APRIL 1995

AERC SPECIAL PAPER NINETEEN

FISCAL ADJUSTMENT AND GROWTH: IN AND OUT OF AFRICA

KLAUS SCHMIDT-HEBBEL

AFRICAN ECONOMIC RESEARCH CONSORTIUM

CONSORTIUM POUR LA RECHERCHE ECONOMIQUE EN AFRIQUE

ISN-151156

IDS Information Resource Unit
University of Sussex
Falmer, Brighton BN1 9RE, UK

PLEASE RETURN BY

31/1/97

26.2.99

Fiscal adjustment and growth: In and out of Africa

LIBRARY
30 JUN 1995
Institute of
Development Studies

IDS
000625

Other publications in the AERC Special paper Series:

Supply response in the context of structural adjustment in sub-Saharan Africa by T. Ademola Oyejide, Special Paper 1.

Structure, development and adaptation by Tony Killick, Special Paper 2.

The African debt crisis by Joshua E. Greene and Mohsin S. Khan, Special Paper 3.

International debt management in Africa by Alan R. Roe with Jonathan Griggs, Special Paper 4.

Graduate training in economics for Africans: A joint report by S. Ibi Ajayi, H. Jacques Pegatienan and Mohamed Mukras, Special Paper 5.

Graduate training in economics in Nigeria and Ghana by S. Ibi Ajayi, Special Paper 6.

Graduate training in economics in francophone west and central Africa by H. Jacques Pegatienan, Special Paper 7.

The state of graduate training in economics in eastern and southern Africa by Mohamed S. Mukras, Special Paper 8.

A strategy for graduate training in economics for Africans by Jeffrey C. Fine, Special Paper 9.

Graduate training in economics with particular reference to anglophone Africa (except Nigeria) by Mohamed S. Mukras, Special Paper 10.

Nigeria's graduate training opportunities in economics by S. Ibi Ajayi and Mike Kwanashie, Special Paper 11.

Trade policy and promotion in Sub-Saharan Africa by William M. Lyakurwa, Special paper 12.

Macroeconomic policies and long-term growth: a conceptual and empirical review by Mohsin S. Khan and Delano Villanueva, Special Paper 13.

Employment issues in Sub-Saharan Africa by Jan Vandemoortele, Special Paper 14.

Recent developments in econometric methods: an application to the demand for money

in Kenya by Christopher S. Adam, Special paper 15.

A review of recent developments in the second economy in Tanzania by M.S.D. Bagachwa and A. Naho, Special paper 16.

Human capacity building of professionals in Sub-Saharan Africa: A case study of economist in Ethiopia by Befekadu Degefe, Special paper 17.

Financial policies and economic growth: Theory, evidence, and country specific experience from sub-Saharan Africa by Peter J. Montiel, Special paper 18.

Fiscal adjustment and growth: In and out of Africa

Klaus Schmidt-Hebbel
The World Bank

AERC Special Paper 19
African Economic Research Consortium, Nairobi
April 1995

© African Economic Research Consortium 1995

Published by the African Economic Research Consortium,
P.O. Box 62882,
Nairobi, Kenya.

Printed by The Regal Press Kenya Ltd.,
P.O. Box 46166,
Nairobi, Kenya.

ISBN 9966-900-36-5

Contents

List of tables
List of figures
Acknowledgements
Abstract

I	Introduction	1
II	Fiscal adjustment and macroeconomic performance across the world	3
III	How does macroeconomic performance affect public deficits and tax revenue	14
IV	Fiscal adjustment, macroeconomic instability, and growth	22
V	Two country cases: Ghana and Zimbabwe	31
VI	Conclusions	38

Notes 40
References 44
Appendix 51

List of tables

1. Public deficit by world regions, Various periods 4
2. Conventional tax revenue by world regions, 1960-90 6
3. Unconventional tax revenue in industrial and developing countries 7
4. Macroeconomic instability index by major world regions, 1970-90 10
5. Per capita GDP growth by kanor world regions, various periods 11
6. Simple correlation coefficients between fiscal and macroeconomic variables for 1970-92 country averages 13
7. Sensitivity of non-financial public sector deficits to changes in macroeconomic determinants, Zimbabwe 1988 15
8. Average contribution of foreign, domestic and fiscal policy variables to the changes in CNFPS deficits in Chile, Ghana and Zimbabwe 16
9. The impact of inflation and real exchange rate devaluations on tax revenue: Country evidence from tax revenue functions 18
10. Long term tax revenue 20
11. Long-term macroeconomic instability and public deficit 25
12. Growth, fiscal balance, macro instability, and determinants of macro instability 26
13. Growth and macroeconomic instability 28
14. Growth and determinants of macroeconomic instability 29
15. Ghana: Selected macroeconomic indicators, 1961-92 32
16. Zimbabwe: Selected macroeconomic indicators, 1980-93 35

List of figures

1.	Public sector balance	4
2.	Tax revenue	6
3.	Macroeconomic instability index	10
4.	Per capita GDP growth rate	11
5.	Ghana: fiscal balance, macroeconomic instability, and per capita GDP growth	33
6.	Zimbabwe: Fiscal balance, macroeconomic instability, and per capita growth	36

Acknowledgements

I am indebted to Ali J. Ali, David Bevan, Ibrahim Elbadawi, Jan Gunning and participants at the Plenary Session of the May 1994 AERC Workshop in Nairobi (Kenya) for useful comments and discussions. I thank Raimundo Soto for valuable suggestions and proficient assistance in preparing this paper. The usual disclaimer applies.

Abstract

A deep rift separates Africa and Latin America (and to a lesser extent Asia) from OECD countries with regard to fiscal adjustment, macroeconomic performance, and long-term growth. Case-study and cross-country econometric evidence drawn from a large world sample is provided to explain at least part of the OECD's better performance. This allows evaluation of Africa's generally dismal experience in the wider context of world development.

Public deficits are sensitive to short-term domestic and foreign macroeconomic shocks but policy makers — not macro shocks — are to blame for persistent deficits and to compliment for sustained fiscal adjustment. Long-term tax revenue rises with per capital GDP. Inflation inhibits tax collection in all regions except Africa while adverse terms-of-trade shocks reduce tax revenue only in Africa. Taxation is much heavier in OECD countries than in developing nations, even after controlling for differences in the levels of development and inflation.

Low public deficits and central bank independence contribute significantly to macroeconomic stability. However, after controlling for these two variables, macroeconomic stability is still significantly lower in Africa than in the rest of the world. Fiscal adjustment does not help growth directly because it does not always provide more resources for overall domestic investment. Instead the contribution of lower public deficits to growth is indirect by enabling a more stable macroeconomy. Overall macroeconomic stability is shown to be a major growth determinant while its individual components (inflation, real exchange rate variability, foreign debt, and the black market premium) are typically not significant when taken individually. Africa — and Latin America too — is also different in its growth performance: it falls well below long-run growth in other developing and in industrialized regions, after controlling for all relevant growth determinants.

I Introduction

> "Twenty-nine African countries drew up adjustment programs in the 1980s .... Six of the adjusting countries had a large improvement in policies, nine a small improvement, and eleven a deterioration. As a whole, they cut their budget deficits (by a median of 1.9 percent of GDP between 1981-86 and 1990-91) and reduced inflation to moderate levels .... The six adjusting countries with the most improved macroeconomic policies had a median increase in GDP per capita growth of almost 2 percentage points between 1981-86 and 1987-91. That compares with an increase of 1.5 percentage points for those countries with less improved policies and a decline of 2.6 percentage points for those with a deterioration in policies" (World Bank, 1994, pp. 3-4).

Fiscal adjustment is a necessary but far from sufficient condition to achieve macroeconomic stability and growth, as shown by a growing body of empirical evidence (Sachs, 1989; Easterly, Rodriguez, and Schmidt-Hebbel, 1994). A growing number of cross-country studies focus on the negative effects of fiscal deficits and/or individual indicators of macroeconomic instability on long-term growth rates (Easterly, 1992; Edwards, 1992; Levine and Renelt, 1992; Ades and Chua, 1993; Chua, 1993; Corbo and Rojas, 1993; Easterly, Kremer, Pritchett, and Summers, 1993; Easterly and Rebelo, 1993; Fischer, 1993; Khan and Kumar, 1993; King and Levine, 1993). Barro and Lee (1993) and Easterly and Levine (1994) compare Africa's growth performance to that of other developing and industrialized countries, concluding that "Africa is different" as reflected by a large and significant negative effect of a dummy variable for Africa in cross-country growth regressions. Elbadawi and Ndulu (1994) decompose the explained difference in growth performance between Africa and other developing countries using regression results from ten cross-country studies. They conclude that the two main variables explaining Africa's dismal growth record have been the larger real exchange rate misalignment and the more adverse terms-of-trade shocks observed in Africa.

This paper differs from this literature in two dimensions. First, it disentangles the empirical relations between fiscal adjustment, conventional and unconventional taxation, macroeconomic stability, and growth. It does so by reviewing previous work (Easterly and Schmidt-Hebbel, 1994a; McMahon and Schmidt-Hebbel, 1995) and providing fresh econometric cross-country evidence on these relations. Second, by focusing on a world sample that includes sub-Saharan African economies, this paper extends the question "Is Africa Different?" — limited by the existing literature to the performance of growth —

to the behaviour of public deficits, taxation, and the level of overall macroeconomic instability.

