coefficient of this variable represents the rate of convergence to the steady state.[20] Standard economic theory predicts the sign of the

[18] It should be noted that there might be a problem of selection bias in the sample of LDCs, due to the lack of data for many of the developing countries. This selection bias would tilt the results toward positive effects of government if it were the case that only well-managed economies could provide data.

[19] This method is based on the work of Kormendi and Meguire (1985) as well as of Levine and Renelt (1992).

[20] The coefficient for initial per capita income is often used to test the convergence hypothesis (i.e. that poor countries tend to grow faster than richer countries, ceteris paribus).

coefficients for the investment and human capital variables to be positive, while the coefficients for initial income and population growth should be negative (Barro and Sala-i-Martin, 1995).

The role of government

Having thus characterized the basic set-up, focus turns to the role of government. A number of separate **M**-variables are included to examine the effects of government on growth in the regression analysis.[21] The **M**-variables measuring government activity are: total government expenditure (TEXP), government consumption expenditure (CUREXP), public investment (CAPEXP) and the combined effect of private and public investment (PRIVPUB). Capital revenue (CAPREV), current revenue (CURREV), tax revenue (TAX), non-tax revenue (NTAX) and seigniorage (SEIG) measure means of financing these activities.[22] All variables except seigniorage are expressed as period average shares of GDP. Seigniorage is measured as the average yearly growth rate of the monetary base. A list of all variables included in the analysis is presented in Appendix 3. A correlation matrix for the variables included in the subsequent regression analysis is presented in Table 2 below.

As mentioned earlier, the problem of simultaneity for this set of **M**-variables is potentially serious.[23] Although there are ways of addressing this problem, none are particularly successful. One alternative is to estimate the regressions with the two

[21] Cross-section growth regressions like these are often subject to criticism for endogeneity (simultaneity) of the explanatory policy variables. Measures of government activity are particularly sensitive to this type of criticism as it can easily be argued that government expenditure as well as financing are policy variables that are altered in direct response to the rate of growth in the economy. The issue of simultaneity will be further discussed below.

[22] The influence of official grants (AID), the level of indebtedness (DEBT) and the debt service ratio (DSR) on economic growth will be investigated separately for the developing countries.

[23] For an extensive discussion of the problems of simultaneity, see Kelly (1997).

stage least square method (2SLS), using instruments for the explanatory government-related variables. Such instruments could e.g. be initial or lagged values of these variables. However, this method severely reduces the total number of observations in the sample, as there is severe lack of data in the early 1970s. In addition, data for a single year may be less reliable than a period average. Moreover, when using lagged values as instruments, the estimation period must be split in half. As a result, the length of the cross-section growth period is severely shortened and the importance of the government-related variables is substantially reduced as the amount of short-term noise in the regression analysis increases.[24] Most importantly though, the use of initial or lagged values as instruments fails to capture the contribution of these variables over the estimation period, which is the main purpose of this study. Consequently, this study, like many other cross-section studies in the literature, uses data for government-related variables averaged over the relevant study period, however, bearing in mind the potential problems involved.[25]

Since the original sample includes both industrialized and developing countries, all preliminary regression have been checked for heteroskedasticity, using the Goldfeld-Quant test.[26] As heteroskedasticity between the two groups proves to be a

[24] The optimal length of a period measuring economic growth is disputed among macroeconomists. Barro and Sala-i-Marin (1995) argue that 15 years is a suitable minimum. When instruments are used in weighted 2SLS regressions for the period 1981-92, the adjusted R-squared falls and the level of significance for all government-related variables is altered either upwards or downwards, when compared to WLS estimates for the same period. Comparing the estimates of the weighted 2SLS regressions with the period 1970-92 WLS estimates, the adjusted R-squared is always much higher in the WLS regression and the same holds true for most of the government-related variables.

[25] See e.g. Barro (1991), Easterly and Rebelo (1993), Kelly (1997), Levine and Renelt (1992) and Nelson and Singh (1994). The only exception referred to in this paper is Devarajan *et al.* (1996).

[26] The Goldfeld-Quant test is a more powerful test than White's test for groupwise heteroskedasticity that is normally used in least square regression analysis. See Greene (1993).

serious problem, the regression equations are estimated using WLS.[27] Furthermore, using the same weights, dummy variable regressions (DVR) with dummies for both groups are estimated in order to investigate if the role of government differs between DCs and LDCs. Although the Goldfeld-Quant method is clearly superior to White's method of correcting for heteroskedasticity in this case, it has not been used in any of the aforementioned studies. Thus, there may be reason to question the accuracy of earlier results for studies covering both sets of countries.[28]

Total government expenditure (TEXP)

In order to investigate the role of general government activity for growth, a variable measuring total government expenditure is introduced as the first **M**-variable along with the four **I**-variables and one **Z**-variables measuring government budget surplus (GSUR).[29] The regression results are presented in Table 3. All the **I**- and **Z**-variables are significant at the ten per cent level with the predicted signs in regression equation 1.[30]

The **M**-variable is equivalent to the sum of government consumption and government investment. As argued by Levine and Renelt (1992), an aggregate measure of government activity will not capture potentially important implications of

[27] Groupwise estimated variances are used as weights. In addition, all weighted regressions are also corrected for heteroskedasticity using White's method whenever called for.

[28] Comparing the results of OLS and WLS regression analysis, the WLS increases the adjusted R-squared markedly. Moreover, the WLS method clearly affects the level of significance for all government-related variables, some upwards and some downwards.

[29] As total government expenditure incorporates public investment, private investment is entered in regression equations 1-3 as an **I**-variable, in order to avoid multicollinearity. Optimally, control variables for all types of government financing should be included, but due to problems of multicollinearity, this is not feasible. Instead, we think of GSUR as a source of error between spending and financing of government activities.

[30] Contrary to the findings of Levine and Renelt (1992), the coefficient for population growth is significantly negative in our analysis. This result may stem from the fact that population growth is a serious problem in many developing countries, where population growth rates are generally considerably higher than in the industrialized world. It should also be noted that the causality between growth and investment is still under debate. See e.g. Barro and Sala-i-Martin (1995), Blomström, Lipsey and Zejan (1996) and Levine and Renelt (1992).

how expenditures are allocated. Government expenditure involves public services as well as bureaucracy. Hence, total government expenditure may not only be a measure of public goods, but also of public "bads", i.e. unproductive public expenditure. Subsequently, there is no prior regarding the sign of the coefficient for total government expenditure. Moreover, since total government expenditure is highly correlated with total government revenue, it is almost impossible to distinguish the effects of the two separate variables in the regression analysis.[31]

Contradicting the findings of Levine and Renelt (1992), TEXP does not turn out to be a significant determinant of growth. There may be two possible reasons for this result. One is that the level of government expenditure simply does not matter for growth. Another is that the two separate components of total government expenditure, namely capital and current expenditure, may have off setting effects on the rate of growth in the economy. Looking at the dummy variable regression, TEXP remains an insignificant explanatory variable of economic growth in both LDCs and DCs.

Government spending - what matters?

Evidence from earlier empirical studies suggest that the impact of government spending has often been contingent on what the government spends its resources on (Baffes and Shah, 1993, Devarajan *et al.*, 1996 and Diamond 1989). Hence, in regression equation 2, total government expenditure is disaggregated into its two components, current expenditure and capital expenditure.

[31] The correlation coefficient between the two variables is 0.93. The effects of e.g. taxes necessary to support government spending may distort incentives and reduce efficient resource allocation (Kormendi and Meguire, 1985).

Government consumption (CUREXP)

Government consumption is not expected to have any direct effect on private productivity, while it may lower both savings and growth through the indirect effect of increased distortionary taxation (Barro, 1991). Just like in Kormendi and Meguire (1985), the relation between growth and government consumption in regression equation 2 is insignificant. The reason behind this is presumably the effect of nonproductive government consumption expenditure, such as oversized and inefficient government administrations as well as distortionary subsidies, which are particularly prominent in many developing countries. In contrast to the work of Barro (1991) and Barro and Sala-i-Martin (1995), expenditure for defense and non-capital outlays for education, which they expect to be positive determinants of growth, have not been subtracted in this study due to subsequent loss of data. In the dummy variable regression, government consumption remains to be an insignificant determinant of growth in both subgroups.

Government investment (CAPEXP)

Following the predictions of the Barro (1990) model, public investment is expected to be a positive determinant of growth. Public investment is, however, not a significant determinant of growth in regression equation 2, confirming the findings of the empirical analysis in e.g. Barro (1991) and Levine and Renelt (1993). In the dummy variable regression, the impact of public investment remains insignificant in both subgroups. This result contradicts the findings of Devarajan et al. (1996), who find the coefficient to be significant and negative in LDCs but significant and positive in DCs.

Interaction effects (PRIVPUB)

Reasoning along the lines of Barro (1990), we will now investigate if the complementary relationship between public and private capital has any consequences for growth. The Barro (1990) model predicts that government services will crowd in private investment and raise growth. This relation should be of particular importance in the LDCs, where the government generally plays a larger role in the process of capital formation than in the industrialized countries (Agénor and Montiel, 1996).

However, it should be remembered that different types of public investment are likely to have different implications both for the accumulation of private capital and for growth. As public investment in many developing countries does not only include basic infrastructure projects but also commercial and industrial projects of large parastatals, public investment may compete with private firms and crowd out private investment, using scarce resources that would otherwise be available to the private sector.[32] This may lead to higher interest rates, credit rationing and a higher future tax burden (Oshikoya, 1994 and Servén, 1996).

In order to study the possible interaction effect between public and private investment, a new regressor is constructed by multiplying the private and public investment variables. This new variable (PRIVPUB) is included separately in regression equation 3. However, in the presence of severe multicollinearity between private investment and the new interaction term, the coefficient for the interaction effect as well as for the two investment variables are insignificant in the regression analysis. Thus, looking at all countries, little can be said about the possibility of an underlying complementarity between public and private investment. In the dummy

[32] Looking at the size of the coefficients in regression equation 2, it is clear that private investment has a larger impact on growth than does public investment.

variable regression, however, the new variable becomes a significant positive determinant of growth in the developed countries, indicating that there are in fact complementary effects between public and private investment in this subset of countries. The coefficient for public investment by itself also becomes significant, but with a negative sign. These results indicate that private investment is needed in order for the negative effect of public investment not to dominate.

In sum, we find that all but one of the aggregate or disaggregated measures of government expenditure have no systematic significant effects on growth rates in either industrialized or developing countries. The only significant effect we are able to find is the negative effect of capital expenditure in DCs, when controlling for the complementary effect of private investment.

Public financing

In the above analysis of the effects of government expenditure on growth, one important factor has not been discussed explicitly, namely, the means of financing. How a government chooses to finance its activities may have significant consequences for growth. If the means of financing are costly, a positive effect of public expenditure may be outweighed by the negative effect of its financing. In this section, the effect on the rate of growth of different measures of government revenue will be analyzed, while again controlling for government deficit financing.

The purpose here is not to investigate what factors determine government expenditure. Rather, government expenditure and their means of financing are taken as given. The objective is to determine whether the means of financing government expenditure have systematic implications for growth. The role of the debt service to export ratio (DSR), as well as the level of indebtedness as a share of GDP (DEBT) will also be investigated for the LDCs. Optimally, a variable measuring domestic

public debt should be included in the analysis, but due to lack of data it has not been possible to construct this variable.

As in the previous section, four **I**-variables: INV, LNY70, POP and SYR, are included in all regressions. In addition, total government is disaggregated into two components: current revenue (CURREV) and capital revenue (CAPREV).[33] In a second stage, current revenue is disaggregated into its two components: taxation (TAX) and non-tax revenue (NTAX). Later, the amount of seigniorage (SEIG) measured by the growth rate of the monetary base is entered as a separate regressor.[34] These variables are introduced as the new **M**-variables in the regression analysis. The variable measuring government deficit financing (GSUR) is again included as a control variable (**Z**-variable). A correlation matrix for the revenue variables is presented in Table 4 and the regression results are presented in Table 5.

Capital revenue (CAPREV)

Capital revenue includes payments or receipts for the acquisition, construction or sale of non-financial assets (IMF, 1986). The coefficient is expected to be positive as the sale of government assets in many countries particularly involves the sale of inefficient state enterprises that are counterproductive to economic growth. Disaggregating total government revenue into its two separate components, current and capital revenue, capital revenue turns out to be a positive and significant determinant of economic growth in regression equation 4. This result confirms the finding of Easterly and Rebelo (1993). Somewhat surprisingly, in the dummy variable

[33] Total government revenue is not introduced as a separate regressor due to its high correlation with total government expenditure.

[34] Seigniorage actually constitutes a part of non-tax revenues but cannot be easily disaggregated. However, due to the low correlation between the two variables, they are entered simultaneously in the regression analysis.

regression, capital revenue is only a significant and positive determinant of growth in the group of industrialized countries.

Current revenue (CURREV)

Current revenue consists of both tax and non-tax revenue. As the effect of taxes on growth are expected to be negative, while the effect of non-taxes is inconclusive (see below), the sign of the coefficient of current revenue is also inconclusive. Perhaps then not so surprisingly, the coefficient for CURREV is insignificant in regression equation 4. The coefficient remains insignificant for both country groups in the dummy variable regression. Moreover, since current revenue is perfectly correlated with total government revenue, it is impossible to distinguish the effects of the two separate variables in the regression analysis.[35]

Tax revenue (TAX)

Due to the distortionary effects of most types of taxation, the effect of total tax revenue on growth is expected to be negative. However, the results in regression equation 5 indicate that the coefficient for tax revenue is not a significant determinant of growth. This result confirms the findings of Easterly and Rebelo (1993), where only one out of thirteen different tax rate variables included in their analysis has a significant coefficient.[36] Looking at the dummy variable regression, the tax variable remains insignificant for both developed and developing countries. One possible explanation behind these results may be that although taxes are distortionary, only relatively successful countries are able to raise significant tax revenues. Moreover, tax

[35] The correlation coefficient between total government revenue and current revenue is 1.00. Moreover, the correlation coefficient between current revenue and total government expenditure is 0.93.

[36] Easterly and Rebelo find that marginal income tax is a significant negative determinant of growth. However, data on income taxation is not sufficient for this sample to include it as a

Continued on next page...

collection is often inefficient in developing countries. Hence, the amount of taxes collected may be too small to have significant distortionary effects on the rate of growth in the economy.

Non-tax revenue (NTAX)

Non-tax revenue includes requited receipts such as e.g. property income, fees and charges, current private donations, seigniorage profits and non-industrial and incidental sales.[37] As the variable consists of many different components, theory gives no clear indication about the sign of the effect of this variable on growth. Moreover, non-tax revenue is generally small in this sample of countries.[38] However, contradicting the findings of Easterly and Rebelo (1993), non-tax revenue turns out to be an insignificant determinant of growth in regression equation 5. In the dummy variable regression, the non-tax variable remains insignificant for both groups.

Seigniorage (SEIG)

Seigniorage is used as a proxy for government financing through the printing presses. Relying on the theory of monetary neutrality, economic growth will not be affected by the anticipated growth of money supply. However, the variability of money supply may increases the level of uncertainty in the economy, with negative implications for economic growth. Confirming the findings of Kormendi and Meguire (1985) and Nelson and Singh (1994) but contradicting the findings of Levine and Renelt (1992), seigniorage is a significant negative determinant of growth in regression equation 6.[39] In the dummy variable regression, the coefficient for

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separate regressor. The authors do not report a coefficient for the effect of a variable including all taxes, comparable to TAX.