Section II provides comparative cross-country information on long-run fiscal and macroeconomic performance, as well as their correlations, and discusses the ways in which fiscal and macroeconomic variables interact. Next the focus is on the causality from macroeconomic variables to public deficits and tax revenue, providing country evidence of the short-term impact of macroeconomic shocks on deficits and cross-country econometric evidence of the long-term effects of per capita income and inflation on tax revenue. Section IV looks at the inverse causality, running from fiscal adjustment to macroeconomic stability and growth. Following a two-stage approach, long-term cross-country results are provided first on the impact of fiscal surpluses on macroeconomic stability, and then, using a Barro-type growth equation, on the contribution of fiscal adjustment and macroeconomic stability to growth. Section V reviews briefly the experience of two African countries, Ghana and Zimbabwe, that illustrates how fiscal adjustment (or the lack thereof) contributes to macroeconomic health, and how the latter raises growth. A final section concludes.

II Fiscal adjustment and macroeconomic performance across the world

Fiscal adjustment and macroeconomic performance are closely related. As is widely recognized, fiscal indicators, like the deficit and the level of taxation, and macroeconomic performance indicators, like inflation, the current account, and growth, influence each other in both directions. This section summarizes the long-run performance — generally from the 1960s to the early 1990s — of fiscal and macroeconomic variables and their correlations across the world and by major industrialized and developing regions, including Africa.

Fiscal stance

The most widely used gauge of fiscal strength is the conventional measure of the public deficit, defined as the nominal (or total) deficit and frequently limited to the central or general government. But popularity does not guarantee economic relevance, and this is particularly true for this conventional indicator. In fact, nominal government deficits present major shortcomings as reliable indicators of fiscal stance, sustainability, and solvency.[1,2] However, in the absence of systematic cross-country estimates of correct deficit measures and assessments of fiscal sustainability, we are limited to using the conventional deficit as the only widely available indicator of fiscal health.

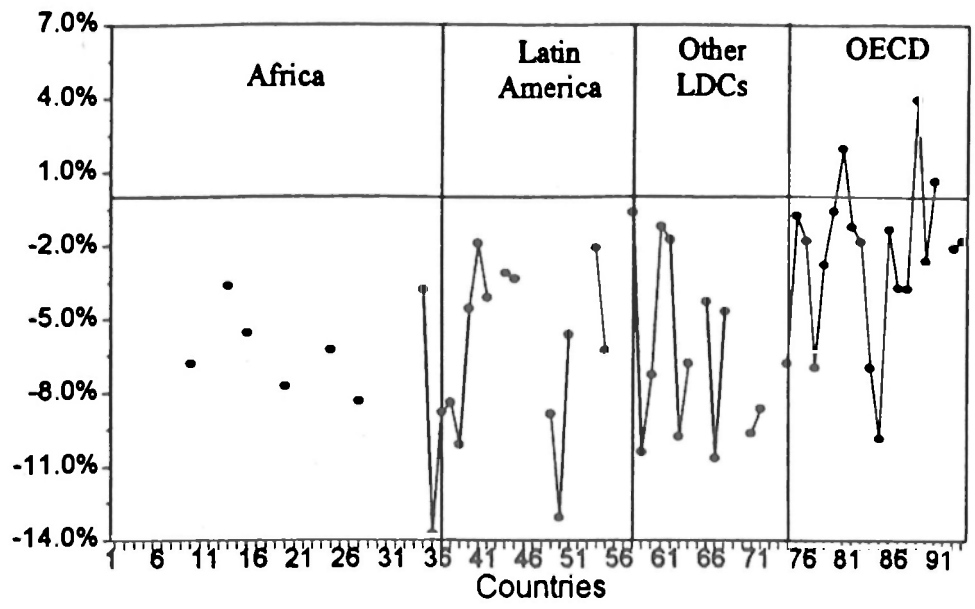
Table 1 and Figure 1 report evidence on nominal deficits of the public sector as ratios of GDP across the world. When available, the deficit measure refers to the consolidated non-financial public sector (CNFPS); alternatively, coverage is limited to the central or general government. The data reported here (and for other fiscal and macroeconomic variables in subsequent tables and figures below) reflect long-run averages of annual observations for each country (in the figures) and unweighted group averages of four major regions of developing and industrialized countries (in the tables) for a large country sample.[3] Time coverage ranges between 1960-1991 and 1970-1990 and sub-periods refer roughly to decades.

Table 1 Public deficit by world regions, various periods
(% of GDP)

	1970-79	1980-90	1970-90
Developing Countries	5.3	6.4	6.0
Africa	6.4	7.5	7.0
LAC	4.6	5.6	5.3
Other LDCs	4.5	6.1	5.6
OECD Countries	1.2	3.7	2.5
World	3.9	5.4	4.8

Source: See Appendix for country coverage.

Figure 1 Public sector balance (% of GDP) 1970-1990



Public deficits have been rising throughout the last two decades. At world level, the public deficit to GDP ratio has increased from 3.9% of GDP in the 1970s to 5.4% of GDP in the 1980s. This trend is common to all major world regions. However, the average long-term public deficit in LDCs — at 6.0% of GDP — exceeds by far the 2.5% of GDP observed in OECD countries. Among the three developing regions, Africa has the highest public deficit, at 7.0% of GDP. The long-term fiscal performance of Latin America and the Caribbean (LAC) and other LDCs is somewhat better, with figures of 5.3% and 5.6% of GDP, respectively.

There is substantial country variation in fiscal performance within each region (Figure 1). The (few) African observations vary between a minimum long-term deficit of 3.6% of GDP in Ghana and a maximum of 13.8% of GDP in Zambia. Even among OECD countries one finds massive differences in long-term public balances, ranging from a surplus of 4.0% of GDP in Norway to a 9.8% deficit in Italy. Variations over time are also common, as exemplified by some successful fiscal adjusters in the three developing regions like Ghana, Chile and Thailand that turned large deficits in the 1970s into small deficits or surpluses in the late 1980s and early 1990s.

A similar structural difference between developing and OECD countries is observed in the case of long-term conventional tax revenue (Table 2 and Figure 2). Average collection of conventional taxes attained only 15.7% of GDP in developing countries during 1960-1990, less than half the 35.3% average long-term tax revenue in the OECD. The larger tax shares in OECD countries suggest that public spending is a superior good, an hypothesis that will be tested below. Across the three developing regions tax revenue reaches a remarkably similar ratio to GDP. But within each region, country variations of up to 20% of GDP are observed.

Conventional taxes are the main form of public expenditure financing. However, two unconventional forms of taxation are often an important source for financing conventional public sector deficits: the implicit revenue collected from inflation and financial repression. In the absence of systematic cross-country evidence on inflation tax collection, Table 3 reports data on seignorage revenue — the sum of the inflation tax and the resources obtained from growing money demand — that therefore overstates the size of the underlying inflation tax.

On average, seignorage is a rather modest source of deficit revenue. In OECD countries, the 1.0% of GDP collected as seignorage is exceeded by the highest individual excise tax revenue, such as liquor or mineral oil, which has averaged 1.1% of GDP (Easterly and Schmidt-Hebbel, 1994a). In developing countries, seignorage at 2.1% of GDP doubles the level reached in OECD countries and also exceeds the largest individual excise tax revenue (at 1.1% of GDP), but still is low when compared to the significant economic costs of inflation.

Table 2 Conventional tax revenue by world regions, 1960-90
(% of GDP) %

Developing Countries	15.7
Africa	15.5
LAC	16.4
Other LDCs	15.0
OECD Countries	35.3
World	19.9

Source: See Appendix for country coverage.

Figure 2 Tax revenue (% of GDP) 1960-1990

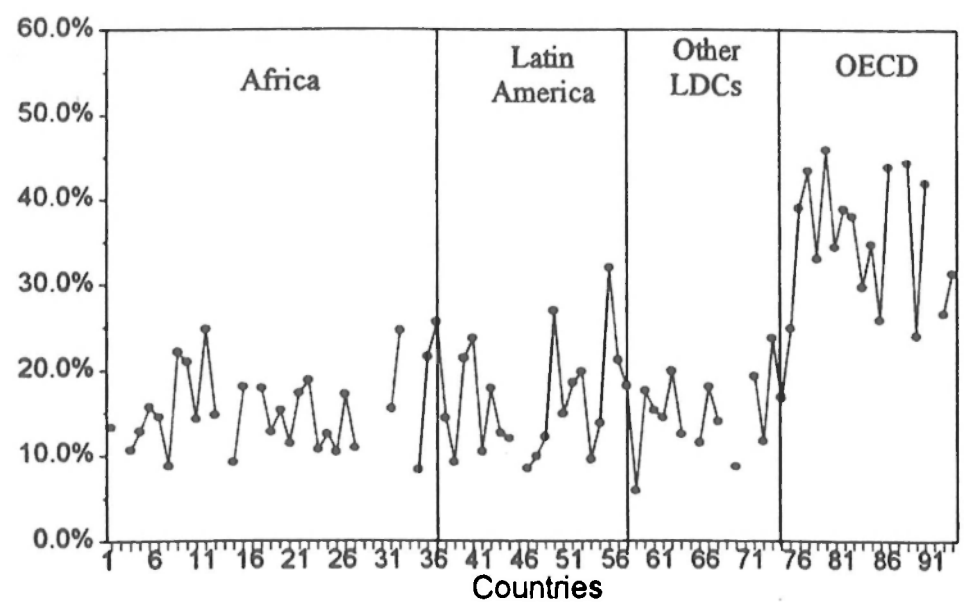


Table 3 Unconventional tax revenue in industrial and developing countries

1. Inflation and Seignorage, 1970-88

	Inflation rate (%)	Seignorage (% of GDP)
15 OECD Countries	8.5	1.0
35 Developing Countries	50.1	2.1
9 African Countries	23.4	2.1

Note: Unweighted averages of individual countries.
Date Source: Easterly and Schmidt-Hebbel (1994b)

2. Real Interest Rates and Financial Repression Tax Revenue, 1980-88

	Real interest rate (%)	Financial repression tax revenue (% of GDP)
Ghana	-18.3	0.5
Mexico	-8.4	1.6
Zimbabwe	-4.3	0.8

Note: The interest rate is the average annual ex-post real rate in time deposits of banking systems, calculated using CPI inflation. The implicit revenue due to financial repression is calculated as the difference between domestic real interest rates and the OECD real interest rate (0.9%) times the outstanding stock of deposits as percentage of GDP.
Source: Easterly and Schmidt-Hebbel (1994a).