[37] For a detailed description of non-tax revenue components, see IMF (1986) pp. 125-9.

[38] On average, non-tax revenue makes up about 15 per cent of total government revenue.

[39] The authors of the mentioned studies use money supply growth (Kormendi and Meguire) and the inflation rate (Nelson and Singh and Levine and Renelt) as the explanatory variable.

seigniorage turns out to be negative and significant only for the group of developing countries. This finding is perhaps not so surprising, as the concept of government financing through the printing presses is a much more common and widespread problem in the LDCs than in the industrialized countries.

Government budget surplus (GSUR)

Government deficit financing through borrowing or the use of reserves has been a common phenomenon in many countries, particularly in the LDCs. The amount of publicly guaranteed debt outstanding clearly affects a government's solvency and in turn its borrowing conditions. As the amount of debt grows, creditors will naturally request shorter maturities or debt indexation due to the increasing risk of default (Giavazzi and Pagano, 1990 and Alesina et al., 1990). Whether public borrowing actually affects the rate of growth or not should depend on whether Ricardian equivalence holds (Barro, 1989). It can, however, easily be argued that Ricardian equivalence does *not* hold perfectly in most LDCs, as capital markets are often underdeveloped. Under these conditions, an increase in the public debt may affect the returns to public expenditure. A common argument has been that when public expenditure is financed through public borrowing on the international market, an increase in the cost of borrowing will increase future taxes and lower growth in the private capital stock.[40]

The relation between the government budget surplus (GSUR) as a share of GDP and growth is positive and significant in regression equations 1 and 2, confirming the arguments made above as well as the findings of Easterly and Rebelo (1993). In the dummy variable regressions it is a positive and robust determinant of growth for the

[40] This effect is particularly important if consumption is already at subsistence level.

LDCs, while it is insignificant for the group of industrialized countries in all the regression equations. Moreover, the coefficient for the government budget surplus in the group of LDCs is significantly different from the coefficient for the DCs in regression equations 3. These results stands in contrast to the findings of Nelson and Singh (1994), who, somewhat surprisingly, do not find government budget deficit to be a significant determinant of growth in their sample only of developing countries.

Besides the argument that Ricardian equivalence does not hold in LDCs, it should be noted that another possible explanation might just be reverse causation; low growth rates may force poor countries to run budget deficits and borrow on the international market. Hence, it is perhaps not a budget deficit or increasing indebtedness that reduces the rate of growth, it may be low growth that forces countries to increase their borrowing.

In sum, we find that capital revenue is a robust and positive determinant of economic growth when all countries are included in the sample. However, the effect seems to be driven by the industrialized countries as the significant effect vanishes for the LDCs when the sample is split between the two groups. Seigniorage, on the other hand, is a negative and significant determinant of growth for the entire sample, but here the effect appears to be driven by the LDCs. The effect on economic growth of running a budget surplus is in general important. However, the result is driven by the LDCs where the coefficient is positive and robust, whereas it is never significant for the industrialized countries.

Public financing in developing countries

In this section, the effects of aid and public debt on economic growth will be analyzed, still controlling for government deficit financing. The regression analysis will be limited to only the developing countries for two separate reasons. One is that

the aid and debt data from the World Bank is limited to LDCs and the other is that the problems with high indebtedness and aid dependency are concentrated to this particular group of countries.

Foreign aid (AID), Grants (GRANT) and Technical assistance (TA)

Many developing countries receive substantial amounts of foreign aid to finance government expenditure. The impact of foreign aid on growth has recently been the focus of studies by e.g. Boone (1995) and of Burnside and Dollar (1996).[41] In the present study, foreign aid is measured as the average share of official grants to GNP (AID), i.e. *not* including concessional lending. Official grants consist of two separate components, namely regular official grants and technical assistance grants. A correlation matrix for the new variables is presented in Table 6.

The effect on growth of unrequited transfers such as official grants is expected to be positive. Hence, *ceteris paribus*, countries that finance government expenditure with foreign assistance instead of with taxes that bring about distortionary effects are expected to grow faster. The relation between growth and AID is, however, significantly negative in regression equation 8. This result is most likely a consequence of reverse causality, because unrequited transfers are generally given to capital constrained economies suffering low growth. Hence, a potential positive effect of aid on growth may not be detected using this method of cross-section regression. The regression results are presented in Table 7.

The two separate components of AID are separated into regular grants (GRANT) and technical assistance (TA) in regression equation 9. The coefficient for

[41] Boone finds no significant correlation between foreign aid and the rate of growth in developing countries, while Burnside and Dollar find foreign aid to be a positive determinant of growth when accompanied by sound fiscal, monetary and trade policies.

GRANT remains negative and significant determinant of growth, while the coefficient for TA turns out to be insignificant.

Public indebtedness (DEBT)

During the debt crisis in the early 1980s, many heavily indebted developing countries experienced severely reduced levels of economic growth and the overwhelming proportion of the external debt outstanding was publicly owed (Agénor and Montiel, 1996).[42] In many developing countries, parastatal companies are common. When these companies borrow on the international market, the debt is frequently guaranteed by the government, so called publicly guaranteed debt, increasing the overall debt burden of the country.

A variable measuring the average level of external indebtedness to GNP (DEBT) is introduced in regression equation 10. Confirming the argumentation above, the relation between the level of indebtedness and growth is negative and significant.

Debt service ratio (DSR)

In the light of many years of discussing the importance of debt reductions for the capital constrained developing countries, it is of obvious interest to examine whether the burden of external debt has an effect on the rate of growth in LDCs. A high debt service ratio is often argued to be a major constraint for these countries. In regression equation 11, a variable measuring the average debt service to export ratio (DSR) is introduced, with an expected negative effect on growth. However, the coefficient for this variable proves to be insignificant. As debt forgiveness has often been a measure taken to alleviate the foreign currency constraint for developing

[42] For most developing countries, the ratio of external public debt to GDP has generally been considerably higher than the ratio of domestic public debt to GDP.

countries, this finding is quite surprising. In this sample of 38 developing countries, all but six benefited from debt forgiveness at one point or another.

Summarizing, we find that aid and the disaggregated measures of aid all are significantly but negatively related to economic growth in developing countries. However, the causality of this relationship must be seriously disputed. Moreover, we find that the level of indebtedness also puts a strain on economic growth, while the debt service ratio does not affect growth significantly.

5. Interpretation of results and conclusions

The purpose of this paper has been to analyze how the role of government for growth in developing countries differs from that in industrialized countries. Because allocation mechanisms for private capital are assumed to be less efficient in LDCs, there is reason to believe that the role of government is different. This study has tested the significance of variables identified as possible determinants of growth in previous empirical literature. It is distinguished from earlier literature inasmuch as it focuses on the differences between the two groups of countries and because it considers both the expenditure as well as the financing aspects of government.

Unlike the earlier literature, we use the method of weighted least square (WLS) in order to control for the severe heteroskedasticity between the two groups. Strong effects on the estimation results emphasize the importance of correcting for groupwise heteroskedasticity. Hence, it is clear that the method of estimation (whether it is OLS, WLS, 2SLS or pooled regressions etc.) matters a lot for the estimation results. When comparing the findings of this study to earlier literature, the results also prove sensitive to the conditioning set of information, a fact that has already been pointed out by both Levine and Renelt (1992) and Easterly and Rebelo (1993).

The general conclusion of this paper is that the means of government financing matter more for economic growth than do government spending, as the role of government expenditure for growth is generally insignificant. The signs and levels of expenditure variable coefficients are similar for both industrialized and developing countries, the only exception being the significant complementary effects between public and private investment that is found in the group of developed countries. However, even though there appears to be no systematic relationship between expenditure and growth, the role of good governance may still be important. One must keep in mind that other objectives besides promoting economic growth, such as e.g. redistribution of income and infrastructure maintenance, may lead governments to maintain high levels of expenditure.

Looking at the role of government financing, capital revenue, seigniorage and the government budget surplus are significant determinants of economic growth. These results seem to be driven by differences between the two groups of countries. Capital revenue proves to be a significant positive determinant of growth in industrialized countries, while it does not play an important role in the LDCs.[43] Seigniorage, on the other hand, is a negative determinant of growth in the developing countries, while it plays no role in the industrialized countries. Moreover, the coefficient for the average government budget surplus is positive and robust in the LDCs, but insignificant in all regressions for the industrialized group of countries.

Studying only the LDCs, we find that the coefficient for foreign aid is negative. This result is most likely a consequence of reverse causality due to the underlying fact that unrequited transfers are generally given to capital constrained economies

[43] Average capital revenue is slightly higher in the industrialized countries, although the figures are not statistically different.

experiencing low growth. In view of the "Heavily Indebted Poor Country Debt Initiative", recently announced by the World Bank and the International Monetary Fund, it is somewhat surprising to find that only the level of indebtedness but not the debt service ratio seems to be significantly related to growth in the analysis. With the above results at hand, the policy implications for the developing countries are first and foremost to reduce the amount of external debt, try to balance the budget and not to turn to the printing presses when government funding is scarce.

Corruption is another government-related factor that may affect growth and government efficiency in developing countries. The level of corruption varies widely between LDCs, ranging from countries like the former Zaire where the president's personal assets could barely be distinguished from the government's, to countries like Chile where corruption supposedly is as low as in Denmark.[44] In a study of the effects of corruption on growth, Mauro (1995) finds that corruption is a robust negative determinant of investment, which in turn has negative implications for the rate of growth in the economy.[45] Other government-related factors that have been argued to be of importance for growth are the extent to which institutions provide effectively for the implementation of laws (the rule of law), political stability, political rights, civil liberties, revolutions and coups, assassinations, peace, repudiation of contracts,

[44] Countries are classified by their level of corruption in an index published by the Business International Corporation.

[45] For the countries included in this study, Mauro's data cover only 26 out of the 43 LDCs. Hence, it is not possible to investigate whether Mauro's measures of corruption would interact with the

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quality of bureaucracy and the risk of expropriation (Barro and Sala-i-Martin, 1995, Knack and Keefer, 1995 and Mauro, 1995). How these variables interact with government activity in this sample of countries is an issue for further research.

traditional government-related variables included in the analysis of this paper without substantially reducing the sample.

Appendix 1. List of countries.

LDCs[46]
Argentina
Bolivia
Brazil
Cameroon
Chile
Colombia
Costa Rica
Cyprus*
Dominican Rep
El Salvador
Guatemala
Guyana
Haiti
Honduras
Hungary
India
Iran
Israel*
Korea*
Lesotho
Malaysia
Malta
Mauritius
Mexico
Myanmar*
Nicaragua
Pakistan
Panama
Paraguay
Peru
Poland
Romania
Rwanda
South Africa*
Sri Lanka
Thailand
Trinidad & Tobago
Tunisia
Turkey
Uruguay
Venezuela
Zambia
Zimbabwe

DCs
Australia
Austria
Belgium
Canada
Denmark
Finland
France
Germany
Greece
Iceland
Ireland
Japan
Netherlands
Norway
Portugal
Singapore
Spain
Sweden
Switzerland
United Kingdom
United States

[46] Countries marked with an asterisk are not included in the separate analysis of the effects of aid and debt on economic growth.

Appendix 2.

Data for the empirical analysis have been collected mainly from the International Finance Statistics (IFS) and the Government Finance Statistics (GFS). The GFS includes data on central government expenditure and revenue. Only for a small set of countries does the GFS provide data of the local government equivalents. However, incorporating both central and local government data for the smaller set of countries, Devarajan *et al.* (1996) as well as Kelly (1997) have tested for differences in estimation results but found the results to be similar between the two data sets.

The data analysis covers developed and developing countries that are available from the two databases between 1970 and 1992. The former Soviet Union, the new republics of the former Soviet Union and the former Yugoslavia are excluded from the analysis. Colonies as well as newly independent countries are also excluded.

Three other major databases were used in the analysis. The Global Development Finance (GDF) includes information on debt, grants and technical assistance. The Penn World Tables (PWT5.6) include data on economic growth and population growth and the Barro and Lee database includes information on secondary education. Economic growth has been calculated as growth in real per capita GDP, where per capita income is real per capita GDP in constant 1985 international prices (Chain Index).

Appendix 3.

List of variables incorporated in the analysis.

AID	Average level of official grants as a share of GNP (including technical assistance). WDI
CAPEXP	Average government investment as a share of GDP. GFS
CAPREV	Average capital revenue as a share of GDP. GFS
CUREXP	Average government consumption expenditure as a share of GDP. GFS
CURREV	Average current revenue as a share of GDP. GFS
DSR	Average debt service as a share of exports. GDF
GRANT	Average level of official grants as a share of GNP (excluding technical assistance). WDI
GSUR	Average government budget surplus as a share of GDP. IFS
GYP	Average annual growth rate of per capita real GDP. Penn WT 5.6
INDEBT	Average level of indebtedness as a share of GNP. GDF
INV	Average total investment share of GDP. IFS
LNY70	Initial level of the natural logarithm of per capita real GDP (1970). Penn WT 5.6
NTAX	Average non-tax revenue as a share of GDP. GFS
POP	Average annual rate of population growth. Penn WT 5.6
PRIV	Average private investment as a share of GDP. IFS
PRIVPUB	Multiplicative interaction term of PRIV and PUBI. IFS and GFS
SEIG	Average annual rate of change in the monetary base as a share of the monetary base. IFS
SYR	Average years of secondary schooling in the total population above 25 years of age. Barro and Lee
TA	Average technical assistance as a share of GNP. WDI
TAX	Average tax revenue as a share of GDP. GFS
TEXP	Average total government expenditure as a share of GDP. GFS
TREV	Average total government revenue as a share of GDP. GFS

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Table 1. Cross-country variable averages, 1970-92.

Variable	LDCs	DCs	t-value prob.
Private investment/GDP	0.17	0.21	**0.00**
Years of secondary schooling 1970	0.58	1.59	**0.00**
Population growth	2.10	0.66	**0.00**
Budget deficit/GDP	-0.05	-0.03	0.12
Government consumption/GDP	0.21	0.30	**0.00**
Public investment/GDP	0.05	0.03	**0.00**
Tax revenue/GDP	0.18	0.27	**0.00**

Table 2. Correlation coefficients for expenditure variables.

	PRIV	SYR	LNY	POP	GSUR	TEXP	CAPEXP	CUREXP	PRIVPUB
PRIV	1.00	0.26	0.28	-0.33	0.06	0.10	-0.11	0.14	0.34
SYR		1.00	0.69	-0.49	0.06	0.18	-0.38	0.30	-0.26
LNY			1.00	-0.60	0.16	0.28	-0.40	0.41	-0.34
POP				1.00	-0.16	-0.44	0.14	-0.51	0.03
GSUR					1.00	-0.34	-0.28	-0.28	-0.26
TEXP						1.00	0.35	0.97	0.34
CAPEXP							1.00	0.10	0.86
CUREXP								1.00	0.13
PRIVPUB									1.00

Table 3. WLS regression results for expenditure variables, 1970-92. Dependent variable: GYP.