In fact, inflation rises exponentially with seignorage (and beyond the maximum of the Laffer curve it declines with inflation)[4], as reflected by the fact that developing countries have an average rate of inflation of 50.1% per year, six times the average OECD inflation rate.

The nine African countries included in the sample show an average level of seignorage equal to that in other developing countries. However, Africa's inflation is only 23.4%, well below average inflation in other developing regions that include the

high-inflation Latin American countries.

Financial repression in the form of sub-market (and often negative) real interest rates is a second form of unconventional, implicit taxation. In three developing countries with significant negative real interest rates during 1980-88 (Table 3), financial repression has raised on average 1% of GDP. Its cost in terms of financial disintermediation and inefficient resource allocation has led many OECD and developing countries to liberalize their domestic financial markets throughout the last 20 years. In fact, financial repression taxation is on a world-wide decline.

We conclude that the three developing regions show a remarkably similar fiscal picture although a large country dispersion is observed within each individual region. Long-term fiscal deficit to GDP ratios at 6% are high in the developing world, almost tripling the deficit level in OECD countries. Conventional tax revenue is homogeneously low at around 15.7% of GDP in the three developing regions, a figure that is 20% of GDP below the OECD's tax collection. Developing countries often resort to unconventional forms of taxation: the implicit revenue collected from inflation and financial repression. These are ineffective ways of taxation; they collect little and sacrifice macroeconomic stability and financial development.

Macroeconomic performance

Macroeconomic performance is herein compared across world regions by using two measures: an index of macroeconomic health (or stability)[5] and GDP growth. To reflect overall macroeconomic stability, different frequently used indicators of macro performance are combined into one index. Among the possible indicators are four variables that are both frequently used and widely available for a large number of countries. They are: the annual inflation cost measure (inf)[6]; the coefficient of variation of the real exchange rate (the latter defined as the product of the nominal exchange rate to the US$ and the US CPI, divided by the domestic CPI) (rercv); the total foreign debt to GDP ratio (debt); and the percentage black market premium over the official exchange rate (prem). These four variables have been used (directly or through an appropriate transformation) in many cross-country studies of fiscal and growth performance (Easterly, Rodriguez, and Schmidt-Hebbel, 1994; Easterly and Rebelo; 1993; Fischer, 1993; Easterly and Levine, 1994). The disadvantage of using them individually is that they reflect a partial picture of macroeconomic health or stability, hence they are combined into one index of macro performance. Given their numerical similarity in a large cross-country sample, and in the absence of a welfare-based criterion for deciding on their weights, they are assigned equal weight by adding them to obtain the following index of macroeconomic instability (mins), which is negatively related to macroeconomic health or stability:[7]

$$\text{mins} = \text{inf} + \text{rercv} + \text{debt} + \text{prem} \quad (1)$$

Lack of macroeconomic stability is a general feature of developing countries (Table 4 and Figure 3). The index mins attains a long-term (1970-1990) value of 1.19 in the developing world, a figure almost five times the average level reached in OECD countries. The three developing regions show similarly high levels of instability, with Africa at 1.22 almost matching LAC's 1.25 value, while other LDCs show a slightly better macroeconomic performance at a level of 1.03. Country variations within each developing region are very large. In Africa, macroeconomic instability ranges from a low of 0.54 (Mauritius) to a high of 2.32 (Zambia). While the country dispersion is almost as large as LAC and other LDCs, OECD countries are homogeneously stable in their macroeconomic performance.

The second indicator of macroeconomic performance, per capita GDP growth, shows a dismal picture for Africa and Latin America (Table 5 and Figure 4). Average 1960-1991 growth at 1.3% per annum in all LDCs has been less than half the OECD growth rate during the same period. In addition, world growth declined from 2.4% in the 1960s and 1970s to a bare 0.3% in 1980-1991. Africa's already modest growth in the 1960s and 1970s turned negative in the 1980s, reaching -0.6%, only surpassed by LAC's -0.8% during Latin America's "lost decade of development".

However, other LDCs, strongly influenced by East Asia, show a better average long-term growth performance, even surpassing the 2.7% long-term growth recorded in the OECD. The difference between growth rates in other LDCs and OECD, on one hand, and Africa and LAC, on the other, reflects increasing unconditional divergence in income levels among poorer and richer regions in the world.

As in the case of macroeconomic instability, much intra-regional variance characterizes each region's growth performance. Even when dismissing three high-growth outliers — Botswana, Korea, and Japan — Africa, LAC and other LDCs show major growth differences among their countries (see Figure 4). In the OECD, however, growth shows much less dispersion.

We conclude that developing regions differ markedly from the industrialized nations in regard to macroeconomic performance. Africa and LAC (and other LDCs to a lesser extent) show high levels of macroeconomic instability in comparison to the OECD. Africa's and LAC's dismal growth performance stands in stark contrast to the high-growth path attained by other LDCs and OECD economies.

Table 4 Macroeconomic instability index by major world regions, 1970-90

Developing Countries	1.19
Africa	1.22
LAC	1.25
Other LDCs	1.03
OECD Countries	0.26
World	0.99

Note: See Appendix for country coverage.

Figure 3 Macroeconomic instability index (1970-1990)

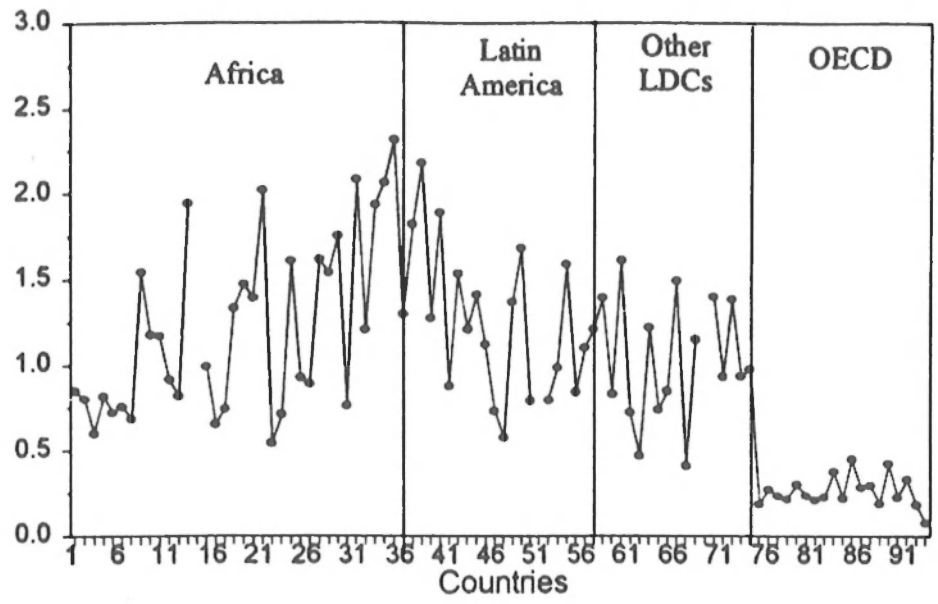
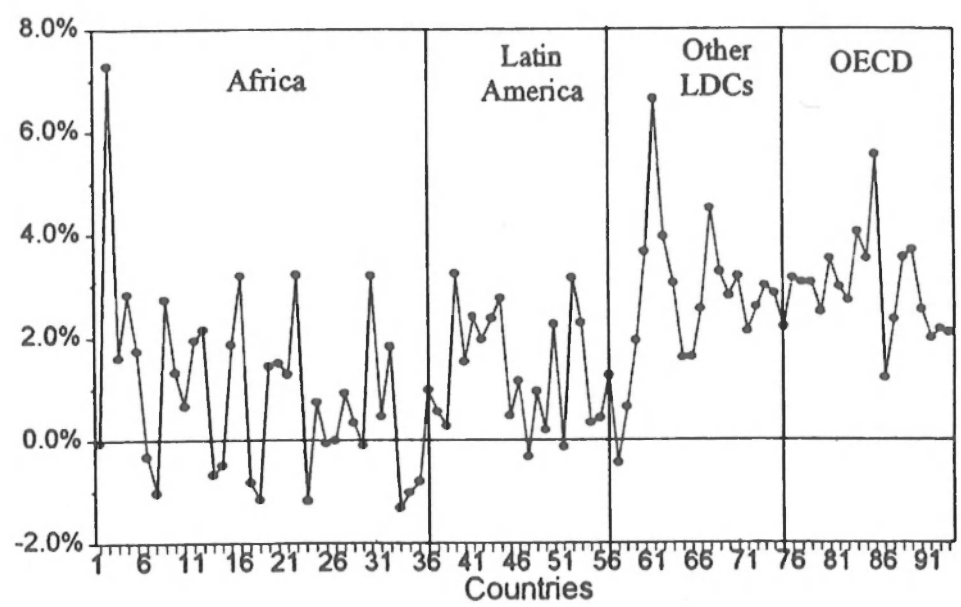


Table 5 Per capita GDP growth by major world regions, various periods (%)

	1960-69	1970-79	1980-91	1960-91
Developing Countries	1.9	2.3	0.0	1.3
Africa	1.2	1.6	-0.6	0.6
LAC	2.2	2.3	-0.8	1.0
Other LDCs	2.9	4.0	2.3	2.8
OECD Countries	4.2	2.6	1.6	2.7
World	2.4	2.4	0.3	1.6

Note: See Appendix for country coverage.

Figure 4 Per capita GDP growth rate (1960-1991)



Fiscal stance and macroeconomic performance; Correlation and causality

Public deficits and the macroeconomy are causally linked in both directions. On one hand, foreign and domestic macroeconomic shocks impinge on many components of public spending and revenue. For instance, lower export prices depress the revenue from export firms, higher inflation often shrinks the tax intake, and a domestic recession raises spending on social assistance and lowers the tax base. The reverse causality is observed when public deficits affect the performance of the overall economy. Public deficits affect domestic output, inflation, interest rates, and real exchange rates by magnitudes that depend on the extent of price rigidities, the way deficits are financed, and how the private sector responds to fiscal policy.

The two-way causality is one reason not to expect a strong correlation between public deficits and other economic variables. Other good reasons are that fiscal deficits are measured in different ways across countries, introducing some measurement error into the sample. In addition, the theoretical relations between deficits and other macroeconomic variables depend crucially on the means of financing the deficits.[8] And partial correlations may fail to be significant because of the omission of other variables. Despite these caveats, significant statistical relationship can be found between the deficit and many, though not all, macroeconomic performance variables.[9]

Making use of the cross-country data introduced above, simple cross-country correlations between average long-term fiscal and macroeconomic variables are reported in Table 6. The results show high long-run correlations between fiscal variables, measures of macro instability, and growth. By construction, the index of macroeconomic instability (mins) is highly correlated with each of its four additive components: the inflation measure (inf), real exchange rate variability (rercv), the foreign debt to GDP ratio (debt), and the black-market premium (prem).

More interestingly, the correlation coefficients between macroeconomic instability and the public sector balance to GDP ratio (fibal) and tax revenue (tax) are high (-0.55 and -0.69, respectively). Both fibal and tax show high individual correlations, in the range of -0.55 to -0.64, with two determinants of mins: foreign debt (debt) and the black market premium (prem). However, fiscal variables are only weakly correlated with inflation. The low correlation between fibal and inf suggests that the inflation tax is only one among many ways to finance budget deficits. The correlation between tax and inf is stronger (-0.40), suggesting that conventional taxation and inflation taxation are either financing substitutes or that inflation reduces tax revenue directly through Keynes-Olivera-Tanzi effects. This hypothesis is subject to more systematic testing below.

With regard to the correlations between growth and fiscal variables it is interesting to note the positive but weak correlation between per capita GDP growth (g) and tax, and the larger positive correlation between g and fibal. Much larger, however, are the

negative correlations between growth and two components of macro instability (debt and prem), and, in particular, between growth and our overall indicator of macro instability (-0.64).

Three preliminary inferences can be drawn from this set of associations between fiscal variables and indicators of macroeconomic performance. First, the fiscal balance is a useful indicator of macroeconomic health despite problems of comparability across countries, simultaneity in causal relations, and misspecification. Second, the fiscal balance is strongly and negatively correlated with macroeconomic instability. Third, growth is more strongly correlated with macroeconomic instability than with fiscal deficits. However, before drawing strong inferences from bivariate correlations we have to focus more carefully on the bi-directional causality between deficits and macro variables. This is the purpose of the next two sections.

Table 6 Simple correlation coefficients between fiscal and macroeconomic variables for 1970-92 country averages (49 developing and OECD countries)

	fibal	tax	inf	rercv	debt	prem	mins	g
fibal	1	0.41	-0.18	-0.08	-0.62	-0.54	-0.55	0.41
tax		1	-0.40	-0.28	-0.63	-0.64	-0.69	0.28
inf			1	0.36	0.40	0.39	0.64	-0.29
rercv				1	0.30	0.42	0.59	-0.24
debt					1	0.64	0.86	-0.59
prem						1	0.86	-0.65
mins							1	-0.64
g								1

Note: see Appendix for country coverage.

III How does macroeconomic performance affect public deficits and tax revenue?

This section looks at the ways in which certain macroeconomic variables affect public deficits and tax revenue. First the influence of macroeconomic shocks on public deficits is discussed, comparing it to the role of fiscal policy variables in shaping deficits. Then country level empirical evidence is provided for the role of inflation, real exchange rate devaluation, and growth in determining the level of tax revenue in developing countries. Finally, systematic cross-country evidence on the effects of income levels, inflation rates, and terms-of-trade shocks on tax revenue is provided for a world sample.

How sensitive are public deficits to macroeconomic shocks and policy changes?

Changes in the foreign and domestic macroeconomic environment impinge directly or indirectly on public sector revenue and expenditure items. Zimbabwe provides an illustration of the sensitivity of public budgets to changes in foreign and domestic macroeconomic variables in the late 1980s (Table 7). The domestic real interest rate has a significant effect on the deficit, resulting from Zimbabwe's high domestic public debt. A one percentage point (pp) increase in the real interest rate raises the deficit by 0.4 pp of GDP, as domestic debt to GDP stands at 40%. Interestingly, inflation has a lower positive effect on the deficit than the real interest rate. The reason is that the 0.40 effect on the deficit via higher nominal interest payments of a 1 pp rise in inflation is in part compensated by the positive bracket-creep effect of inflation on income taxation. A devaluation contributes to a slightly lower deficit in Zimbabwe: the increase in the foreign interest bill is more than compensated by higher tax collection from import taxes and direct taxes on traded-goods producing sectors. Finally, growth has a strong negative effect on the public deficit.

Table 7 Sensitivity of non-financial public sector deficits to changes in macroeconomic determinants: Zimbabwe 1988

Changes in domestic and foreign macroeconomic determinants	Changes in NFPS Deficit (Percentage Points of GDP)	
1 pp increase of domestic inflation		0.31
1 pp increase of domestic real interest rate		0.40
1 % devaluation of real exchange rate	-0.06	
1 pp increase of foreign interest rate	0.25	
1 % growth of real GDP		-0.37

Note: based on 1987/88 and 1988/89 CNFPS budgets. pp = percentage points.
Source: Morandé and Schmidt-Hebbel (1994).

This example illustrates the strong effects of macroeconomic shocks on the short-run behaviour of public budgets. The central question to be addressed now is how significant these shocks are relative to variables under the control of fiscal policy makers in shaping fiscal outcomes. This issue is addressed by comparing the role of fiscal policy variables with the influence of foreign and domestic macro variables in the medium to long-term evolution of public deficits. Based on the deficit decomposition methodology by Marshall and Schmidt-Hebbel (1989a,b), changes of public sector deficits are attributed to changes in the three groups of deficit determinants: foreign macroeconomic, domestic macroeconomic, and fiscal policy variables (the latter controlled by policy makers). The relative contribution of each group of deficit determinants, averaged over long periods, is summarized for Chile, Ghana and Zimbabwe in Table 8.

Chile's fiscal experience reflects four distinct periods: massive fiscal stabilization (1974-76), consolidation of public sector retrenchment (1977-80), crisis and deficit explosion (1981-84) and, again, deep fiscal stabilization (1985-89). Fiscal policy makers are the main actors behind this experience, achieving CNFPS surpluses of 1% to 4% of GDP in the late 1980s and early 1990s. On average, the relative contribution of fiscal policy variables to changes (and therefore to trend reduction) in the deficit is 142%. Hence the changes in fiscal policy variables more than compensated for the strongly negative contribution of domestic macroeconomic variables and the slightly negative contribution of external variables.

Ghana is a case of more gradual but similarly successful fiscal adjustment. The contribution of fiscal policy variables to this turn-around is also dominant, explaining on average 91% of the change in the deficit. Improvements in domestic macro variables helped to a small extent, contributing by 11% to the fluctuations and structural correction of the central government deficit in Ghana.

Table 8 Average contribution of foreign, domestic and fiscal policy variables to the changes in CNFPS deficits in Chile, Ghana and Zimbabwe (%)

	Relative Contribution of:		
	Foreign Macro Variables	Domestic Macro Variables	Fiscal Policy Variables
Chile (1974-89)	-1	-41	+142
Ghana (1971-89)	-2	+11	+91
Zimbabwe (1980-88)	-11	+1	+110

Note: The figures for Ghana for the 1971-1981 sub-period are fiscal-year data for 1971/72 - 1981/82, and those for Zimbabwe are for fiscal years throughout 1980-1988.

Source: Easterly and Schmidt-Hebbel (1994a).

Zimbabwe shows a substantial deterioration in its CNFPS budget after 1982 that is partly reversed by a limited fiscal stabilization started in 1988. Zimbabwean policy makers compensated for the influence of variables beyond their control: changes in fiscal policy variables explain 110% of the variation of public deficits, neutralizing the negative contribution of foreign interest shocks to the deficit.

A central conclusion emerges from these three cases: fiscal policy changes dominate in absolute terms these countries' experiences of fiscal adjustment or deterioration. External and domestic macroeconomic shocks play a minor, and often even negative, role in the medium-term variation and structural changes of public sector budgets. Active fiscal policies are both the main culprit in fiscal crises and an effective instrument in bringing about fiscal stabilization and adjustment. Fiscal policy makers are to blame for enduring public sector disequilibrium and to be praised for lasting fiscal adjustment.