Variable category	Regression/Variable	1	1 (DVR)		2	2 (DVR)		3	3 (DVR)	
		All countries	LDCs	DCs	All countries	LDCs	DCs	All countries	LDCs	DCs
	Constant	11.45	9.16	25.57	10.76	8.58	28.16	10.94	8.34	17.31
		(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.02)
I-variables										
	LNY70	-1.51	-1.33	-2.82	-1.43	-1.28	-3.07	-1.26	-1.55	-1.61
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)
	POP	-0.77	-0.55	-0.06	-0.78	-0.53	0.00	-0.74	-0.50	0.27
		(0.00)	(0.08)	(0.88)	(0.00)	(0.10)	(1.00)	(0.00)	(0.12)	(0.48)
	SYR	0.37	1.28	0.33	0.39	1.43	0.31	0.32	1.63	-0.02
		(0.07)	(0.12)	(0.12)	(0.06)	(0.09)	(0.17)	(0.13)	(0.06)	(0.91)
	PRIV	19.25	20.54	8.51	19.04	20.64	8.00	10.44	32.95	-6.42
		(0.00)	(0.00)	(0.06)	(0.00)	(0.00)	(0.08)	(0.12)	(0.00)	(0.33)
M-variables										
	TEXP	1.86	0.72	0.21						
		(0.24)	(0.74)	(0.91)						
	CUREXP				1.49	-0.19	0.55	1.12	-0.23	1.56
					(0.39)	(0.94)	(0.77)	(0.51)	(0.93)	(0.33)
	CAPEXP				6.30	5.88	-9.65	-28.43	38.65	-131.46
					(0.43)	(0.46)	(0.57)	(0.36)	(0.15)	(0.01)
	PRIVPUB							205.76	-195.18	645.97
								(0.26)	(0.20)	(0.01)
Z-variable										
	GSUR	9.16	16.87	8.88	9.40	17.12	9.08	7.88	16.84	-5.05
		(0.04)	(0.00)	(0.17)	(0.04)	(0.00)	(0.17)	(0.18)	(0.00)	(0.51)
	Adj. R^2	0.76	0.84		0.75	0.83		0.80	0.88	
	N obs	64	64		64	64		64	64	

Figures in parenthesis are t-statistic probabilities (i.e. the level of significance).

Table 4. Correlation coefficients for financing variables.

	INV	LNY	SYR	POP	GSUR	TREV	CAPREV	CURREV	TAX	NTAX	SEIG
INV	1.00	0.03	0.03	-0.22	-0.10	0.29	0.30	0.28	0.22	0.24	-0.13
LNY		1.00	0.69	-0.60	0.16	0.39	-0.06	0.39	0.48	-0.08	-0.05
SYR			1.00	-0.49	0.06	0.24	-0.01	0.24	0.31	-0.06	-0.08
POP				1.00	-0.16	-0.56	-0.01	-0.56	-0.59	-0.10	0.23
GSUR					1.00	-0.05	0.15	-0.06	-0.12	0.12	-0.14
TREV						1.00	0.07	1.00	0.93	0.47	-0.17
CAPREV							1.00	0.04	-0.06	0.26	0.08
CURREV								1.00	0.93	0.46	-0.17
TAX									1.00	0.11	-0.16
NTAX										1.00	-0.07
SEIG											1.00

Table 5. WLS regression results for financing variables, 1970-92. Dependent variable: GYP.

Variable category	Regression/Variable	4	4 (DVR)		5	5 (DVR)		6	6 (DVR)	
		All countries	LDCs	DCs	All countries	LDCs	DCs	All countries	LDCs	DCs
	Constant	9.02	7.93	12.16	8.99	7.75	11.75	8.30	6.28	10.39
		(0.00)	(0.02)	(0.17)	(0.00)	(0.03)	(0.24)	(0.00)	(0.04)	(0.35)
I-variables										
	INV	12.17	17.02	8.72	12.19	16.83	8.68	11.50	16.16	9.11
		(0.00)	(0.00)	(0.04)	(0.00)	(0.00)	(0.05)	(0.00)	(0.00)	(0.05)
	LNY70	-1.04	-1.17	-1.36	-1.04	-1.14	-1.31	-0.93	-0.90	-1.19
		(0.00)	(0.01)	(0.13)	(0.00)	(0.01)	(0.22)	(0.01)	(0.03)	(0.31)
	POP	-0.93	-0.53	-0.14	-0.93	-0.53	-0.15	-0.80	-0.45	-0.22
		(0.00)	(0.12)	(0.72)	(0.00)	(0.13)	(0.71)	(0.00)	(0.15)	(0.64)
	SYR	0.31	1.78	0.12	0.32	1.78	0.11	0.25	1.94	0.14
		(0.08)	(0.03)	(0.59)	(0.10)	(0.04)	(0.71)	(0.17)	(0.01)	(0.65)
M-variables										
	CAPREV	89.93	82.65	89.77	88.87	69.53	89.28	92.05	151.15	102.12
		(0.00)	(0.45)	(0.06)	(0.00)	(0.54)	(0.08)	(0.00)	(0.15)	(0.12)
	CURREV	-0.51	-1.95	-0.38						
		(0.70)	(0.50)	(0.80)						
	TAX				-0.57	-2.86	-0.66	-0.89	-4.04	-0.46
					(0.72)	(0.41)	(0.80)	(0.59)	(0.19)	(0.87)
	NTAX				-0.34	1.38	0.99	0.01	-0.30	-0.99
					(0.93)	(0.81)	(0.94)	(1.00)	(0.95)	(0.95)
	SEIG							-0.00	-0.00	0.01
								(0.00)	(0.00)	(0.73)
Z-variable										
	GSUR	3.58	18.51	-5.65	3.87	17.78	-6.32	4.01	15.93	-7.61
		(0.59)	(0.00)	(0.58)	(0.50)	(0.00)	(0.60)	(0.61)	(0.00)	(0.56)
	Adj. R^2	0.80	0.85	0.79		0.84		0.77	0.83	
	N obs	64	64	64		64		64	64	

Figures in parenthesis are t-statistic probabilities (i.e. the level of significance).

Table 6. Correlation coefficients for developing countries.

	GSUR	GRANT	AID	DEBT	TA	TREV
GSUR	1.00	-0.48	-0.42	-0.62	-0.34	0.00
GRANT		1.00	0.98	0.61	0.85	0.08
AID			1.00	0.52	0.92	0.01
DEBT				1.00	0.29	0.12
TA					1.00	-0.09
TREV						1.00

Economic Reforms and the Poor*

Tove Strauss**

Abstract: This paper analyzes the effects of economic reform for different income groups. Our interest is spurred by the international debate on the social consequences of reforms and the potential adverse effects on poverty in particular. We find that the poor are in general positively affected by inflationary control, structural reforms and trade reforms, while reducing government consumption affect the poorest income quintile negatively. In countries having undertaken World Bank financed reforms actual income of the poor was higher than predicted. Moreover, as the impact of reforms was strongest on the poor, World Bank support appears to reduce income inequality.

JEL: C230; E650; O110; O150; O190

Key words: Economic reform, Income distribution, Poverty, Structural adjustment, the World Bank

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1. Introduction

A wave of structural adjustment programs followed after the Latin American debt crisis in the early 1980s. Since then, many African and Asian countries have experienced a similar process of crisis followed by structural adjustment, and many still are. Although the individual country experiences differ in many respects, the background stories appear to have much in common. Typically, large increases in public expenditure resulted in fiscal deficits. The ensuing gaps had to be closed by foreign borrowing, which in turn rendered the economies vulnerable. Exogenous shocks, such as deterioration in the terms of trade or sharply raised interest rates, subsequently precipitated serious external and internal imbalances.[1]

Against this background, it is evident that some form of external crisis lies behind the implementation of most structural adjustment programs. The immediate objective of such programs has been to address unsustainable balance of payments situations. In the longer run, however, the programs also address issues related to investment and growth, since external balances can only be maintained by sustained economic recovery.

The purpose of this paper is to analyze how structural adjustment programs affect different income groups in the economy. Our interest in this issue is spurred by the international debate on social consequences of reform and the potential adverse effects on poverty in particular.[2] The reduction of government expenditure is often one of the most important aspects of the structural adjustment process, with

[1] In recent years, a new wave of reform programs has been undertaken under somewhat different circumstances. Several of the former communist countries of Eastern and Central Europe have undertaken structural reforms in their transition from centrally planned economies to more market oriented systems.

[2] See e.g. Jayarajah *et al.* (1996), Mohamed and Hassan (1997) and World Bank (1990).

potentially harsh implications for the well being of the poor. Can reforms that imply laying off government employees, eliminating subsidies on staple foods and increasing real interest rates increase poverty, while still improving overall per capita GDP levels? Or does the implementation of sound macroeconomic policies favor the poor through increasing real wages, increasing employment opportunities and improved access to capital markets? Particularly, we are interested in the effects of World Bank supported adjustment lending that has been taking place in many developing countries since the early 1980s. In our analysis, we will investigate whether these World Bank financed reforms have affected the different income groups in the reforming countries any differently from similar types of reforms in other countries.

Unlike some earlier research, our primary interest does not lie in how reforms affect relative poverty, i.e. income distribution. Moreover, we are not interested in how reforms affect the rate of growth in the economy *per se*. Rather, we are interested in how economic policies affect absolute poverty, i.e. the level of per capita income of the poorest population groups, over time. The paper primarily adds to earlier research in that it analyzes the effects of reforms on different income levels through a systematic regression analysis using panel data for 55 countries, enabling an analysis of the effects of reforms in both industrialized and developing countries.

The paper is organized as follows. In the second section we begin by describing the key characteristics of World Bank supported adjustment programs for developing countries. In the third section, we look at earlier research on poverty reduction and income inequality. The regression analysis is presented in section four, an analysis of World Bank supported reforms is conducted in section five and our conclusions are presented in the sixth and final section of the paper.

2. World Bank supported structural adjustment

The first World Bank supported adjustment loan was signed in early 1980 and lending reached its peak in the fiscal year of 1988 when adjustment lending constituted almost 25 per cent of the World Bank's total lending (Thomas and Chhibber, 1989). The objective of structural adjustment lending is to provide support for member countries experiencing serious balance of payments difficulties, or countries faced in the years ahead with the prospect of unmanageable deficits arising from external factors not likely to be easily or quickly reduced (Wright, 1980). A developing country has been shown to be more likely to take on a structural adjustment loan if it is highly indebted, when its current account deficit and debt to GDP ratio have increased and its terms of trade has deteriorated (Corbo and Rojas, 1992).

In order to qualify for World Bank supported adjustment lending, a country must be willing to adopt appropriate changes in its policies and programs. Primarily, this means reducing the current account deficit to a level corresponding to the amount of external capital that is available on a regular basis, without straining its debt servicing capacity. The measures taken mainly fall into four categories: mobilization of domestic resources, improving the efficiency of resource allocation and use by the public sector; reform of the structure of economic incentives, and institutional strengthening (Michalopoulos, 1987).

Although neither the contents nor the form of structural adjustment programs are guided by a preconceived model, most of the programs supported by the World Bank typically include measures such as trade policy reform, exchange rate reform, debt management, fiscal restructuring, financial sector development, institutional strengthening, public enterprise restructuring, specific sector policies and anti-poverty

policies (Landell-Mills, 1981 and Thomas and Chhibber, 1989). Countries such as the Republic of Korea and Turkey that adopted a series of reforms over time and stuck with them, are typical examples of successful World Bank supported reforms during the 1980s. Less successful reforms were experienced in e.g. Bolivia, Guyana and Senegal in the early 1980s. Their reform attempts were often characterized by policy reversals and the direction and purpose of reform was confused and uncertain (Michalopoulos, 1987).

Several different studies have examined the effects of structural adjustment on the macroeconomy during the 1980s, although relatively less attention has been paid to the aspect of poverty. For instance, Thomas and Chhibber (1989) study the success of structural adjustment in 30 countries that have received adjustment loans from the World Bank. Experience shows that adjustment programs have generally been more easily sustained when countries adjust quickly to shocks and maintain sound policies over the long term. The negative effects of structural adjustment on growth, employment and poverty have been short-lived and domestic supply has responded quickly to policy changes. The programs have been adequately financed, fully backed by the government and viewed by the general public as necessary. In a similar study of 51 countries, McCleary (1989) finds that policy changes have been implemented quite successfully with regard to exchange rate management, energy policy, agricultural pricing, financial sector reforms and the rationalization of public expenditure programs. Implementation has, however, been less successful for industrial policies, tax reforms and some aspects of public enterprise reforms.

In a study of 220 separate structural adjustment loans financed by the World Bank, Dollar and Svensson (1998) find that the success or failure of structural adjustment is to a large extent determined by a small number of political economy

variables such as ethnic fractionalization, government crisis, democracy and government time in power. Variables under World Bank control such as resources devoted to project preparation and supervision or number of loan conditions appear to have no influence on the success or failure of the adjustment program.

In a study of the effects of structural adjustment on private investment, Strauss (1998) finds that while political economy factors seem to have no effect on the private investment response in reforming countries, the magnitude and scope of reforms are important positive explanatory variables. Reducing the rate of inflation and devaluing the real exchange rate prove to be significant determinants of private investment in a sample of 56 World Bank financed adjustment loans. Johansson (1998) also finds that financial sector reforms, reform scope, the time aspect of structural change and public institutional reforms are important determinants of successful adjustment when she looks at the response of foreign direct investment for 99 structural adjustment loans financed by the World Bank.

3. Earlier research on poverty reduction and income inequality

A few authors have made attempts at investigating the relation between structural adjustment and poverty reduction. For instance, in a recent study by Jayarajah *et al.* (1996), it is found that sound macroeconomic policies in reforming countries have generally favored growth and poverty reduction in the period between 1980 and 1993.[3] In their comparative study, 23 out of the 53 World Bank supported adjusting countries had sufficient poverty data available for reliable before and after

[3] Macroeconomic policies were classified into three groups: internal balance, resource balance and external balance.

comparisons.[4] The authors found that about two thirds of these adjusters implemented sound policies and as a consequence experienced both improved growth rates and reduced poverty in the post-adjustment period. Using ordinary least square regression analysis on cross-section data, effects on growth of macroeconomic policy performance for fiscal, monetary and exchange rate policies were evaluated. Successful stabilization signaled that the government had both the commitment and the ability to sustain economic reforms.

In a comparative case study of the effects of adjustment on poverty in six African countries, Demery and Squire (1996) also demonstrate that poverty was more likely to decline in those countries that improved their macroeconomic balances, than in those that did not.[5] The study uses data from household surveys for the six countries at two points in time during the 1980s and the 1990s, spanning between three to eight years for the different countries. Macroeconomic policy performance is evaluated using a weighted index constructed by the World Bank (1994), where macroeconomic policies such as fiscal, monetary and exchange rate policies are combined into a single index.[6]

The authors show that the link from adjustment to poverty goes through economic growth; countries that showed commitment to adjustment efforts grew

[4] The authors use four different poverty lines (the headcount index (HDI), the poverty gap index, the squared poverty gap index and a PPP adjusted poverty line) in testing the sensitivity of the poverty estimates to the choice of poverty lines. A relevant adjustment period was selected for each country, generally ranging from the beginning of the first loan to a year after the final disbursement. The pre-adjustment period ranges from 1970 until the year before the adjustment period, while the post-adjustment period ranges from the year after the adjustment period until 1990. See Jayarajah and Branson (1995).

[5] Poverty is here measured by the HDI, i.e. the share of the population below a predetermined poverty line. The same poverty line is not used in all countries, as the focus of the study is not to compare levels of poverty between countries, but rather changes in poverty within countries.

[6] The use as well as construction of this index has, however, been heavily criticized for its methodological and analytical shortcomings by Weeks (1997).

faster and in turn also experienced declining levels of poverty.[7] In particular, depreciating the real effective exchange rate proved an important instrument as it benefited the poor both directly and indirectly. However, the authors make a particular note of the fact that the poorest of the poor have not always benefited from recent growth.

A few other interesting studies look at how income distribution is affected by variables such as growth and other macroeconomic variables. Deininger and Squire (1998) use two new data sets to examine the links between growth and income inequality. The new data sets include information on the distribution of land as a proxy for the distribution of assets for 103 countries, and data on income inequality that meets minimum quality standards for 108 countries between 1960 and 1992.[8] Using cross section as well as panel data regression analyses, Deininger and Squire find no robust effect of initial income distribution on subsequent economic growth. However, initial inequality in the distribution of land significantly lowers subsequent economic growth.

Looking at growth determinants for different income quintiles, the authors find that initial land inequality is an important negative determinant of income growth for the poor, but not for the rich. Furthermore, investment is a positive and significant determinant for all income groups, where the poor benefit the most. They are, however, unable to ascertain robust and consistent effects of either schooling, black market premium or financial development on income growth for specific quintiles and conclude that these major policy variables do not have any independent effects on the poor. As the effects of changes in aggregate investment prove to be stronger than

[7] The authors do not use the tools of formal regression analysis.

[8] These minimum quality standards are described in detail in Deininger and Squire (1996).

those of changes in the land Gini coefficient, a policy conclusion that emerges is that accumulation of new assets is more important for reducing poverty than efforts to redistribute existing assets.

Using the new data sets on Gini indices and land distributions from Deininger and Squire (1996) for 49 countries between 1947 and 1994, Li *et al.* (1997) find support for the arguments that political freedom and capital market liberalization explain intertemporal and international variations in income inequality. In their panel regression analysis, the authors also find that capital market deepening, political freedom and secondary education are all positive significant explanatory variables of the income levels of both the poor and the rich. Moreover, they find that the initial land Gini coefficient is a negative significant determinant of the income level of the poor.

Xu and Zou (1997) investigate explanatory variables behind the changes in income distribution in 29 Chinese provinces between 1985 and 1995. In their panel data regression analysis, they find that inequality as well as the income share of the rich increased with the reduction in the share of state owned enterprises, higher inflation and growth rates and the increasing extent of foreign trade, while the opposite was true for the income share of the poor.

4. Analysis

We will in this paper use the tools of panel data regression analysis to analyze the effects of reforms on different income groups. As our sample of countries not only includes World Bank financed adjusters, we are able to compare the effects of particular reforms between both specific World Bank adjusters and others.

Method

As our method of analysis, we employ a cross-country framework in which we relate countries' changes in income levels for each population quintile to changes in economic policy over time. We estimate a regression equation based on this framework for all countries and time periods for which data are available.

There are several advantages to using panel data analysis compared to cross section or time series analysis (Baltagi, 1995, Easterly *et al.*, 1997 and Hsiao, 1986). First, the question we are asking is a dynamic question: how did income levels change when policies were altered during reforms? Second, as the variables of interest change significantly over time, using time series provide a considerable wealth of information ignored in cross-sectional averages. Third, panel data give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency than cross section or time series data. Fourth, we are able to control for individual heterogeneity as the use of panel data allows us to control for both time specific and country specific effects.

We use five-year averages of our data in the regression analysis. Compared to using a shorter time period, we achieve a more balanced panel, as the yearly data on quintile income shares are fairly limited and unevenly distributed over time. Moreover, for the reform variables included in the analysis, short-run fluctuations can be reduced and we are allowed to focus on the more important structural relationships in the economy. Using a longer time period, say of ten years, we would on the other hand loose many degrees of freedom and not be able to capture policy changes during the adjustment periods.

For each estimate of population quintile income levels, we first run ordinary least square (OLS) regressions where all coefficients are constant and the disturbance is assumed to capture differences over time and countries, then one-way fixed effect

(FE) and one-way random effect (RE) models where slope coefficients are constant and the intercept varies over countries, and finally two-way FE and two-way RE models where slope coefficients are constant and the intercept varies over time and countries. In the FE models, the intercepts are assumed to be fixed like in a dummy variable model. In the RE models, the intercepts are assumed to be random leading to an error component model.[9] In order to determine what model best captures the effects of reforms on the different income levels, we examine the standard F-test, the Hausman chi-squared statistics and the Breusch and Pagan's Lagrange multiplier statistics. Only the results of the preferred models are reported in the paper. The results of the models that are statistically inferior are available from the author upon request.

The data

The data used in the analysis of this paper are drawn from the data set on income distribution prepared by Deininger and Squire (1996), only including observations with households or individuals as units of observation.[10] The data are based on representative samples covering all of the population as well as on comprehensive coverage of different income sources and population groups. Following recent literature, we compute the average income of the different population quintiles by multiplying real per capita GDP from Penn World Tables (PWT 5.6) with the quintile income share data from Deininger and Squire (1996).[11] This renders the average income of each quintile as a share of the total population.

[9] For a more detailed description of panel data regression models, see Baltagi (1995), Hsiao (1986) or Judge *et al.* (1984).

[10] In order to minimize the problem of different methods being used in the original calculation of the indices, wherever needed, the authors have recalculated the Gini indices and the quintile shares using the computational tool POVCAL. See Deininger and Squire (1996).

[11] See e.g. Deininger and Squire (1998) and Li *et al.* (1997).

Hence, in order to get the average per capita income of each separate quintile, we must multiply this figure by five. The study covers the period between 1966 and 1992 and includes 55 countries.[12] In our calculations, we use only data classified by Deininger and Squire (1996) as "high quality" data.

The raw data on quintile shares from Deininger and Squire (1996) suffer from a few inconsistencies as income shares are measured either in gross income, net income or expenditure, and the units of observation are either households or individuals. How the data classifications are distributed is described in Table 1.[13] What definitions are used could potentially affect our measure of income per capita in each quintile. Hence, in the regression analysis of the different income quintiles we will introduce three separate dummy variables to account for income, gross income and household data respectively. Distinguishing between income distribution gross or net of taxes may be of little relevance for a majority of the countries, i.e. the developing countries, where the role of redistributive taxes is quite low. However, whether individual or household data are used may well have a significant impact on our results.

As discussed in section two, World Bank financed structural adjustment reforms typically focus on policy variables such as inflation, interest rate, exchange rate etc. Although far from all countries covered by this study have undertaken World Bank supported programs, these policy variables are typically believed to have strong effects on macroeconomic performance in all countries. We will use proxies for the most common structural reforms as explanatory variables in the formal regression analysis presented in section four.

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[12] Figures for the last five year period are restricted by the lack of per capita GDP data from the PWT 5.6 after 1992.

[13] Each observation is a five year average estimate containing no data inconsistencies among the separate data points.

The data on policy variables are primarily the data collected by Easterly *et al.* (1997). For the countries and time periods not included in their data base, we have supplemented with data from the original sources of their data base. All original data sources are presented in the Appendix.

The income sample means and the standard deviations for the different quintiles in industrialized and developing countries for the period 1966-70 and 1990-92 respectively are presented in Table 2. The number of observations per country varies between one and six. As our sample includes both industrialized and developing countries, unlike Jayarajah et al. (1996), we are able to make comparisons of the effects of similar reforms in both groups.

Income determinants

As mentioned earlier, the net effect of economic reforms on the income levels of the poor have been much debated in the literature. While poor rural producers tend to benefit from agricultural, trade and exchange rate reforms and from a demonopolization of important commercial activities, poor consumers, on the other hand, tend to be hurt by rising food prices as price controls are abolished (World Bank, 1994). However, a reduction in the rate of inflation should directly benefit the poor as real wages will not be eroded over time.

In attempts to balance the government budget, subsidies that directly benefit the poor are often eliminated or drastically reduced. Many adjustment programs have arguably not paid enough attention to poverty reduction and ensuring adequate provision of services to the poor. As a consequence, social cost have begun to rise (Mohamed and Hassan, 1997). Cutting spending on public health care, education, sanitation and water supply may lead to further deterioration of already low standards.

Moreover, layoffs of government employees may add to the number of poor people as many become unemployed.

We focus our analysis on the explicit effects of economic policy on income levels.[14] As for the various dimensions of economic reform, we follow Easterly *et al.* (1997) in our choice of variables. To measure macroeconomic stabilization, we use the average annual rate of inflation as well as the rate of government consumption to GDP. Our indicator of financial reform is the traditional measure of financial deepening, i.e. the average ratio of broad money (M2) to GDP. Reform of the external sector encompasses both trade reform and liberalization of the foreign exchange market, which are measured by the average trade share of GDP and the average black market premium respectively. A variable capturing "other structural reforms", such as e.g. privatization of public enterprises and liberalization of the foreign direct investment regime is also included, measured by the average rate of investment to GDP.[15]

Easterly *et al.* (1997) think of the investment variable as capturing the effects on income through the investment channel of all reforms, including those already in the equation. However, as the correlation coefficients between investment and the other policy variables are quite low in this sample, this is most likely not a serious issue. See Table 3. Following the arguments of Easterly *et al.* (1997) investment could

[14] It could be argued that level values of traditional economic growth determinants (e.g. secondary education, population growth and terms of trade shocks), may also affect per capita income levels. However, it is hard to find theoretical arguments for introducing the levels of terms of trade or population as explanatory variables of income levels, leaving only the level of secondary education as a potential explanatory variable. This variable does, however, turn out to be insignificant in the regression analysis, most likely due to its lack of variance over time.

[15] Total investment is the sum of public and private investment, where private investment may be endogenous to the reform process itself. A better measure of reform would be the share of public investment to GDP. Due to lack of data for this variable before 1970, it has not been included in our analysis as the sample would be reduced considerably.

also be capturing the effects of reforms that are difficult to quantify and are not included in the regression.[16]

As the objective of most economic reforms is to raise overall per capita income levels rather than to redistribute income between different groups in society, this paper analyzes the effects of reforms on income *levels* and not on income distribution. Therefore, we will also be using level values of our policy variables. Sound macroeconomic policy does not require any changes in these variables. Hence, looking at the *changes* in policies *per se* the way they are calculated in Easterly *et al.* (1997) is not the purpose of this paper.

We estimate the following log-linear regression model:[17]

$$INC_{jit} = \alpha + \beta_1 OPEN_{it-1} + \beta_2 GC_{it-1} + \beta_3 INF_{it-1} + \beta_4 M2_{it-1} + \beta_5 INV_{it-1} +$$

$$\beta_6 BMP_{it-1} + I_{it} + H_{it} + G_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

where *INC* is the log of the income level of the *j*:th population quintile in country *i* at time *t*, *OPEN* is the log of the trade share, *GC* is the log of the government consumption share, *INF* is the log of the inflation rate, *M2* is the log of financial deepening, *INV* is the log of total investment and *BMP* is the log of the black market premium.[18] *I* is a dummy for income data, *H* is a dummy for household data, *G* is a dummy for gross income data. ϕ is the country specific effect, λ is the time specific effect and ε is the error term. As we believe that reforms generally do not affect the

[16] However, the investment variable could also be affected by exogenous factors unrelated to reform, so that one could miscalculate the effects on income levels associated with reform when investment is introduced as a reform variable.

[17] The foremost reason we have chosen the log-linear rather than the linear model specification is that the log-linear model specification allows for easier comparisons between variable coefficients.

[18] For some countries, the black market premium is zero. Instead of excluding these observations from the analysis, we assign the logged value to –1000.

level of income instantaneously, we have lagged all measures of economic policy one period.[19] A correlation matrix for all logged policy variables is presented in Table 3.

We expect the effects of liberalizing the foreign exchange market, measured by the black market premium, to be an indication of market imperfections (such as lack of goods and foreign exchange) with negative effects for all income groups. The effects of trade reforms and macroeconomic stabilization, measured by openness and government consumption respectively, are ambiguous. Presumably, the effect of openness should benefit all potential exporters and consumers, rich as well as poor. To the extent that trade licenses and quotas are used, these may have a tendency to benefit the rich and powerful at the expense of the poor (Xu and Zou, 1997). The effect of government consumption on the poor should be positive, alleviating poverty through public spending on subsidies and health care etc, although the effect on the richer part of the population, i.e. the higher tax payers, could be negative.[20] From previous studies, we know that financial deepening usually has positive effects on the poor as well as the rich (Li *et al.*, 1997). We have also seen that inflation has a negative impact on the income of the poor, eroding real wages, while it may have a positive effect on the rich (Xu and Zou, 1997). However, high levels of inflation increase the amount of uncertainty in the economy which may reduce private investment and income levels for all groups in society. The effect of other structural reforms, measured by total investment, is expected to be positive for all income groups.

[19] We have experimented with other lag structures (no lags as well as two lags) but the above model specification has the highest explanatory power.

[20] That government consumption may have a negative effect on overall economic growth has been found in several empirical studies. See e.g. Barro (1991), Easterly and Rebelo (1993) and Levine and Renelt (1992).

Results

We estimate separate regressions for the income levels of each population quintile. See Table 4. For all population quintiles, we find consistent evidence of both country and time specific effects. In all regressions, the country and time specific effects are correlated with the included explanatory variables and hence, the two-way FE models are the most appropriate. Moreover, all three dummy variables are significant in one income group or another. Hence, the dummy variables are included as control variables in all separate regressions.

We find that *openness* has a positive and significant impact on all separate income groups. This finding contradicts the results of Xu and Zou (1997), where Chinese trade reforms tend to benefit only the rich at the expense of the poor.

Government consumption is a positive and significant determinant of income for the poorest two income quintile as expected but has no significant effect on the other income groups.

The *level of inflation* is a negative and significant determinant of income in all but the poorest and the richest two quintiles.[21] This finding again contradicts the result of Xu and Zou (1997), who find inflation to be a positive determinant of the income share of the rich in China.

M2 is not a significant determinant of income in any of the five separate income groups. These results contradict the findings of Li *et al.* (1997), who use the same variable in their analysis and find that it is a positive and significant income determinant for the rich as well as for the poor. However, Deininger and Squire

[21] The reason that inflation does not affect the income level of the poorest quintile may be that this particular group does not always participate in the monetarized economy; instead people in this group often rely on subsistence farming or barter trade.

(1998), conclude that the financial development has no significant effects on quintile income growth.

Somewhat surprisingly, the *black market premium* is a negative and significant determinant of income only for the richest population quintiles. These results are, however, to a large extent supported by the findings of Deininger and Squire (1998), who conclude that the black market premium has no significant effects on quintile income growth.

Investment is a positive and significant determinant of income in all separate quintiles as expected. This finding is also supported the results of Deininger and Squire (1998), who find that investment promotes income growth for all income groups.

Summarizing, we find that reform variables such as investment, openness, inflation and government consumption affect the income levels of the poor with the expected signs. Increasing openness and investment and lowering the rate of inflation will raise income levels of the poor. One must, however, keep in mind that the structural reforms aim at lowering government consumption, which will reduce incomes of the poorest quintile.[22] As mentioned earlier, cutting spending on public health care, education, sanitation and water supply may lead to further deterioration of already low standards. Moreover, layoffs of government employees may add to the number of poor people as many become unemployed.

Looking at the separate income groups, we find that openness has the largest impact on the poorest income group with lower but similar effects on all the higher income quintiles. This implies that although increasing openness will raise income for

all income groups, relative income inequality will actually fall. The coefficient for government consumption is larger for the first quintile than for the second, indicating that a reduction in government consumption will increase income inequality. The coefficient for inflation is highest for the middle income group with slightly lower effects on the second and fourth quintiles. The investment variable also has its largest impact in the third income group with falling effects both with higher and lower income groups.

Studying the magnitude of the effects of different policy reforms, we find that a one per cent increase in the investment ratio will have a larger effect on income than any of the other significant policy variables for all separate income groups except the poorest quintile. A one per cent increase in openness will have the largest effect on income for the poorest quintile, while it will have the second largest effect on income in the third, fourth and fifth income groups. Out of the significant policy variables, reducing the rate of inflation by one per cent will have the least effect on income in the three middle income groups.