Effects of macroeconomic stabilization and growth on taxation

There are various channels through which macroeconomic stabilization and growth affect tax revenue. Here the focus is on country evidence of how tax collection is affected by inflation, the real exchange rate, and output.[10]

Inflation affects tax collection in opposite ways, depending on the tax systems in place. Tax collection lags in non-fully indexed tax systems (for example, nominally fixed excise taxes) lead to declining real revenue when inflation increases (this is sometimes called the Keynes-Olivera-Tanzi effect).[11] Inflation also tends to lead to public demoralization and hence to lower compliance and enforcement of tax payments. However, if income brackets are non-indexed, higher inflation leads to bracket creep and hence higher direct taxation.

Evidence of the effects of inflation on tax revenue in six developing countries, based on results from estimated tax revenue functions,[12] shows a distinction between countries according to the net influence of inflation on tax revenue (Table 9). Inflation lowers taxes in Colombia (aggregate tax revenue) and in Ghana (both direct and indirect taxes). The opposite is true in Zimbabwe, where inflation raises direct tax revenue, a result of bracket creep as income tax brackets are not indexed to inflation. The third category of countries comprises Chile (direct and indirect taxes), Morocco (total taxes), Pakistan (direct, indirect, and trade taxes), and Zimbabwe (indirect and direct taxes), where inflation does not significantly affect tax collection. The reason could be that their tax systems display short collection lags, indexation of tax revenue, and indexation of income brackets.

The real exchange rate (RER) could also affect public revenue in either direction. Direct and indirect taxation on income or sales of traded goods is boosted by a depreciation, while the opposite happens to taxation on non-traded goods-producing sectors. Hence the net effect of the RER on tax revenue depends on the relative weight of traded and non-traded categories in total tax revenue. This is borne out by the evidence on the effects of the RER on tax revenue in three developing countries (Table 9). Total tax revenue declines with a real devaluation in Colombia, presumably because of the negative correlation between the RER and quantitative import restrictions or because of a highly elastic import demand.[13] The opposite is true for Ghana and Zimbabwe, where various revenue categories (direct and indirect taxes in Ghana, direct and trade taxes in Zimbabwe) are increased by devaluation. This is presumably because traded-goods activities (sales and production) are taxed more heavily than non-traded activities. Because the remaining tax categories are shown to be insensitive to the RER, aggregate tax revenue rises with a more depreciated RER in the latter two countries.

Finally, cyclical and trend output (or growth) affect taxation in different ways. Tax collection behaves pro-cyclically due to the strong correlation between output and most tax bases. Trend output or long-term growth tends to raise tax bases more than income. Should growth therefore be seen as a cure to public deficits? If growth is high enough, it is sometimes argued, tax bases expand and hence countries can grow out of deficits. This view is flawed for two reasons. First, it neglects the fact that not only tax bases but also successful pressures for higher public expenditure rise with output levels. Second, growth will not materialize if public deficits are large, inflation and real interest rates are high, and hence private investment is low.

Table 9 The impact of inflation and real exchange rate devaluations on tax revenue: country evidence from tax revenue functions

A. Effects of inflation on tax revenue

Negative	Zero	Positive
Colombia: Total taxes (1972-1987)	Chile: Direct taxes, indirect taxes 1973-1989)	Zimbabwe: Direct taxes (1970/71-1988/89)
Ghana: Direct taxes, indirect taxes (1970/71-1988)	Morocco: Total taxes	
	Pakistan: Direct taxes, trade taxes, indirect taxes (1972/73-1987/88)	
	Zimbabwe: Indirect taxes, total taxes (1970/71-1988/89)	

B. Effects of a RER devaluation on tax revenue

Negative	Positive
Colombia: Total taxes (1972-1987)	Ghana: Direct taxes, total taxes (1970/71-1988)
	Zimbabwe: Direct taxes, indirect taxes (1970/71-1988/89)

Source: Easterly and Schmidt-Hebbel (1994a).

What determines long-term tax revenue?

A stylized fact of development is the non-linear relationship between tax revenue and income: the share of total tax revenue in GDP ratio tends to rise with per capita GDP levels. The positive influence of income on taxation reflects the notion that both the will and the ability to tax increase with the level of development (Musgrave, 1959, 1969; Hinrichs, 1966; Gillis, 1989; Tanzi, 1991; Burgess and Stern, 1993). A second often-quoted empirical regularity is the negative influence of inflation on tax revenue. Inflation

has an ambiguous impact on tax revenue when bracket creep is observed. Otherwise, as discussed above, inflation unambiguously reduces tax revenue. The potential negative impact of the direct ways by which inflation affects conventional tax collection is increased by an indirect negative effect that arises when the inflation tax is a substitute for conventional taxation and as long as it remains at levels consistent with the left-hand or "correct" side of the money-demand Laffer curve. Finally, it is often stated that adverse terms-of-trade shocks erode tax revenue by reducing taxation on exports or income from exportable production.[14]

The influence of these three variables on tax revenue will be tested by using the following linear relation:[15]

$$\text{tax} = \gamma_0 + \gamma_1 \text{ lgdp} + \gamma_2 \text{ inf} + \gamma_s \text{ totsh} \qquad (2)$$

where tax is the tax revenue to GDP ratio defined above, lgdp is the log level of long-run average per capita real GDP, inf is the inflation measure introduced above, and totsh is the income loss from adverse terms-of-trade shocks as a ratio to GDP. Expected coefficient signs are:

$\gamma_0 \lessgtr 0; \gamma_1 > 0; \gamma_2, \gamma_3 < 0.$

Table 10 reports cross-country regression results for equation (2), adding a regional dummy variable for OECD countries (oecd). The sample comprises long-term (1960-1990) country averages for three different country groupings. The first set of four regressions for 70-77 developing and OECD countries shows that tax collection increases significantly with the level of development (proxied by GDP per capita) and falls unambiguously and significantly with inflation. Adverse terms-of-trade shocks tend to reduce tax collection, although their effect is barely significant at conventional levels and only when controlling for OECD countries. The significance of the OECD dummy in regressions 1.3 and 1.4 reflects the structural difference in tax collection between developing and industrialized economies.[16] It shows that OECD countries are able to collect 8 to 10 percentage points of GDP more than developing nations, after controlling for their higher development and lower inflation.

For the subset of 54-60 developing countries the qualitative conclusions derived from the all-country sample are confirmed, albeit individual and overall significance levels are lower than above. The evidence reported here dominates substantially the recent cross-country results obtained by Burgess and Stern (1993, p. 774) for the tax revenue ratio as a function only of the log of per capita GNP.[17]

For the sub-sample of 22-27 African countries the overall fit is superior to the larger subset of LDCs. The level of development is still the dominant determinant of tax

Table 10 Long-term tax revenue

(Cross-country regressions for three country groupings)

$tax = \gamma_0 + \gamma_1 lgdp + \gamma_2 inf + \gamma_3 totsh + \gamma_4 oecd$

Regression	Constant	lgdp	inf	totsh	oecd	R^2A	F	n
1. All Countries								
1.1	-0.025 (-0.3)	0.058 (11.7)	-0.212 (-2.1)	-0.014 (-1.6)	—	0.74	65.5	70
1.2	0.087 (0.9)	0.054 (11.0)	-0.303 (-3.0)	—	—	0.68	83.3	77
1.3	0.047 (0.5)	0.039 (5.8)	-0.164 (-1.8)	-0.014 (-1.9)	0.076 (2.9)	0.76	56.2	70
1.4	0.141 (1.6)	0.032 (4.0)	-0.208 (-2.5)	—	0.096 (3.2)	0.72	67.7	77
2. Developing Countries								
2.1	0.048 (0.5)	0.036 (5.1)	-0.14 (-1.6)	-0.011 (-1.5)	—	0.33	9.8	54
2.2	0.131 (1.5)	0.029 (3.5)	-0.178 (-2.1)	—	—	0.20	8.4	60
3. African Countries								
3.1	-0.199 (-0.9)	0.049 (5.0)	0.056 (0.3)	-0.016 (-2.5)	—	0.46	7.0	22
3.2	-0.073 (-0.4)	0.041 (4.3)	-0.016 (-0.1)	—	—	0.27	5.7	27
3.3	-0.135 (-2.9)	0.046 (6.0)	—	-0.017 (-2.6)	—	0.49	10.9	22

Note: OLS estimations with heteroskedasticity-consistent covariance matrix; See Appendix for country coverage

collection. But inflation drops out while adverse terms-of-trade shocks play a significant role in reducing the tax intake.

We conclude four points:

- The level of development is the single most important determinant of tax revenue.
- Inflation inhibits tax collection in all regions except Africa.
- Adverse terms-of-trade shocks are more important in Africa than in other regions in inhibiting tax collection, probably a reflection of Africa's heavier reliance on export taxation.
- OECD countries are able to collect more taxes than developing nations, after controlling for their higher level of development and lower inflation.

IV Fiscal adjustment, macroeconomic instability and growth

This section looks at the causality from fiscal stance to macroeconomic instability and to growth in a two-stage setting, relying on long-run cross-country regression results. First the influence of public sector surpluses and central bank independence on macroeconomic stability is assessed. Then the contribution of both fiscal surpluses and macroeconomic stability on long-run growth is measured, controlling for other determinants of cross-country growth differences.