5. World Bank supported reforms

As mentioned earlier, structural adjustment reforms typically include measures such as altering trade policies, exchange rate devaluations, debt management, fiscal restructuring, financial sector development etc. Hence, a successfully implemented reform will lead to changes in the policy variables included in our regression analyses, such as increased openness, investment and financial deepening as well as reduced government consumption, inflation and black market premium.

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[22] However, lowering government consumption may increase resources available for investment in productive capital. This may in turn ensure higher economic growth in the longer run, also for the poorest quintile.

Taking a closer look at economic reforms during the two five-year periods of World Bank financed structural adjustment, we find that for most policy variables, level values were in general different for World Bank financed reformers and non-reformers, as can be seen in Table 5. In the first reform period, the non-reforming countries had significantly higher levels of openness, government consumption and financial deepening. In the second reform period, the non-reforming countries had significantly higher levels of investment, government consumption and financial deepening, while their levels of inflation and black market premium were significantly lower.[23] Most of these statistical differences indicate that there may be cause for structural adjustment in these particular countries.

Nevertheless, as can be seen in Table 6, the adjusting countries in general did not seem to undertake particularly extensive reforms compared to the rest of the world. Looking at the average change in the reform variables between 1976-80 and 1981-85, we find that openness and financial deepening were the only two policy variables that actually changed in the right direction. Comparing the extent of these reforms to reforms in other countries, we find that the adjusting countries on average increased financial deepening more that did other countries.

In the period between 1981-85 and 1986-90, all policy variables except government consumption, which remained stable, changed in the right directions in the adjusting countries. Moreover, the extent of the reforms outperformed non-adjusters for the same variables except inflation, which on average decreased less than in the rest of the world, and financial deepening, which on average increased less.

[23] Using the Student's t-test, we test for equality between mean level values. There were 17 reforming countries in the period between 1981-85 and 12 reforming countries in the period between 1986-90. Only seven of these countries conducted World Bank supported reforms in both periods.

To calculate how recent World Bank supported structural adjustment has affected income levels for the different population quintiles, we introduce a dummy variable for the reforming countries. We find that the dummy variable is positive and statistically significant at the ten per cent level in all quintile regressions except for the richest quintile, indicating that World Bank supported reforms enhance income levels of the poor majority. Moreover, the coefficient for the dummy variable is increasing with falling income groups, which indicates that the poorer quintiles benefit more than the rich from World Bank support, which suggests that income inequality is reduced.

We also calculate actual and predicted income levels for the reforming countries, presented in Table 7.[24] Looking at the results, we find that actual income levels in the reforming countries were higher than predicted for all quintiles during both reform periods. Thus, we find no evidence of the potentially adverse effects of reforms on poverty in this sample of countries. Rather, we must conclude that World Bank financing of reforms have contributed to reduced income inequality and higher income levels for the poor majority. This includes the poorest quintile and thus contradicts the findings of Demery and Squire (1996).

6. Conclusion

This paper analyses how economic reforms affect different income groups in the economy. Particularly, we are interested in the effects of World Bank supported adjustment lending that took place in many developing countries during the 1980s.

We find that reform variables such as openness, investment, inflation and government consumption have significant effects on the income levels of the poor.

Increasing the degree of openness, raising investment and lowering the rate of inflation are policies that are often included in structural adjustment programs, and that appear to raise the income levels of the poor significantly. One must, however, keep in mind that structural reforms may also aim at reducing government consumption, which affects the income levels of the poorest quintile negatively.

Looking at the separate income groups, we find that openness has the largest impact on the poorest income group with lower but similar effects on all the higher income quintiles. This implies that although increasing openness will raise income for all income groups, relative income inequality may actually fall. The coefficient for government consumption is larger for the first quintile than for the second, indicating that a reduction in government consumption may increase income inequality. The coefficient for inflation is highest for the middle income group with slightly lower effects on the second and fourth quintiles. The investment variable also has its largest impact in the third income group with falling effects both with higher and lower incomes.

Despite the heavy criticism of World Bank supported structural adjustment, we find that the World Bank financed reforms *per se* appear to have contributed to higher than predicted income levels for all groups in society, including the poorest quintile. Moreover, the effect of World Bank support appears to benefit the poorer quintiles more than the rich, which may contribute to a reduction of the income inequality. Hence, some allegations against World Bank reforms are not supported by the empirical evidence.

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[24] Predicted income levels are calculated using variable averages and values of model coefficients.

Appendix

Country coverage

The following is a list of countries covered in our study. Our panel data set is unbalanced and we indicate for what time periods we have data in each of the 55 countries. A star represents that the country undertook a World Bank financed structural adjustment program in the previous period, for which quintile data for all variables are available.

Country	1966-70	1971-75	1976-80	1981-85	1986-90	1991-92
ALGERIA					X	
AUSTRALIA	X		X	X	X	X
BANGLADESH				X	X*	X*
BOLIVIA					X	
BRAZIL	X	X	X	X	X*	
CANADA	X	X	X	X	X	X
CHILE	X	X			X	
COLOMBIA	X	X	X		X*	X*
COSTA RICA		X	X	X	X*	
DENMARK			X	X	X	X
DOMINICAN REP.				X	X	
EL SALVADOR			X			
FINLAND	X		X	X	X	X
FRANCE			X			
GERMANY, WEST	X	X	X	X		
GHANA					X*	X*
GREECE		X		X	X	
GUATEMALA			X		X	X
HONDURAS	X					X*
HONG KONG				X	X	
INDIA	X	X	X	X	X*	X
INDONESIA			X	X	X	
IRELAND		X	X		X	
ITALY			X	X	X	X
JAMAICA		X			X*	X*
JAPAN	X	X	X	X		
JORDAN					X	
KENYA						X*
KOREA, REP.		X	X	X	X*	
MALAYSIA			X	X	X	
MAURITIUS					X*	X*
MEXICO	X	X	X	X	X*	X*
NETHERLANDS		X	X	X	X	X
NORWAY	X	X	X	X	X	X
PAKISTAN	X	X	X	X	X*	X*
PANAMA	X		X			
PERU				X	X	
PHILIPPINES		X		X	X*	
PORTUGAL		X	X		X*	

Country	1966-70	1971-75	1976-80	1981-85	1986-90	1991-92
RWANDA				X		
SENEGAL						X*
SINGAPORE					X	
SPAIN		X	X	X	X	
SRI LANKA	X	X	X	X	X	
SWEDEN	X	X	X	X	X	X
THAILAND	X	X		X	X*	X
TRINIDAD & TOBAGO				X		
TUNISIA					X*	
TURKEY	X				X*	
U.K.	X	X	X	X	X	X
U.S.A.	X	X	X	X	X	X
UGANDA						X*
VENEZUELA			X	X	X	
ZAMBIA			X			X*
ZIMBABWE					X*	

Data sources

BMP Data on black market premium are from Wood "Global Trends in Real Exchange Rates" 1960-84, World Currency Yearbook, 1985, International Currency Analysis, 1990-93 (1st choices) and for missing observations Barro & Lee (2nd choice).

GC Data on government consumption as a share of GDP come from World Bank (1st choice, 1961-93) and PWT 5.6 (2nd choice, 1950-92).

GINI Data on Gini coefficients are from Deininger and Squire (1996).

INC Data on income levels are calculated using average real per capita GDP (current international prices) from Penn World Tables 5.6 (PWT 5.6) and quintile income share data from Deininger and Squire (1996).

INF Inflation rates are calculated using CPI data from International Financial Statistics (IFS) (1st choice -93) and WDI (2nd choice, 1970-95).

INV Data on investment as a share of GDP are from the World Bank (1st choice, -93) and PWT 5.6 (2nd choice - 92).

IPCGDP Data on initial real per capita GDP (1960 international prices) are from PWT 5.6.

M2 Data on financial deepening are calculated using M2 and CPI data from IFS. Statistic is (M2/end of year CPI)/(GDP/average year CPI).

OPEN Data on imports plus exports as a share of GDP come from World Bank 1st choice, 1961-90), World Development Indicators (WDI) (2nd choice, 1970-95) and PWT 5.6 (3rd choice, 1950-92).

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Table 1. Classifications of income inequality data.

Household	123	Income	133	Gross	87
Personal	52	Expenditure	42	Net	44
				Undefined	2
	175	Nob	175		133

Table 2. Average quintile per capita income (current USD).

Country group	Period		IncQ1	IncQ2	IncQ3	IncQ4	IncQ5
Developing countries	1966-70	Mean	157	275	437	702	2041
Nob	10	St. dev.	76	120	205	356	1207
	1990-92	Mean	735	1334	1949	2933	7219
Nob	15	St dev	631	1117	1599	2449	6072
Industrialized countries	1966-70	Mean	992	1892	2662	3591	5988
Nob	9	St. dev.	293	505	727	874	1500
	1990-92	Mean	5787	11106	15922	21754	35358
Nob	10	St dev	1120	1497	2155	2857	6197

Table 3. Correlation coefficients. 175 obs.

	BMP	GC	INF	INV	M2	OPEN
BMP	1.00	-0.48	0.37	-0.24	-0.61	-0.04
GC		1.00	-0.20	0.12	0.49	0.24
INF			1.00	-0.17	-0.43	-0.16
INV				1.00	0.47	0.21
M2					1.00	0.20
OPEN						1.00

Table 4. One lag reform model. Dependent variable: Ave income

Quintile	*Variable*	*Coefficient*	*t-value*	*Probability*
Q1	OPEN	0.38	**2.54**	**0.01**
FE	GC	0.36	**2.00**	**0.05**
2-WAY	INF	-0.02	-0.51	0.61
Nob 175	M2	-0.03	-0.23	0.82
Adj R-squared 0.96	BMP	-0.00	-0.82	0.41
	INV	0.36	**2.31**	**0.02**
	CONSTANT	3.66	4.01	0.00
Q2	OPEN	0.19	**1.86**	**0.06**
FE	GC	0.21	**1.71**	**0.09**
2-WAY	INF	-0.05	**-1.66**	**0.10**
Nob 175	M2	-0.01	-0.06	0.95
Adj R-squared 0.98	BMP	0.00	1.18	0.24
	INV	0.42	**3.88**	**0.00**
	CONSTANT	5.26	8.42	0.00
Q3	OPEN	0.20	**2.10**	**0.04**
FE	GC	0.15	1.26	0.21
2-WAY	INF	-0.06	**-2.12**	**0.04**
Nob 175	M2	-0.05	-0.55	0.59
Adj R-squared 0.98	BMP	-0.00	-0.18	0.86
	INV	0.46	**4.63**	**0.00**
	CONSTANT	5.73	9.84	0.00
Q4	OPEN	0.19	**2.19**	**0.03**
FE	GC	0.15	1.49	0.14
2-WAY	INF	-0.05	**-2.00**	**0.05**
Nob 175	M2	-0.07	-0.89	0.37
Adj R-squared 0.99	BMP	-0.00	-0.03	0.97
	INV	0.43	**4.94**	**0.00**
	CONSTANT	6.16	12.01	0.00
Q5	OPEN	0.18	**2.18**	**0.03**
FE	GC	-0.04	-0.36	0.72
2-WAY	INF	-0.03	-1.22	0.23
Nob 175	M2	0.08	1.08	0.28
Adj R-squared 0.98	BMP	-0.00	**-1.70**	**0.09**
	INV	0.37	**4.20**	**0.00**
	CONSTANT	6.64	13.09	0.00

Table 5. Reform averages, non-reforming and reforming countries. Actual time averages.

Country group/Reform variable	Period		OPEN	GC	INF	M2	BMP	INV
Reforming countries	1981-1985	Mean	47.05	12.03	28.82	33.39	1.03	22.01
		St dev	23.79	3.76	36.06	15.18	3.17	6.17
Non-reforming countries	1981-1985	Mean	69.43	16.19	36.57	47.34	0.23	23.19
		St dev	59.89	5.75	121.58	20.85	0.58	7.54
Students t-test prob.			**0.10**	**0.01**	0.76	**0.02**	0.32	0.58
Reforming countries	1986-1990	Mean	54.68	13.11	32.52	27.79	0.85	18.04
		St dev	33.27	3.57	38.33	13.75	1.27	5.66
Non-reforming countries	1986-1990	Mean	52.29	17.73	6.54	56.48	0.04	22.12
		St dev	23.04	5.48	4.92	15.69	0.12	4.75
Students t-test prob.			0.84	**0.02**	**0.04**	**0.00**	**0.05**	**0.06**

Table 6. Percentage change in reform variables. Based on actual time averages.

Country group/Reform variable	Period	OPEN	GC	INF	M2	BMP	INV
Reforming countries	1976-1980 to 1981-1985	2 %	1 %	98 %	11 %	27 %	-3 %
Non-reforming countries	1976-1980 to 1981-1985	6 %	6 %	1 %	4 %	70 %	-8 %
Reforming countries	1981-1985 to 1986-1990	19 %	0 %	-2 %	8 %	-79 %	14 %
Non-reforming countries	1981-1985 to 1986-1990	10 %	-3 %	-17 %	15 %	41 %	5 %

Table 7. Actual and predicted income for reforming countries 1986-90 and 1991-92.

Period	Quintile	Actual income level, logged	Predicted income level, logged	Difference
1986-90	Q1	6.64	6.24	0.40
	Q2	7.24	6.81	0.43
	Q3	7.62	7.17	0.44
	Q4	8.01	7.58	0.43
	Q5	8.87	8.45	0.42
1991-92	Q1	6.30	5.93	0.38
	Q2	6.88	6.51	0.37
	Q3	7.26	6.87	0.38
	Q4	7.65	7.26	0.38
	Q5	8.51	8.15	0.36

Structural Reforms, Uncertainty and Private Investment *

Tove Strauss**

Abstract: Since almost two decades back a large number of LDCs have embarked on World Bank supported structural adjustment programs with the objective to promote economic growth and private investment. We consider how the design of reform programs can increase reform credibility and thus reduce uncertainty in the economy. Using a unique database on adjustment lending, we test the effects of reform on private investment behavior. We find that while political factors seem to have no effect on private investment response in reforming countries, magnitude as well as scope of reform are important positive explanatory variables.

JEL: C210; E610; E650; O110; O190; O230

Key words: Credibility, Economic reform, Private investment, Structural adjustment, Uncertainty

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1. Introduction

Since almost two decades back, in some cases even earlier, a large number of developing countries have embarked on structural adjustment programs. The precipitating factor has almost everywhere been the same: an acute need to correct external imbalances. The short run objectives of structural adjustment lending have been to provide support for member countries experiencing serious balance of payments difficulties, or countries faced in the years ahead with the prospect of unmanageable deficits arising from external factors not likely to be easily or quickly reduced (Wright, 1980). The long run objectives have been to provide an incentive structure conducive to economic growth. This suggests an important role for private investment.

Since structural reform by definition implies restructuring, we should expect investment levels to increase during the reform process. Mere scrapping and reallocation needs should prompt higher ratios of investment. However, evidence of the investment cycle during structural adjustment programs appears to be mixed. In some cases the investment response is relatively favorable, in others there are substantial lags in the revival of investment, and there are even cases where investment does not recover to its pre reform levels. A weak investment response is worrisome, since it prevents economic recovery in the longer term. It is therefore important to know under what circumstances investment will react forcefully to adjustment efforts. The purpose of this paper is to examine empirically the link between structural adjustment programs and private investment. In doing so, we will

also provide a brief review of the specific literature on policy uncertainty and private investment.[2]

The relation between investment and structural reforms can be analyzed from three different perspectives. The first is that investment is exogenous to structural reforms. External factors, such as changes in terms of trade, precipitate structural adjustment and the same external factors hamper the scope for investment. Hence, there is no explicit link between reforms and investment. The second is that investment will respond very directly to structural reforms, but always in the same manner - by falling. Contractionary fiscal and monetary policies are from this point of view intrinsically harmful for investment. The third approach is that investment is indeed endogenous to reforms, but that the investment response largely depends on expectations about the future, and not only on the immediate effects from the specific reforms that are implemented.

In this paper, the point of departure is the third of these alternatives, which is also the only approach that allows for policy implications. Our main theme is that the level of uncertainty is a strong determinant for investment. This means that the mixed experiences of countries undergoing structural adjustment programs are not necessarily linked only to the direct effects of the programs, but also to how the reform process may influence the overall level of uncertainty.[3]

The analysis aims to provide a clarifying structure of the links between reforms, uncertainty, credibility and investment. With reforms, we will mean World

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[2] A detailed and enlightening survey of investment theory in general and investment irreversibility in particular is provided in Serven and Solimano (1992a). See also Pindyck (1993) or Dixit and Pindyck (1994). One strand of this literature that will not be discussed here involves the question of gradualism versus "big bang" reform programs. See e.g. Roland (1993), Aghion and Blanchard (1994), Caballero and Hammour (1994) and Rodrik (1994).

[3] Clearly, our discussion applies to private investment and reforms. Throughout the study, we take public investment to be a policy variable, and therefore less directly linked to uncertainty.
Continued on next page...

Bank financed structural adjustment programs only. We are not alone in our concern about the relation between investment performance and the design of structural reforms, nor in our focus on uncertainty.[4] Our intention is not to unnecessarily repeat what has already received attention in the literature. Although we try to account for many different channels, our focus is on the role of uncertainty. However, to our knowledge, no previous attempts have been made in this field to explicitly link investment performance to the design and implementation of reforms in empirical investigations.

The paper is organized as follows. In the second section we begin by briefly discussing the factors behind the need for structural reforms. We also present some earlier findings about the effects of structural reforms on investment and take a closer look at the investment pattern across regions since 1970. In the third section we describe the key characteristics of World Bank supported adjustment programs. Against this background, in the fourth section, we consider how the design of structural reform could induce or deter investment in a detailed discussion of the relationship between investment decisions and reform programs. In particular, we discuss the theoretical concepts of investment irreversibility, uncertainty and policy credibility, and how they influence one another. We also discuss in more general terms the relationship between the magnitude, speed and scope of reform on the one hand and credibility on the other. In the fifth section we give a brief description of the empirical data at hand and proceed by testing the effects of reform on private investment response. The sixth section concludes.

Indirectly, however, reforms will influence the path of public investment, which in turn may have an impact on private investment.

[4] See e.g. Serven and Solimano (1992a, 1992b, 1993a) and Schmidt-Hebbel, Serven and Solimano (1994).

2. Structural reforms and the investment pause

A wave of structural adjustment programs followed after the Latin American debt crisis in the early 1980s. However, neither debt crisis nor structural adjustment are exclusively Latin American phenomena. Many African and Asian countries have experienced a similar process of crisis followed by reforms, and many still are. In recent years, a new wave of reform programs have been undertaken under somewhat different circumstances, as several of the former communist countries of Eastern and Central Europe have undertaken structural reforms in their transition from centrally planned economies to more market oriented systems. Although the individual country experiences differ in many respects, the background stories appear to have much in common. Typically, large increases in public expenditure resulted in fiscal deficits. The ensuing gaps had to be closed by foreign borrowing, which in turn rendered the economies vulnerable. Exogenous shocks, such as deterioration in the terms of trade or sharply raised interest rates, subsequently led to serious external and internal imbalances.

The immediate objective of structural adjustment programs has been to address unsustainable balance of payments situations. In the longer run, however, the programs also address issues related to investment and growth, since external balances can only be maintained by sustained economic recovery.

From this perspective, however, the results of structural reforms are far from encouraging. Although previous empirical studies are fairly consistent in their findings that structural adjustment efforts can be associated with faster export growth and moderate increases in domestic savings and output growth, structural adjustment has also been associated with a reduction in investment levels (Bleaney and Fielding, 1995). The empirical evidence suggest that aggregate investment rates observed in

the less developed countries (LDCs) declined sharply after the 1982 debt crisis and remained low throughout the rest of the decade, although private investment rates started a slow recovery after 1987 (Serven and Solimano, 1993a).[5] Moreover, investment often appears to go through two or three phases during adjustment: initial contraction, inertia and, possibly, revival. During the first one or two years of implementation, investment falls and then tends to remain at a low level. To the extent that investment takes off again, it does so with a considerable lag, and the revival is far from automatic (Solimano, 1992). The second phase of more or less sustained inertia is, in the terminology of Schmidt-Hebbel, Serven and Solimano (1994), referred to as the investment pause. Their survey reveals such a pause in a majority of countries. Few economies appear to be able to jump directly from contraction to revival.

Looking at private investment data for the more than 40 developing countries undergoing structural adjustment in our sample, we find that private investment as a share of GDP remained relatively stable during the 1970s and 1980s, but increased sharply in the first half of the 1990s. See Table 1. There were, however, quite substantial regional disparities. While private investment levels declined in both Latin America and the Caribbean (LAC) as well as in Sub-Saharan Africa (SSA) between the 1970s and the 1980s, private investment increased in South and East Asia (SEA) during the same time period. During the first half of the 1990s, however, private investment levels increased in all three regions. Throughout the entire period, private investment levels have been higher in SEA than in LAC and SSA, while SSA has always had the lowest levels.

[5] The sample includes 41 LDCs.

Clearly, there are many reasons for differing experiences with regard to investment, a number of which are exogenous to the reform process itself. The state of the economy before reforms were undertaken, the nature of the balance of payments crisis, the underlying industrial structure, and a number of other factors are bound to influence investment incentives. However, it is also likely that the investment response is at least partly endogenous to the structure of the reform process.

3. World Bank supported structural adjustment

The first World Bank supported adjustment loan was signed in early 1980 and the lending reached its peak in the fiscal year of 1988 when adjustment lending constituted almost 25 per cent of the World Bank's total lending (Thomas and Chhibber, 1989).

Although neither the contents nor the form of structural adjustment programs are guided by a preconceived model, programs supported by the World Bank typically include measures such as trade liberalization, exchange rate reform, debt management, fiscal restructuring, financial sector development, institutional strengthening, public enterprise restructuring, specific sector policies and anti-poverty policies (Landell-Mills, 1981 and Thomas and Chhibber, 1989). Countries such as the Republic of Korea and Turkey that adopted a series of reforms over time and stuck with them, are typical examples of successful World Bank supported reforms during the 1980s. Less successful reform were experienced in e.g. Bolivia, Guyana and Senegal in the early 1980s. Their reform attempts were often characterized by policy reversals and the direction and purpose of reform was confused and uncertain (Michalopoulos, 1987).

At least four separate studies have addressed the concept of successful structural adjustment during the 1980s. Thomas and Chhibber (1989) examine 30

countries that received adjustment loans from the World Bank adjustment in the 1980s. Their evidence indicates that adjustment programs have generally been more easily sustained when countries adjust quickly to shocks and maintain sound policies over the long term. The negative effects of structural adjustment on growth, employment and poverty have been short-lived and domestic supply has responded quickly to policy changes. The programs have been adequately financed, fully backed by the government and viewed by the general public as necessary. In a similar study of 51 countries, McCleary (1989) finds that policy changes have been implemented quite successfully with regard to exchange rate management, energy policy, agricultural pricing, financial sector reforms and the rationalization of public expenditure programs. Implementation has, however, been less successful for industrial policies, tax reforms and some aspects of public enterprise reforms.

In a study of 220 separate structural adjustment loans financed by the World Bank, Dollar and Svensson (1998) find that the success or failure of structural adjustment is to a large extent determined by a small number of political economy variables such as ethnic fractionalization, government crisis, democracy and government time in power. Variables under World Bank control such as resources devoted to project preparation and supervision or number of loan conditions appear to have no influence on the success or failure of the adjustment program.

Johansson (1998) looks at 99 separate structural adjustment loans financed by the World Bank, studying the response of foreign direct investment (FDI) to structural adjustment. She finds that financial sector reforms, reform scope, the time aspect of structural change and public institutional reforms are important determinants of (FDI).

With this empirical evidence at hand, in the next section we go on to discuss the theoretical foundation for investment decisions.

4. Reform credibility and investment decisions

The link between uncertainty and structural reforms should be apparent. A government that initiates reform makes a statement of a new course of action. Trade reforms, price liberalizations and abolishment of state monopolies are meant to incite a private sector response, and may provide investors with an expanded set of investment opportunities with higher expected profitability. At the same time, however, structural adjustment is a time consuming process and there may be a large degree of uncertainty at the early stages. Thus, success is far from guaranteed at the outset of reform.

It is clear that reform processes can differ in many dimensions. We refer to these dimensions as scope, magnitude, speed and sequencing. The *scope* of reform measures how many different reforms that have been incorporated in the adjustment program. Given that programs differ in scope, the question arises as to how far-reaching the reforms have been, i.e. the *magnitudes* of the different reforms. *Speed*, on the other hand, refers to how quickly the reforms have actually been implemented - is it a gradual implementation or a shock treatment? *Sequencing*, finally, is the timing of the reforms, i.e. when the particular reforms have been introduced and in what particular order.[6] In view of this multitude of options, it is clear that structural adjustment is a term that serves as an umbrella for potentially very heterogeneous programs.

A particularly important contribution to the literature on the credibility of reforms and the response of private investment comes from Rodrik (1989a, 1989b, 1991), who considers in detail the different reasons for increased uncertainty during reform and finds at least five important effects. First, there may be substantial

uncertainty as to the suitability of the reform package itself. This idea is captured in the notion of compatibility of policy sets, where policy sets are equivalent to our definition of reform packages. Hence, a compatible policy set is such that the various individual components or reforms are perceived to be consistent and work in the same direction. With an incompatible policy set, expectations of overall failure of the reform program will arise. Since the private investment response is contingent on the level of uncertainty, it is indirectly contingent on the compatibility of the policy set.[7]

Second, for a number of reasons, investors may be uncertain of a government's underlying intentions. Imperfect information of this kind is likely to be a particular problem in developing countries, where governments tend to rotate frequently. For example, a regime can temporarily introduce reforms or announce policy changes in order to obtain foreign assistance. However, whereas reforms may be reversible, investments are not fully so. In the case of reversal, investors would find themselves trapped with irreversible investments in a situation that is unfavorable for production.

Third, reforms can be subject to time inconsistency problems.[8] The difficulty arises from the fact that current policy must be consistent with future optimal policy from the private sector's point of view. Hence, although there can be a temptation for the regime to reverse reforms in the future e.g. once foreign resources have been secured, the government must build a reputation of commitment in order not to loose credibility to private investors.

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[6] Although we recognize that potential importance of sequencing, we have not been able to analyze it empirically, due to problems with data classification.

[7] We are not able to examine the compatibility of reform packages in the subsequent analysis due to lack of reform specific data.

[8] Kydland and Prescott (1977) is perhaps the most cited paper on the time inconsistency problem.

Fourth, there may be anticipated political costs due to redistributive struggles set in motion by reforms. When considerable political opposition is expected, the private sector will postpone investment until the situation has calmed down.

Lastly, macroeconomic stability is important for the success of reforms as it reduces the overall level of uncertainty in the economy.

In all, the sustainability and long term success of reforms will depend on an adequate response from the private sector. In this way, the success of reforms is partly endogenous. The design and sequencing of reforms will influence expectations of future economic conditions, and hence guide current investment decisions. Indeed, reforms that lack credibility are likely to fail altogether (Calvo, 1989 and Rodrik, 1989b, 1991).

So, how can policy makers increase the credibility of reforms? Primarily, rather than introducing the reform gradually, it should signal to the private sector that it is committed to the reform process through a decisive radical action, as e.g. was the case in Turkey during the early 1980s. In order to signal its commitment, the government may be required to undertake more substantial reforms than it would have done in the absence of the credibility problem (Rodrik, 1989b).[9] Hence, through policy overshooting a genuinely reform committed government may distinguish itself from more ambiguous counterparts. However, when the scope of reform is broad and particularly when the reforms are drastic, the potential for policy conflicts and the possibilities of contagion from failures in one particular reform area increase. Therefore, Rodrik argues that the shock-treatment approach is likely to reduce credibility when it is launched in more than one area at the time (a so-called big bang approach). He points out that it therefore becomes purposeful to distinguish between

the magnitude and scope of reforms and argues that reform credibility will generally increase when a reform is large in magnitude and speed but narrow in scope.

With these theoretical implications in mind, we now proceed with the empirical analysis of the data.

5. Data analysis

In a review of some of the recent developments in investment theory and empirical studies on investment in developing countries, Serven and Solimano (1992b) point to a few features of investment behavior that were important in the analyses of the 1980s. They emphasize the following, which also get particular attention in this study: (i) the irreversibility of most investments; (ii) the crowding-out as well as the crowding-in effects between private and public investment; (iii) the consequences for private investment of imperfections in financial markets; (iv) the volume, timing and composition of investment in relation to changes in the real exchange rate and (v) the complex relationship between the volume of private investment and the foreign debt overhang.

In addition to this review, there exists a long list of authors who attempt to estimate investment equations empirically, where a typical private investment equation includes variables such as the lagged value of private investment, terms of trade, economic growth, real interest rate, real exchange rate, debt service ratio and public investment.[10] Moreover, several attempts have been made to estimate the

[9] The particular question of reforms and signaling is thoroughly discussed in Rodrik (1989b). A simple model formalizing a scenario is developed in Rodrik (1991).

[10] See e.g. Cardoso (1993), Cohen (1993), Greene and Villanueva (1991), Levine and Renelt (1992), Oshikoya (1994) and Pindyck and Solimano (1993). Rama (1993) also provides a comprehensive survey of empirical investment functions for LDCs.

effectiveness of structural adjustment. Among these studies, most authors have attempted to estimate investment functions in the presence of uncertainty.[11]

In this section, we will proceed with our empirical analysis. The discussion provided in this paper is prompted by the observation that the investment response differs between countries that have all undergone structural adjustment. We hypothesize that this variation is not entirely random. In particular, we will look at how reform speed, scope and magnitude affect the investment response. However, we do not attempt to build and estimate a full-scale structural model of private investment in LDCs. Rather, what follows is more of an exploratory data analysis.

Throughout the paper, we have assumed that uncertainty about the future is a result of the design and implementation of the adjustment program and that it is this uncertainty that has an impact on the investment response. Unlike what has been assumed in several previous studies, uncertainty following on structural reforms cannot simply be measured in a few variables such as the variabilities (i.e. standard deviations) of the exchange rate, inflation rate and/or output in the economy, as the variables just mentioned will not only be measures of uncertainty about the future, but also affected by the implementation of the reform program itself. [12] [13] Hence, variables measuring the design and outcome of the reform programs, reflecting both the success and failure of the adjustment effort seem necessary to complete the picture. The change in such variables during the adjustment process should better

[11] See e.g. Bleaney (1996), Bleaney and Fielding (1995), Goldsbrough *et al.* (1996), Pindyck and Solimano (1993) and Serven and Solimano (1991, 1993a). The techniques for estimating the investment functions have varied between cross-section, time series and panel data regression analyses.