Fiscal adjustment and growth

Fiscal adjustment could have contractionary short-term effects while being expansionary in the long term, particularly when the initial condition is one of a large fiscal disequilibrium associated with high macroeconomic instability and distorted financial markets. This trade-off between short-term economic costs and long-term economic benefits is often worsened by the political-economy costs of fiscal adjustment. Not surprisingly, decisive and consistent fiscal adjustment tends to be the exception rather than the rule.

The potential contractionary effects of deficit reduction depend on the incidence of an economy's market rigidities and externalities. Here the views vary between neo-Keynesians asserting the importance of these rigidities and neoclassicals dismissing them.[18]

The long-term effects of fiscal adjustment on growth depend on two channels: the resource contribution to higher domestic investment and the reduction in financial/monetary market distortions and macroeconomic instability.

Reducing public deficits involves by definition a combination of lower public investment and higher public saving. If the reduction in public investment is lower than the indirect contribution higher public saving makes to private investment, fiscal adjustment raises capital formation and hence growth. But the contribution of fiscal adjustment to growth through this first resource-flow channel is generally ambiguous.

Does higher public saving raise national saving, and does the latter translate into higher domestic investment? Empirical evidence shows that raising public saving is an effective contribution of public policy to raise national saving. The reason is that

Ricardian Equivalence (Barro, 1974) is typically rejected; when fiscal stabilization boosts public saving through cuts in current expenditure, the private sector does not offset this increase one-to-one but reduces its saving only by a fraction of the rise in public saving.[19] Explicit rejection of the Ricardian proposition for developing countries has been provided by Haque and Montiel (1989), Corbo and Schmidt-Hebbel (1991), and Easterly, Rodriguez, and Schmidt-Hebbel (1994).[20]

As long as financial markets are not completely open and domestic assets are imperfect substitutes for external assets, higher national saving will tend to reduce domestic interest rates and raise domestic investment. The international evidence supports this hypothesis. Frankel (1992) concludes that perfect capital mobility is rejected even for open OECD countries, as large real interest rate differentials are still observed. This implies that part of the increase in national saving will be reflected in higher domestic investment. However, the part of the increase in national saving that does not translate into more domestic investment, which hence is reflected by a lower current account deficit, is still important. Easterly and Schmidt-Hebbel (1994a) conclude for a sample of ten developing countries that a significant share of lower public deficits is reflected in lower current account deficits, providing evidence to Rodriguez' (1994) fiscal approach to the current account.

The second channel by which fiscal adjustment can contribute to growth stems from the shift in financing and improved fiscal stability derived from lower public deficits. The need for unconventional, distortionary, and unstable forms of taxation — mostly the inflation and financial repression taxes — diminishes when conventional, explicit, and more stable forms of taxation are strengthened and public expenditure is cut. This leads to financial deepening, lower relative price variability, and a more stable tax system. The resulting improvement in financial intermediation and macroeconomic stability improves resource allocation, raises the quantity and quality of private investment (see Corbo and Rojas, 1993; Pindyck and Solimano, 1993; and Serven and Solimano, 1994), and therefore raises growth (Easterly and Rebelo, 1993; Fischer, 1993; and Easterly and Levine, 1994).

We conclude that fiscal adjustment potentially affects growth through two channels. The first channel, based on the resource-flow effects of public investment and saving on domestic investment, is generally ambiguous. The second channel, based on the effects of improved financial intermediation and a more stable macroeconomic environment on resource allocation and the quality and quantity of private investment, is unambiguously positive. The empirical dimension of these channels is explored next.

Do fiscal surpluses and central bank independence contribute to long-term macroeconomic stability?

We start by looking at impact of public sector deficits on overall macroeconomic instability. We control for the degree of independence of the central bank as a

determinant of the monetary stance and hence of overall macroeconomic instability. For this variable we use the Cukierman *et al.* (1992) rate of average central bank board turnover per year (torb), a measure that is negatively correlated with central bank independence. A systematic way to identify the effect of public sector balances and central bank (in)dependence on macroeconomic instability is by estimating the following simple linear relation:[21]

$$\text{mins} = \alpha_0 = \alpha_1 \text{ fibal} + \alpha_2 \text{ torb} \qquad (3)$$

with expected coefficient signs: $\alpha_0 \lessgtr 0, \alpha_1 < 0; \alpha_2 > 0.$

Table 11 reports cross-country regression results for Equation 3, adding a regional dummy variable for Africa (africa). The sample comprises long-term (1970-1990) country averages for both developing and OECD economies. Both the public surplus and central bank independence have a significant influence on macroeconomic stability (regressions 1 and 2). Inclusion of the Africa dummy improves the overall fit and weakens somewhat the contribution of the fiscal balance to macroeconomic instability (regressions 3 and 4).[22] We conclude that across the world a prudent fiscal stance and central bank independence are significant determinants of macroeconomic stability. However, once controlling for these two determinants, macroeconomic stability is still significantly lower in Africa for reasons open to future inquiry.

Do public deficits and macroeconomic instability impair growth?

Empirical cross-country growth regressions have focused on the growth effects of both fiscal deficits and individual measure of macroeconomic instability such as inflation and the black market premium (see for instance Easterly and Rebelo, 1993; Fischer, 1993; Corbo and Rojas, 1993; Easterly and Levine, 1994; McMahon and Schmidt-Hebbel, 1995; and Elbadawi and Ndulu, 1994, for a survey). Here we follow an approach that differs in three ways from the existing literature. First, we control for the separate influence of the fiscal balance to check for the (generally ambiguous) first channel by which fiscal adjustment affects growth. Second, we include our measure of macroeconomic (in)stability, which reflects the second and unambiguously positive channel by which fiscal adjustment boosts growth. Third, our emphasis is on an aggregate measure of macroeconomic instability, which could be superior to using (some of) its individual components as growth regressors.

In order to test for the influence of the fiscal balance and macroeconomic instability we specify a cross-country long-term growth equation. The equation includes as right-

Table 11 Long-term macroeconomic instability and public deficits

(Cross-country regressions for 41-52 developing and OECD countries)

$$\text{mins} = \alpha_0 = \alpha_1 \text{ fibal} + \alpha_2 \text{ torb} + \alpha_3 \text{ africa}$$

Regression	Constant	fibal	torb	africa	R^2A	F	n
1.	0.30 (2.5)	-0.06 (-2.4)	1.37 (2.8)	—	0.31	9.9	41
2.	0.51 (4.4)	-0.09 (-4.9)	—	—	0.27	19.5	52
3.	0.31 (2.9)	-0.04 (-1.7)	1.18 (3.4)	0.79 (3.6)	0.48	13.2	41
4.	0.49 (4.5)	-0.07 (-4.0)	—	0.60 (3.4)	0.40	16.4	52

Note: OLS estimations with heteroskedasticity-consistent covariance matrix.

hand determinants a set of variables controlling for initial conditions and growth convergence ($lgdp_{60}$, the log of 1960 per capita GDP; $enpri_{60}$, the 1960 primary school enrollment rate; and $ensec_{60}$, the 1960 secondary school enrollment rate), our indicator of macroeconomic instability (mins), terms-of-trade shocks (totsh), structural development indicators (trade; the index of trade openness; and lly, the log of the ratio of liquidity to GDP), and a political development indicator (civl, the index of civil liberties).[23] The Barro-type endogenous-growth equation (Barro, 1989, 1990, 1991) is the following:

$$g = \beta_0 + \beta_1 \, lgdp_{60} + \beta_2 \, enpri_{60} + \beta_3 \, ensec_{60} + \beta_4 \text{ fibal} + \beta_5 \text{ mins} + \beta_6 \text{ totsh} + \beta_7 \text{ trade} + \beta_8 \text{ lly} + \beta_9 \text{ civl} \quad (4)$$

with expected coefficient signs: $\beta_0 \lesseqgtr 0$; $\beta_1, \beta_2, \beta_3, \beta_7, \beta_8, \beta_9 > 0$; $\beta_5, \beta_6 < 0$.

The sample comprises long-term (1960-1990) country averages for a variable number (48 to 82) of developing and OECD countries. Our strategy for estimating Equation (4) consists in checking first for the significance of both the fiscal balance (fibal) and macroeconomic instability (or its separate components) in explaining long-term

Table 12 Growth, fiscal balance, macro instability, and determinants of macro instability

(Cross-country regressions for 48-49 developing and OECD countries)

Regression	1	2	3	4
Constant	0.022	0.038	0.031	0.0445
	(0.9)	(1.7)	(1.3)	(1.9)
$lgdp_{60}$	-0.0018	-0.0011	0.0008	-0.0025
	(0.6)	(-0.5)	(0.2)	(-0.9)
$enpri_{60}$	0.000032	—	-0.0004	—
	(0.3)		(-0.5)	
$ensec_{60}$	-0.0003	—	-0.0003	—
	(-3.0)		(-2.7)	
fibal	0.0002	-0.0001	-0.0002	-0.0003
	(0.5)	(-0.3)	(-0.3)	(-0.8)
mins	-0.018	-0.019	—	—
	(-4.1)	(-7.0)		
inf	—	—	0.0008	-0.0072
			(0.1)	(-0.9)
rercv	—	—	-0.0029	0.0007
			(-0.2)	(0.04)
debt	—	—	-0.031	-0.023
			(-3.2)	(-3.5)
prem	—	-0.033	-0.003	
			(-4.3)	(-4.6)
totsh	-0.005	-0.004	-0.005	-0.004
	(-2.1)	(-2.0)	(-3.0)	(-2.8)
trade	0.005	—	0.011	—
	(1.0)		(2.0)	
lly	0.004	—	0.004	—
	(0.4)		(0.4)	
civl	0.002	0.004	0.002	0.003
	(1.1)	(2.4)	(1.4)	(2.2)
korea	0.033	0.031	0.036	0.034
	(7.4)	(8.4)	(8.3)	(8.0)
japan	0.039	0.033	0.037	0.028
	(4.9)	(11.3)	(4.3)	(5.5)
africa	-0.016	-0.014	-0.013	-0.011
	(-3.9)	(-3.6)	(-2.8)	(-2.7)
lac	-0.004	—	-0.001	—
	(-0.7)		(-0.3)	
R^2A	0.77	0.75	0.79	0.76
F	13.1	18.9	12.3	14.5
n	48	49	48	49

growth, controlling for all other growth determinants included in Equation (4). Table 12 reports the cross-country regression results.