[12] See e.g. Serven and Solimano (1991, 1993a), Pindyck and Solimano (1993), and Goldsbrough *et al.* (1996).

[13] The variability of e.g. both the exchange rate and the inflation will increase as a consequence of any successful attempt to depreciate the exchange rate or reduce the rate of inflation.

capture the magnitude of the reform process. The change in these variables will affect the economy directly as well as indirectly through the credibility of reforms.

The countries included in our study will, due to data limitations, be those that have undergone structural adjustment programs supported by the World Bank between 1980 and 1989.[14] See Appendix 1. Each adjustment loan defines the beginning of an adjustment period and the evaluation periods cover both the short run and the long run.[15] The data we use in this study have been collected from various World Bank data bases such as the Global Development Finance (GDF), the World Development Indicators (WDI), the Adjustment Lending and Conditionality Implementation Database (ALCID) and the International Finance Corporation's Emerging Markets Database (EMDB). We also use IMF data from the Government Finance Statistics (GFS) and the International Financial Statistics (IFS).

Private investment response is measured as the growth rate between the pre- and post-reform periods, where the pre-reform benchmark level (*PRIVIB*) is defined as the five year average level of investment to GDP prior to program implementation (including the initial year of the adjustment program).[16] The short run response (*PRIVIS*) is defined as the growth of private investment from the benchmark level to the average of the three years directly following the adjustment loan, while the long run response (*PRIVI*) is defined as the growth from the benchmark level to the

[14] The loans included in our studies are World Bank structural adjustment loans (SALs) and sectoral adjustment loans (SECALs).

[15] When a country has received more than one adjustment loan during one year, the loan data have been aggregated into a single loan.

[16] The data on private investment are mainly from the IFC and calculated as the difference between total and public investment. Due to lack of data for Ghana and Jamaica, another private investment residual has been calculated for these countries, using the difference between total investment data from the WDI and public investment data from the World Development Report (WDR).

average of the four to six years following the adjustment loan.[17] Previous empirical work indicates that it generally takes at least five years until the permanent effects of economic reforms can be detected in measures such as productivity and output growth (Atkeson and Kehoe, 1997).

Looking at the data, we find that for the 58 observations (21 countries) included in the subsequent regression analyses, the average response of private investment to structural adjustment efforts is generally positive and substantially larger in the long run than in the short run.[18] See Table 2. We also find that 37 of the 58 observations are positive in the short run and 42 are positive in the long run. Moreover, trying to find empirical evidence for the so-called investment pause, we find only 10 observations included in our long run sample for which this seems to be the case. For these 10 observations, investment levels have declined or remained the same in the short run while they have increased in the long run, compared to the benchmark level. However, 11 observations turn out to be negative or stable in the short as well as the long run. Hence, using a wider definition, more than one third of the observations in our sample show evidence of an investment pause.

As mentioned earlier, the structural adjustment process refers to several dimensions. More specifically, we postulate that long run growth of private investment as a share of GDP is a function of a set of control variables, reform magnitude, speed and scope:

Private investment growth = F(magnitude, speed, scope, control variables) Eq. 1

[17] When data is scarce, the short run may cover only year one to two and/or the long run year four to five.

We have tried to define a few variables capturing these aspects:

Magnitude. The variable intended to reflect the magnitude of reforms is drawn from a set of variables that relate to how far-reaching reforms actually have been. We believe that traditional explanatory variables of investment behavior, such as the real exchange rate, the current account surplus, foreign exchange availability, public investment, the real interest rate as well as the rate of inflation, should be directly affected by the structural reform process and may in turn have effects on the growth of private investment. Each type of reform will have direct and indirect effects on investment incentives. While the direct effect may be either positive or negative, the indirect effect is always assumed to be positive in the sense that a far-reaching reform improves credibility.[19] Using the same method as in the construction of our dependent variable, *PRIVI*, the variables we construct measure the long run responses.[20]

The magnitude variable (*MAGNITUDE*) captures policy changes and is constructed using a method similar to the calculations used for creating the "policy scores" presented in a World Bank report on the effects of macroeconomic policies on economic growth in Sub-Saharan Africa (World Bank, 1994).[21] However, instead

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[18] It should be noted that it is not possible to use a control group in this study, as the years of reform vary between countries. Moreover, only World Bank loan recipients are included in the database.

[19] However, in this particular section we concentrate on describing only the potential direct effects.

[20] This method of introducing policy *changes* is similar to the one applied in Easterly *et al.* (1997) when they analyze growth effects of reforms in Latin America.

[21] Besides the variables listed below, *MAGNITUDE* includes the squared values of the level of inflation and the real interest rate, in order to capture the diminishing marginal effects of these variables. As in Bleaney and Fielding (1995), we assume that the government is able to select policy instruments such as the real exchange rate and the degree of financial repression (the real interest rate). We are aware that some of these variables may be subject to reverse causality. However, instrumenting with lagged values of these variables, we would not be able to capture the change in the variables during the actual reform period.

of arbitrary weighting these policy scores, the separate variables are combined into a principal component, measuring the overall magnitude of the reform.[22]

Exchange rate reform is measured as the growth in the average real exchange rate (*RER*). Normally, exchange rate reform refers to devaluations undertaken to correct an overvalued exchange rate and to restore international competitiveness. As a result, investment in tradable goods is expected to increase.[23]

Trade liberalization has tended to be a controversial issue. On the one hand, reducing trade barriers should be to the advantage of the export sector and thus, improve the current account balance. By opening up the economy, access to foreign technology as well as overall efficiency should increase.[24] On the other hand, trade liberalization may well have a negative impact on fiscal balances, to the extent that tariff revenues are an important source for government revenue, and hence be inconsistent with overall balances (Rodrik, 1989a, 1991). However, quota elimination has generally been the main target of trade liberalization during structural adjustment (Bleaney and Fielding, 1995). Trade liberalization is here measuread by the growth in the average current account surplus as a share of GDP (*CA*). [25]

Debt management is measured as the growth in the average debt service to export ratio (*DSR*). The issue of debt overhang may be of significant importance to

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[22] The first principal component accounts for 28 per cent of the variance in the eight variables. For a detailed discussion of principal component analysis see e.g. Greene (1993) and Johnston (1984).

[23] However, the immediate impact of a devaluation is to increase the cost of imported capital, raising the cost of imported investment components. In addition, devaluation increases the cost of servicing foreign currency denominated debt. Clearly, such effects counteract deficit reduction. Hence, the overall long run effect will depend on the responsiveness and flexibility of the productive sectors as well as on demand elasticity. See Serven and Solimano (1993a) for additional effects on private investment of anticipated as well as unanticipated devaluations.

[24] However, with fierce competition from imported goods, firms may be wiped out and the incentives to invest may plunge. In addition, import substitution is often more capital and investment intensive than more open trade strategies, which may lead to lower investment rates in the short run.

[25] *CA* is measured before official transfers.

highly indebted developing countries.[26] A debt overhang reduces the rate of return to investment and thus acts as a disincentive to private investors.

Financial reforms, internal as well as external, also influence investment. Internal liberalization refers to the liberalization of domestic interest rates and of domestic credit policies. The positive and direct effects on investment are twofold. First, higher interest rates increase the amount of resources available for investment purposes through increased savings incentives (Bleaney and Fielding, 1995). Second, with the higher cost, the quality of investment should improve. However, according to standard neo-classical theory, higher interest rates may also have a negative effect on investment, as they raise the cost of capital (Greene and Villanueva, 1991). Nevertheless, we expect the net effect to be positive as the distortions imposed by low real interest rates are typically more serious than the investment cost effects.

External liberalization refers to transactions on the capital account, for capital outflows as well as capital inflows. With capital mobility, foreign savings may increase the total amount of resources available for investment. To capture the magnitude of financial repression (internal as well as external), the average level of the real interest rate (*INTL*) during the four to six years following the adjustment loan is used.[27]

Monetary control has absorption reducing effects and is important for the preservation of low inflation. Keeping down inflation is relevant for the rate of saving and for channeling savings to productive investment. In addition, uncertainty about

[26] Krugman (1988) and Sachs (1989) introduced models of debt overhang. A country is said to suffer from debt overhang when the difficulties of meeting its external debt obligations affect the economic performance of the country (Savvides, 1992). The country may only benefit partially from an increase in output or exports, as a fraction of the increases must be used to service its external debt obligations. This implies that the debt overhang acts as a high marginal tax rate, lowering returns on investment.

future inflation prunes funds for long-term investment.[28] The average level of inflation (*INFL*) during the four to six years following the adjustment loan is used to measure it.

Public investment may be complementary to private investment. Previous findings suggest that there exist a long run complementarity between public and private investment in LDCs, even though public investment may temporarily crowd out private investment in the short run (Greene and Villanueva, 1991). Due to lack of data on government savings, we are here confined to measure fiscal reform by the growth of average public investment as a share of GDP (*PUBI*).

Following the discussion above, we expect the sign of the coefficients for *RER, CA, PUBI* and *INTL* to be positive, while we expect the sign of the coefficients for *DSR* and *INFL* to be negative.

Using a unique database on World Bank adjustment lending, ALCID, we have been able to construct a few other important loan specific variables measuring the number of loan components, speed of reform, loan amount and the existence of other adjustment loans:[29]

Speed. The variable *SPEED* is an attempt to measure the how quickly the reforms should be implemented. A number between 0 and 1, it describes the share of loan conditions that were attached to the first half of the loan tranches. A figure exceeding 0.5, hence, identifies a relatively front loaded policy conditionality, with heavier emphasis on actions to be taken early in the reform. A low value of this variable will indicate a gradual implementation of the reform process. Following the

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[27] The underlying argument is that in many developing countries, financial repression implies that the real interest rate is fixed below market clearing levels that are often negative (Bleaney and Fielding, 1995).

[28] In their empirical investigation, Pindyck and Solimano (1993) find inflation to be the only measure of risk that strongly explains investment behavior.

implications of Rodrik (1989a), we expect a positive sign of the coefficient for *SPEED*.

Scope. Rodrik (1989a) not only argues that a credible reform should be deep in magnitude and high in speed, but also narrow in scope. The variable we have created, *SCOPE*, measures the number of policy categories in which there were any loan conditions. The variable can take a value between one and six, where a higher value indicates a wider scope.[30] Hence, following the predictions of Rodrik (1989a), we expect the sign of the coefficient for *SCOPE* to be negative.

AMT indicates the adjustment loan amount committed by the World Bank.[31] In general, we expect large amounts of *AMT* to indicate support for the government's reform program, cushion the effects of contractionary fiscal policies and thus have a positive effect on the climate for private investment. However, it has been suggested that abundant external support may soften budget constraints and destroy incentives to undertake reforms, thereby undermining their credibility in the first place.[32]

SLOANS relates the number of adjustment loans in the six-year period succeeding the reform. Again, the interpretation of this variable is quite ambiguous. A large block of reforms could indicate a series of consecutive failures, verifying an inability or unwillingness to undertake reform, presumably with a negative effect on private investment. But it could also indicate an effort at an all-encompassing reform, reflecting a continued commitment to policy reform as well as a renewed confidence

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[29] See Dollar and Svensson (1998).

[30] The six policy categories are: macroeconomic stabilization and fiscal reforms, financial reforms, trade reforms, public enterprise reforms, public institutional reform and other sectoral reforms.

[31] As an alternative explanatory variable, we have also used the yearly average amount of foreign assistance as a share of GDP the country has received in the six-year period directly following the reform. Foreign assistance is then defined as the yearly average sum of long-term lending, grants, technical assistance and IMF lending the country has received. However, the variable is not significant in the regression analysis.

[32] See e.g. Johansson (1997), Rodrik (1989b) and Svensson (1997).

from the World Bank, with positive effects on private investment. Moreover, *SLOANS* should correct for effects relating to consecutive loans, such as e.g. in countries like Turkey, Pakistan and the Philippines that received several separate adjustment loans in the 1980s.

The variable *ERLAG* is constructed in a similar manner, but indicates if the loan has been preceded by a loan classified as an "economic recovery loan" in the previous five-year period. There is reason to expect positive influence of this variable, as an economic recovery loan is expected to contribute to a broad economic rehabilitation, enhancing the success of the new loan.[33]

We also identify a set of control variables that may be of importance for the private investment response. The variables consist of a few political variables that we believe may be of importance for the private investment climate as well as some other variables identified in previous cross-country regression analyses as significant determinants of private investment. The set comprises measures such as a war dummy (*WAR*), three indices for political instability (*PINSTAB*), risk of expropriation (*ROEXP*) and government repudiation of contracts (*GOVREP*), as well as economic growth, external shocks to the economy and previous levels of private investment. Per capita economic growth (*PCG*) is measured as the average real per capita GNP growth and external shocks are measured as the average change in the terms of trade (*TOT*). Both these latter variables are expected to influence private investment with a positive sign. *PRIVIB* is, again, the benchmark level of private investment and we expect the sign of the coefficient to be negative.[34] All variables, their abbreviations

[33] Again, our reasoning follows Rodrik (1989a).

[34] We expect countries with lower initial private investment levels to respond more profoundly to the improved incentive structure induced by economic reforms.

and respective data sources are presented in Appendix 2. Correlation coefficients for all explanatory variables are given in Table 3.[35]

Sample averages of all explanatory variables are presented in Table 4.The primary OLS regression includes the potential explanatory variables, where the principal component *MAGNITUDE* is replacing the eight separate reform magnitude variables.[36] The regression results are presented in Table 5 (regression equation 1). Significance levels for the coefficients of the explanatory variables are reported for two-tailed tests. Whenever called for, we control for heteroskedasticity in the residuals using White's tests.[37]

Looking at the control variables, we find that quite surprisingly none of the political variables are significant in the regression analysis.[38] However, all other control variables have the predicted signs and the coefficients are highly significant. We then take a closer look at whether the magnitude, speed and scope of reforms affect credibility through the response from the private sector. As predicted by Rodrik (1989a), we find that *MAGNITUDE* is a significant determinant of private investment growth while the coefficient for *SCOPE* as well as *SPEED* do not prove to be significant. Surprisingly, *SCOPE* has a positive sign of the coefficient while the coefficient for *SPEED* is negative.[39] Hence, the predictions of Rodrik (1989a) that

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[35] Note that *PUBI* and *RER* prove to be highly correlated.

[36] The variable *MAGNITUDE* is introduced for three separate reasons. The primary reason is to investigate the significance of reform magnitude in general, the secondary reason is to increase the degrees of freedom and the third reason is to come to terms with the multicollinearity between some explanatory variables (see Table 3). Although the principal component accounts for only 28 per cent of the variance in the eight variables, the variable is significant and thus captures some of the magnitude that we are trying to explain.

[37] In the cases where multicollinearity may be a problem, F-tests for redundant variables have been conducted.

[38] In contrast, Dollar and Svensson (1998) find that domestic political-economy factors are the only important determinants of successful structural adjustment. These diverging results are most likely a consequence of the use of different dependent variables. The World Bank definition of a successful adjustment loan obviously does not emphasis the private investment response.

[39] Turkey, in particular, is a country where most successful adjustment programs have been wide in scope.

programs should be high in speed but narrow in scope cannot be confirmed in this study.[40] Rather, what we find is some support for an all-encompassing gradual reform with a wide set of reform components.

Looking at the variables measuring external support and spillover effects from other adjustment loans, we find that the coefficient for *SLOANS* is negative and significant. This result suggests that a large block of reforms could indicate a series of consecutive failures, verifying an inability or unwillingness to undertake reform. The coefficients for *AMT* and *ERLAG* are positive and significant, as expected.

In regression equation 2, we eliminate the four insignificant political variables from the regression analysis. We find that although none of the explanatory variables changes sign, the level of significance increases for *SCOPE*, *AMT* and *SLOANS*, while the coefficients for *SPEED* and *ERLAG* become insignificant.

Before we proceed, the problem of potential endogeneity must be addressed. Not only may the magnitude variables, as mentioned earlier, be subject to reverse causality; the variables influenced by the World Bank, such as speed and scope, may also be endogenous to the some of the control variables.[41] However, we have been unable to find good instruments for the endogenous variables and thus, we will refrain from estimating two stage least square regressions. What we most likely lack in the set of explanatory regressor is a variable capturing the bargaining power relation between individual governments and the World Bank that may be of importance for the design of the structural adjustment program.

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[40] As an alternative variable, we have also measured *SPEED* by the short-term changes in the *MAGNITUDE* variables, creating another principal component. However, this variable also proved to be insignificant in the regression analysis, most likely due to the contradicting effects of big bang versus gradual reforms.

[41] E.g. the implementation speed of the adjustment program may depend on the initial level of private investment, the loan amount and the width of the scope. Moreover, although the political variables did not appear to have an impact on the response of private investment, they may well have indirect effects on the variables influenced by the World Bank.

Next, we will investigate whether particular magnitude variables are more important for the determination of private investment growth than others. Hence, in regression equation 3, we exclude the primary component *MAGNITUDE* and replace it with its six original components.[42] Out of the six, only two turn out to be particularly important determinants of private investment growth. Somewhat surprisingly, we find that even though one of the immediate objectives of structural reform has been to address unsustainable balance of payments situations, negative changes in the current account balance are significant in the regression analysis. This effect is most likely explained by the success of trade reforms where relative increases in imports have increased current account deficits due to a pent-up demand for imported consumer goods.[43] Devaluing the real exchange rate also significantly raises private investment growth, as expected. We do not find any evidence of complementary effects between public and private investment. However, the insignificant coefficient for the public investment variable may be a consequence of the multicollinearity between *PUBI* and *RER*.[44]

Following successive iteration, in regression equation 4, we have adopted the following reduced regression equation due to the higher significance levels of the variable coefficients:

$$PRIVI = \alpha + \beta_1 PRIVIB + \beta_2 PCG + \beta_3 TOT + \gamma_1 SCOPE + \gamma_2 INFL + \gamma_3 RER + \gamma_4 AMT + \gamma_5 SLOANS + \gamma_6 ERLAG + \mu \quad \text{Eq. 3}$$

[42] Due to the high degree of correlation between the real interest rate and its squared value (0.95) as well as between the inflation rate and its squared value (0.98), we have excluded the quadratic variables from the subsequent regression analysis.

[43] Another possible explanation may be that the new private investments may be import intensive. Hence, the link is perhaps from investment to the current account rather than the other way around.

[44] An F-tests for redundant variables indicates that *RER* and *PUBI* are jointly significant at the five per cent level.

In this equation, the significance levels for most separate variables have increased, including the level of inflation, which is now significant at the five per cent level. The exception is the coefficient for the current account, which becomes insignificant in the iteration process.

6. Conclusions

The rules of thumb for investment decisions are strongly contingent on the amount of information available about the future. Hence, the level of uncertainty prevailing in the economy will be an important determinant for private investment. A government that initiates structural reform makes a statement of a new course of action.

In the empirical analysis, our primary concern has been how the design of structural reforms influences private investment behavior. It is clear that the reform process can differ in several dimensions and we refer to these dimensions as scope, speed and magnitude. We find evidence that the magnitude and scope of the reform process are particularly important for the private investment response. However, we find no evidence that domestic political factors influence the response of private investment. These results sharply contradict the findings of Dollar and Svensson (1998), who conclude that domestic political-economy factors strongly influence the World Bank definition of general success or failure of structural adjustment, while variables under the influence of the World Bank seem to have no effect on the outcome.

With the objective of enhancing economic growth and increasing private investment levels, most structural adjustment programs launched by the World Bank emphasize reforming macroeconomic variables such as the current account, the exchange rate, the interest rate, the rate of inflation, the debt service ratio and the level

of public investment. Although not all reforms are equally important, actions such as devaluing the real exchange rate and keeping down the level of inflation play a significant role for determining private investment growth during structural reform. Surprisingly, we also find that reducing the current account deficit is not a prerequisite for increasing private investment. On the contrary, a liberalization of the trade sector, which may increase imports and it turn increase the current account deficit, may still be perceived as a success by the private sector and thus improve credibility. The main point is, of course, that these imports are used productively.

Looking at the scope of reforms, an all-encompassing reform with policy components from different categories encourages private investment growth in our sample of reforming countries. Moreover, support from the World Bank, measured by the size of the loan amount, is of importance for investment growth. We also find that previous economic recovery loans contribute to broad economic rehabilitation, as predicted by e.g. Rodrik (1989a). Surprisingly, the speed of reform does not seem to have a significant effect on private investment. This may, however, be due to contradicting effects of some observations with big bang reforms, where high speed is important and other observations with gradually implemented reforms, where a lower speed is preferred.

The sharply diverging results of Dollar and Svensson (1998) and this study needs to be further investigated. If the differences result from the underlying fact that the World Bank definition of successful structural adjustment does not incorporate a firm response from the private investment sector, a more specific definition of what successful adjustment actually implies must be used in future research. Furthermore, why successful adjustment does not seem to be linked to private investment is also an issue for further research.

Appendix 1. Loans included in long-run sample[45]

ARG86	ARGENTINA	-
ARG87	ARGENTINA	+
ARG88	ARGENTINA	+
BOL87	BOLIVIA	-
BOL88	BOLIVIA	-
BRA86	BRAZIL	+
CHI86	CHILE	+
CHI87	CHILE	+
CHI88	CHILE	+
COL85	COLOMBIA	+
COL86	COLOMBIA	-
COL88	COLOMBIA	+
COS85	COSTA RICA	+
ECU86	ECUADOR	+
ECU88	ECUADOR	+
GHA83	GHANA	+
IDN88	INDONESIA	+
JAM82	JAMAICA	+
JAM83	JAMAICA	+
KEN80	KENYA	-
KEN83	KENYA	-
KEN86	KENYA	-
KEN88	KENYA	-
KEN89	KENYA	-
MLW84	MALAWI	+
MLW86	MALAWI	+
MLW88	MALAWI	-
MAU84	MAURITIUS	+
MAU87	MAURITIUS	+
MEX83	MEXICO	+
MEX87	MEXICO	+
MEX88	MEXICO	+
MOR85	MOROCCO	+
MOR86	MOROCCO	+
MOR87	MOROCCO	-
MOR88	MOROCCO	-
PAK81	PAKISTAN	+
PAK82	PAKISTAN	+
PAK85	PAKISTAN	+
PAK86	PAKISTAN	+
PHI83	PHILIPPINES	-
PHI85	PHILIPPINES	-
PHI87	PHILIPPINES	+
PHI88	PHILIPPINES	+
THA82	THAILAND	+
THA83	THAILAND	+
TUN87	TUNISIA	-
TUN88	TUNISIA	+
TUR80	TURKEY	-
TUR81	TURKEY	+
TUR82	TURKEY	+
TUR83	TURKEY	+
TUR84	TURKEY	+
TUR85	TURKEY	+
TUR86	TURKEY	+
TUR87	TURKEY	+
TUR88	TURKEY	+
URU87	URUGUAY	+

[45] Data on risk of expropriation is not available for Mauritius.

Appendix 2. List of variables and databases

Dependent variables:

PRIVI	Private investment/GDP average growth, long run. EMDB and WDR
PRIVIS	Private investment/GDP average growth, short run. EMDB and WDR

Program design variables:

AMT	World Bank adjustment loan amount, commitment. ALCID
ERLAG	Number of economic recovery loans received in previous five-year period. ALCID
FOR	Yearly average amount of foreign assistance/GDP in the six-year period after reform. GDF
MAGNITUDE	Principal component consisting of program outcome variables. See sources below.
SPEED	Timing of loan conditions, front load or back load. ALCID
SLOANS	Number of SALs received in succeeding six-year period. ALCID

Program outcome variables:

CA	Current account surplus before official transfers/GDP, average change. WDI
DSR	Debt service to export ratio, average change. GDF
INFL	Rate of inflation, average level. IFS
INFLSQ	Rate of inflation, average level. squared. IFS
INTL	Real interest rate, average level. IFS
INTLSQ	Real interest rate, average level squared. IFS
PUBI	Public investment/GDP, average change. EMDB and WDR
RER	Real exchange rate, average change. IFS

Control variables:

GOVREP	Government repudiation of contracts index, 0-10. International Country Risk Guide, (IRIS)
PCG	Real per capita GNP average growth. WDI
PINSTAB	Political instability index. Banks
PRIVIB	Private investment/GDP, benchmark level. EMDB and WDR
ROEXP	Risk of expropriation index, 0-10. IRIS, International Country Risk Guide
TOT	Terms of trade, average change. WDI
WAR	War dummy. Banks

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Table 1. Private investment as a share of GDP, regional averages.

Region	1970-1995	1970-1979	1980-1989	1990-1995
South & East Asia	15.1	12.4	17.5	18.0
Latin America & the Caribbean	12.0	12.2	11.5	12.6
Sub-Saharan Africa	8.7	9.9	7.6	8.8
All LDCs	11.6	11.3	11.0	13.2
Total number of observations	862	296	377	189
Total number of countries	43	32	43	32

Table 2. Private investment.

	PRIVIS short run response	*PRIVI* long run response
Mean	14.32	22.81
Median	8.25	14.73
Obs	58	58

Table 3. Correlation matrix for explanatory variables.

	PRIVIB	*TOT*	*PCG*	*MAG*	*SCOPE*	*SPEED*	*CA*	*INTL*	*INFL*	*RER*	*DSR*	*PUBI*	*AMT*	*SLOANS*	*ERLAG*	*WAR*	*ROEXP*	*PINSTAB*	*GOVREP*
PRIVIB	1.00	0.16	0.26	-0.34	-0.09	-0.16	-0.05	0.15	0.08	-0.28	-0.23	-0.43	0.37	0.02	-0.18	0.28	-0.11	0.10	0.00
TOT		1.00	0.11	-0.19	-0.08	-0.08	0.11	-0.12	0.05	-0.25	-0.15	-0.25	0.24	0.13	0.59	0.46	0.18	0.12	-0.10
PCG			1.00	-0.04	0.15	0.04	0.20	-0.31	0.20	0.01	0.05	-0.16	0.06	0.02	0.01	0.47	0.04	-0.01	0.21
MAG				1.00	0.15	0.08	0.05	-0.21	-0.52	0.89	0.81	0.73	-0.45	0.21	0.01	-0.08	-0.26	0.31	0.02
SCOPE					1.00	-0.05	0.03	-0.19	-0.01	0.19	0.12	0.01	-0.33	0.07	0.18	-0.17	0.04	-0.35	0.10
SPEED						1.00	-0.11	-0.05	-0.15	-0.09	-0.07	0.23	-0.18	-0.05	-0.07	-0.03	0.01	0.05	0.08
CAB							1.00	0.08	0.07	0.10	0.09	0.01	-0.31	-0.01	0.12	0.26	-0.23	0.05	-0.22
INTL								1.00	-0.13	-0.13	-0.15	0.06	0.24	-0.30	-0.15	-0.19	0.18	-0.10	0.17
INFL									1.00	-0.18	-0.15	-0.13	0.20	0.17	-0.03	0.10	-0.03	-0.06	-0.20
RER										1.00	0.80	0.75	-0.37	0.29	-0.06	-0.07	-0.28	0.27	-0.05
DSR											1.00	0.54	-0.34	0.27	0.04	0.03	-0.34	0.28	-0.04
PUBI												1.00	-0.35	0.19	-0.13	-0.26	-0.16	0.35	0.01
AMT													1.00	0.02	0.03	0.29	0.45	-0.15	0.24
SLOANS														1.00	0.05	0.16	-0.36	0.21	-0.40
ERLAG															1.00	0.28	0.04	0.20	-0.10
WAR																1.00	-0.07	0.27	-0.02
ROEXP																	1.00	-0.67	0.72
PINSTAB																		1.00	-0.47
GOVREP																			1.00

Table 4. Variable averages.

Variable	Long run overall level average	Long run positive *PRIVI* sample	Long run negative *PRIVI* sample
PRIVIB	11.05	10.99	11.23
PCG	2.45	3.03	0.94
TOT	-5.24	-1.51	-15.04
CA	-12.77	-25.57	20.82
INFL	39.50	28.35	68.75
INTL	4.49	5.10	2.87
RER	16.18	19.88	6.47
DSR	-6.39	-7.42	-3.71
PUBI	-5.94	-6.87	-3.48
SPEED	0.45	0.43	0.50
SCOPE	4.14	4.21	3.94
AMT	202.04	218.71	158.27
SLOANS	2.81	2.60	3.38
ERLAG	0.76	0.83	0.56
WAR	0.60	0.67	0.44
ROEXP[46]	6.01	6.19	5.57
PINSTAB	0.11	0.10	0.15
GOVREP	5.45	5.59	5.12
Obs	58	42	16

[46] Data is lacking for Mauritius.

Table 5. Private investment growth regressions. Dependent variable is *PRIVI*.

Variable	Regression eq. 1		Regression eq. 2		Regression eq. 3		Regression eq. 4	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
PRIVIB	-3.05	0.00	-3.68	0.00	-4.02	0.00	-3.63	0.00
TOT	0.81	0.00	0.79	0.00	0.87	0.00	0.85	0.00
PCG	3.48	0.00	2.88	0.01	3.58	0.01	2.79	0.01
MAGNITUDE	7.36	0.00	6.75	0.01				
SCOPE	3.29	0.19	5.20	0.01	4.04	0.03	4.98	0.01
SPEED	-22.09	0.11	-18.44	0.19	-11.72	0.49		
CA					-0.02	0.03		
INTL					0.14	0.15		
INFL					-0.02	0.15	-0.02	0.04
RER					0.17	0.01	0.14	0.00
DSR					-0.06	0.50		
PUBI					-0.05	0.65		
AMT	0.06	0.07	0.08	0.00	0.05	0.03	0.08	0.00
SLOANS	-3.52	0.08	-4.63	0.01	-4.13	0.02	-5.07	0.01
ERLAG	6.40	0.09	4.53	0.12	5.61	0.07	4.86	0.08
WAR	-7.77	0.30						
PINSTAB	-14.02	0.72						
GOVREP	0.12	0.98						
ROEXP	3.46	0.60						
C	27.27	0.49	41.00	0.01	44.23	0.01	33.13	0.01
Adjusted R-squared	0.68		0.68		0.69		0.70	
Nob	56		58		58		58	

Table 6. Regression analysis for potential endogenous variables

Variable	Dependent variable		Dependent variable	
	SCOPE		*SPEED*	
	Coefficient	Prob.	Coefficient	Prob.
PRIVIB	0.05	0.28	-0.01	0.51
SCOPE			-0.01	0.72
SPEED	-0.31	0.72		
AMT	-0.00	0.02	-0.00	0.26
ERLAG	0.55	0.00	-0.02	0.55
WAR	-0.19	0.62	0.02	0.75
ROEXP	-0.54	0.13	0.03	0.67
PINSTAB	-7.47	0.00	0.24	0.53
GOVREP	0.31	0.24	0.02	0.63
C	6.64	0.00	0.32	0.36
Adjusted R-squared	0.32		-0.07	
Nob	56		56	

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