Four country and regional dummies are added to Equation (4).[24] Regressions 1 and 2 contain macroeconomic instability (mins) as a regressor, while regressions 3 and 4 contain separately the four determinants of mins — instead of mins — as growth regressors. Regressions 2 and 4 omit some of the variables that are not significant in 1 and 3, respectively.

The main result to be highlighted here is that the contribution of the fiscal balance (fibal) is systematically not different from zero while the significance of macroeconomic instability (mins) is always negative and very high.[25] This suggests that the first channel through which fiscal adjustment could affect growth, by providing more resources for domestic investment, is empirically not significant, confirming its theoretical ambiguity. However, fiscal adjustment makes a very significant and positive contribution to growth by reducing macroeconomic instability. The second conclusion for this sample is that while mins is significant in regressions 1 and 2, when testing for the significance of its individual components (regressions 3 and 4), two of them are significant while the other two are not. The discussion of the role of other growth determinants is deferred to the next estimation stage.

The systematic non-significance of fibal justifies dropping this variable from the regression. This allows us to exploit a much larger country sample. Tables 13 and 14 report cross-country regression results for Equation (4), using a sample of long-term averages for 76-82 countries. Country and regional dummies are again added in some equations. Table 13 shows four results including mins as a regressor, while Table 14 reports four analogous results including the four determinants of mins as growth regressors.

The results show a significant role played by 1960 GDP per capita levels and primary school enrollment ratios in most regressions. Secondary school enrollment shows the wrong sign. Terms-of-trade shocks are not significant. The two structural determinants, trade and lly, are sometimes significant, typically depending on the inclusion of the dummy variables. The index of civil liberties is not significant here.

Country dummies for Korea and Japan are systematically significant, reflecting that growth in these two countries exceeds that in all other countries by 2-4 percentage points, after controlling for all other variables. Are Africa and LAC different from other regions? The answer is a resounding yes: after controlling for other factors, Africa grows on average by 1.6-1.7 pp less and LAC grows on average by 1.0-1.5 pp less than the OECD and other LDCs.[26]

Table 13 Growth and macroeconomic instability

(Cross-country regressions for 76-82 developing and OECD countries)

Regression	1	2	3	4
Constant	0.022 (0.9)	0.054 (3.2)	0.032 (1.9)	0.044 (2.3)
$lgdp_{60}$	-0.0004 (-0.1)	-0.0050 (-2.4)	-0.0037 (-1.6)	-0.0055 (-2.1)
$enpri_{60}$	0.0002 (2.3)	0.0002 (2.2)	0.0002 (2.8)	0.0002 (2.9)
$ensec_{60}$	-0.0002 (-1.8)	---	---	---
mins	-0.008 (-2.8)	-0.006 (-2.3)	-0.008 (-3.2)	-0.008 (-3.2)
totsh	-0.002 (-0.8)	---	---	---
trade	0.010 (1.9)	0.011 (2.3)	0.006 (1.3)	0.005 (1.1)
lly	-0.004 (-0.4)	0.001 (0.1)	0.017 (1.7)	0.021 (2.1)
civl	0.0006 (0.5)	---	---	---
korea	0.034 (9.8)	0.035 (11.0)	0.043 (15.6)	---
japan	0.040 (4.6)	0.027 (4.7)	0.019 (2.4)	---
africa	-0.017 (-3.8)	-0.016 (-3.7)	---	---
lac	-0.013 (-2.6)	-0.010 (-2.3)	---	---
R^2A	0.59	0.59	0.52	0.42
F	9.9	13.7	13.3	13.0
n	76	82	82	82

Table 14 Growth and determinants of macroeconomic instability

(Cross-country regressions for 76-82 developing and OECD countries)

Regression	1	2	3	4
Constant	0.027	0.054	0.032	0.045
	(1.1)	(3.3)	(2.0)	(2.7)
$lgdp_{60}$	-0.0003	-0.0045	-0.0034	-0.0052
	(-0.1)	(-2.1)	(-1.5)	(-2.2)
$enpri_{60}$	0.0002	0.0002	0.0002	0.0003
	(2.6)	(2.8)	(3.1)	(3.6)
$ensec_{60}$	-0.0002	—	—	—
	(-2.0)			
inf	-0.009	-0.004	-0.009	-0.007
	(-0.1)	(-0.3)	(-0.8)	(-0.5)
rercv	-0.023	-0.024	-0.025	-0.029
	(-1.5)	(-1.7)	(-1.5)	(-1.9)
debt	0.00004	0.004	0.001	0.001
	(0)	(0.7)	(0.3)	(0.2)
prem	-0.012	-0.008	-0.009	0.009
	(-1.6)	(-1.2)	(-1.3)	(-1.2)
totsh	-0.001	—	—	—
	(-0.7)			
trade	0.0052	0.004	-0.0005	-0.0020
	(0.7)	(0.7)	(-0.1)	(-0.3)
lly	-0.005	0.001	0.018	0.024
	(-0.4)	(0.1)	(1.9)	(2.6)
civl	0.000008	—	—	—
	(0)			
korea	0.033	0.033	0.041	—
	(3.0)	(3.0)	(12.2)	
japan	0.042	0.030	0.020	—
	(3.0)	(2.3)	(2.4)	
africa	-0.017	-0.016	—	—
	(-3.9)	(-3.8)		
lac	-0.015	-0.011	—	—
	(-3.1)	(-2.7)		
R^2A	0.59	0.60	0.52	0.43
F	8.3	11.1	9.9	8.8
n	76	82	82	82

Note for Tables 12 - 14: OLS estimations with heteroskedasticity-consistent covariance matrix

Data Sources: see Appendix.

Now consider the influence of macroeconomic instability on growth; mins reduces growth significantly in all four regressions, as reflected by a highly significant, average regression coefficient of -0.075. Given mins' average sample value of 0.26 in OECD countries, it reduces annual growth by 0.2 pp in that region. The much larger sample

value of mins in developing countries (equal to 1.19) leads to the important inference that macroeconomic instability reduces LDC growth by a very large amount: 0.9 percentage point per year.

What can be said about the individual contribution of the determinants that define mins? Table 13 shows that only in one out of 16 cases (4 regressors times 4 regressions) does an individual component of mins reach conventional levels of statistical significance. This leads to the conclusion that partial proxies for macroeconomic instability are not powerful growth inhibitors if taken individually. Growth is only depressed — and then massively — by overall macroeconomic instability.

We conclude three points. First, fiscal adjustment does not contribute to higher growth by providing more resources for domestic investment; the empirical non-significance of the fiscal balance confirms its theoretical ambiguity. Second, fiscal adjustment does make a very significant and positive contribution to growth by reducing macroeconomic instability. Mins is, however, not influenced only by fiscal adjustment. Third, while mins is a central and systematic growth determinant, its individual components are seldom significant when taken individually. Finally, Africa (and LAC) is different: its growth performance falls well below that in other (mostly Asian) LDCs and in OECD economies.

V Two country cases: Ghana and Zimbabwe

Ghana and Zimbabwe embody two strikingly different country experiences in Africa, vividly illustrating the links between fiscal adjustment, macroeconomic stability, and growth.[27] In 1983, after many years of high deficits, massive state intervention, and dismal growth, Ghana started a deep stabilization and structural adjustment program that led to a resumption of positive per capita growth. Zimbabwe, however, put off for 12 years a deeply needed program of fiscal stabilization and structural adjustment, reaping low growth and rising poverty. The country was hit by a major drought in 1992, which exposed its fragile public finances and distorted incentive structure, at the time it started a major stabilization and structural reform package.

These two country experiences, discussed in more detail below, illustrate three points. First, deep fiscal adjustment is necessary for achieving high growth. Second, sustainable fiscal adjustment can only be achieved as a result of a broader public sector reform that stabilizes general government finances, eliminates public enterprise deficits, and strengthens monetary policy by keeping it separate from fiscal or quasi-fiscal demands. Third, macroeconomic stabilization must be complemented by financial and trade liberalization to achieve a path of high private investment and growth.

Ghana

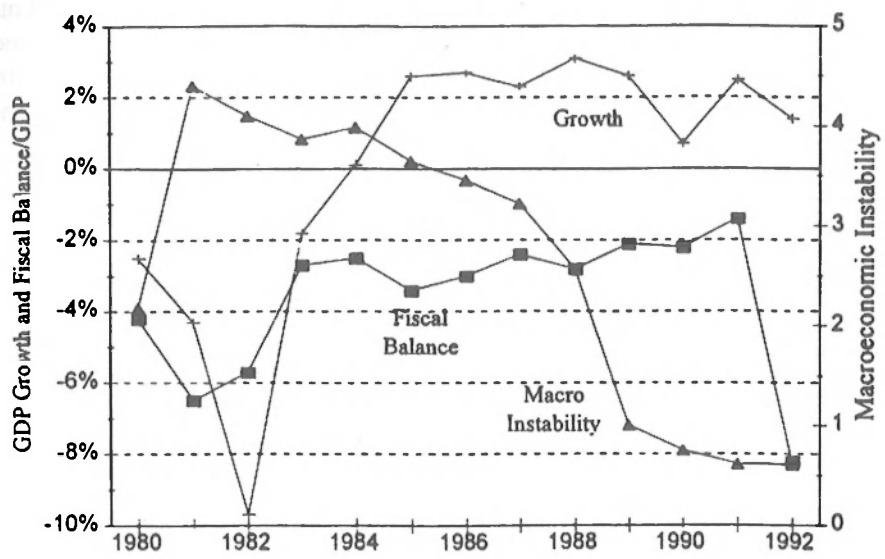
After achieving independence in 1957, Ghana embarked on a strategy based on import substitution and massive public investment in infrastructure and public enterprises that led to substantial fiscal deficits and increasing inflationary pressures (Table 15 and Figure 5). In 1972 a political crisis led to a military coup and the reversal of liberalization measures initiated in the late 1960s. Per capita growth fell to zero during the 1970s. Economic mismanagement peaked during 1979-1983, with extensive quantitative restrictions and controls that severely affected the private sector, inducing low investment, shortages, corruption, and widespread rent-seeking activities. In 1983, at the onset of the economic recovery program (ERP), the economy was in shambles: the consolidated fiscal deficit reached 6% of GDP, inflation exceeded 125%, GDP fell by 7%, and the black market exchange rate premium reached 2,700%.

Table 15 Ghana: Selected macroeconomic indicators, 1961-92

	1961 -66	1967 -71	1972 -77	1978 -83	1984	1985	1986	1987	1988	1989	1990	1991	1992
GDP growth (%)	3.0	4.3	0.3	-0.5	2.6	5.1	5.2	4.8	5.6	5.1	3.2	5.0	3.9
Per capita GDP growth (%)	0.4	2.0	-2.3	-2.7	0.0	2.5	2.5	2.1	2.9	2.4	0.7	2.6	1.3
Inflation (%)	11.8	3.9	41.4	73.2	39.7	10.3	24.5	39.8	31.4	25.2	37.2	18.1	10.0
Real Exchange Rate (Dec, 1989=100)	94.3	95.6	77.4	18.2	138.7	54.4	69.5	88.0	91.6	102.5	93.6	96.9	108.6
Black Market Premium (%)	60.0	70.0	170.0	850.0	269.0	141.0	107.0	42.0	24.0	16.0	-	-	-
Gross Domestic Investment (% of GDP)	16.8	12.3	10.4	4.9	6.9	9.5	9.4	10.5	11.0	13.6	14.4	15.9	12.6
Gross National Saving (% of GDP)	10.9	8.2	3.1	-0.8	7.4	7.4	8.6	8.4	9.3	11.8	10.9	12.3	7.1
Exports (% of GDP)	19.2	18.9	17.7	7.0	7.5	9.7	16.0	21.2	20.7	20.5	16.7	15.7	15.0
Imports (% of GDP)	24.6	20.8	16.6	7.9	7.7	11.6	17.7	23.4	21.0	28.1	25.8	23.7	26.8
Central Government Deficit (% of GDP)	6.4	3.4	10.0	6.1	1.8	2.2	-0.1	-0.6	-0.7	-0.8	-1.2	0.1	-5.9
Broad Coverage Fiscal Deficit (% of GDP)*					-2.5	-3.4	-3	-2.4	-2.8	-2.1	-2.2	-1.4	-8.2
Current Account Balance (% of GDP)**	-5.9	-4.1	-7.3	-5.7	-2.8	-4.2	-4.2	-4.9	-4.9	-5.8	-5.9	-6.5	-8.7
Foreign Debt (% of GDP)	na	na	na	35.0	39.7	43.6	49.1	47.5	42.6	45.0	43.4	42.7	45.5

Source: World Bank.
Note: *includes capital expenditures financed through foreign loans and grants, **before grants and official transfers.

Figure 5 Ghana: Fiscal balance, macroeconomic instability, and per capita GDP growth



The ERP implemented stabilization measures as well as trade and financial sector reforms. Fiscal deficits were reduced gradually, monetary expansion was restrained, price controls were lifted, producer prices for cocoa were raised substantially, and exchange rates and domestic interest rates were liberalized. The fiscal deficit was gradually reduced until 1991. Macroeconomic instability declined massively from a level of 4.4 in 1982 to 0.6 in 1992 as a result of fiscal adjustment, monetary restraint, and foreign exchange market liberalization. The realignment of the real exchange rate and agricultural liberalization supported the recovery of exports and investment; the latter increased from 9.4% of GDP in 1986 to 15.9% in 1991. Per capita growth resumed to reach positive (but only moderate) levels averaging 1.9% per year during 1985-92. National saving, however, did not adjust as fast as investment; the current account deteriorated from a deficit of 4.6% of GDP in 1986 to 7.0% in 1990, financed to a large extent by multilateral lending.

Despite the success of the ERP in fostering growth, Ghana remains vulnerable to adverse terms-of-trade shocks and its fiscal stability is still fragile. The country adopted a new constitution in 1992 and held its first democratic elections. Due to political pressure, the government granted a massive wage raise to public employees before the elections, contributing to the large increase in the deficit from 1.4% of GDP in 1991 to

8.2% in 1992. Monetization of the deficit led to a resurgence of inflation in 1993, which doubled to reach 25%. The cedi was devalued in nominal terms by 35% in 1992 and another 40% in the first 10 months of 1993.

Although some measures to correct macroeconomic imbalances were implemented in 1993 and GDP grew at 5%, the resistance of civil servants to wage cuts and the incomplete implementation of tax reforms are delaying the required fiscal adjustment. Its postponement would hinder the recovery of saving and investment and hence hamper Ghana's future growth performance.

Zimbabwe

At the time of independence in 1980, Zimbabwe was characterized by a policy regime that controlled most aspects of economic life and a dualistic economy, where the bulk of resources were allocated to a small white minority, at the expense of a large black majority that had very limited access to education, health, and other public services. As a result, the new government's strategy was aimed at reducing social inequality and inducing extensive state involvement in productive activities, as well as a highly regulated environment for private investment.

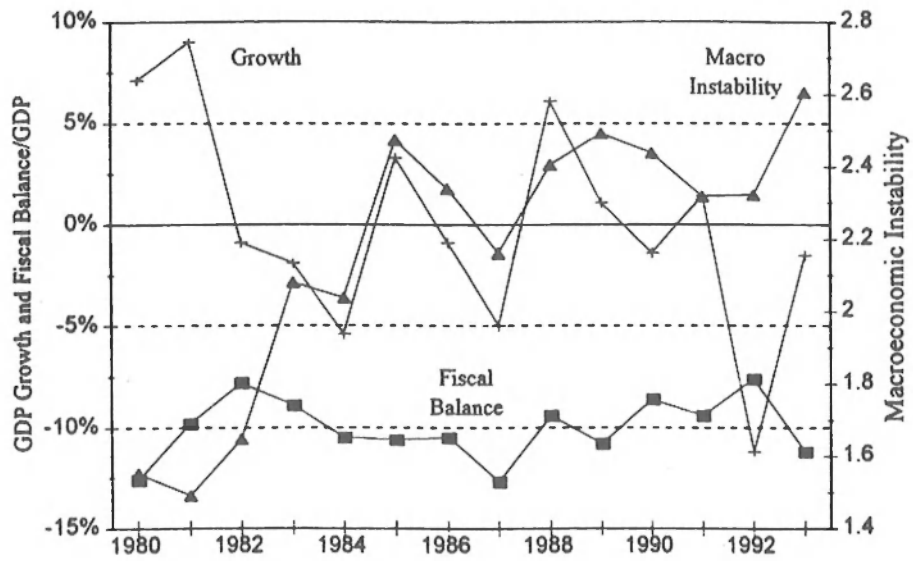
Despite important social achievements, improvements in the overall standard of living have been rather disappointing. Large public deficits, increasing macroeconomic instability, excessive market regulations, and recurrent droughts have hindered growth; per capita GDP remained stagnant during 1980-1993 (Table 16 and Figure 6). Public sector imbalances, worsened by a vast loss-making state-enterprise sector, have been at the heart of the country's difficulties. The deficit of the consolidated non-financial public sector, comprising the general government and public enterprises, shows double-digit levels in almost every year since 1981. Some fiscal adjustment was achieved in 1987, when the deficit was brought down from roughly 14% to 10% of GDP. Additional fiscal adjustment has been pursued since 1991 in the framework of a structural adjustment program, but has not been reflected in declining fiscal deficits in part due to the massively adverse budgetary impact of the 1991/92 drought.

Table 16 Zimbabwe: Selected macroeconomic indicators, 1980-93

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
GDP growth (%)	10.6	12.5	2.6	1.5	-1.9	6.8	2.6	-1.5	9.6	4.6	2.1	4.9	-7.7	2.0
Per capita GDP growth (%)	7.19	9	-0.9	-1.9	-5.4	3.3	-0.9	-5	6.1	1.1	-1.4	1.4	-11.2	-1.5
Inflation (%)	5.5	13.1	10.7	23.1	20.2	8.5	14.3	12.5	7.4	12.9	17.4	24.3	46.3	19.0
Real Exchange Rate (1980=100)	100	104.6	110.3	123.4	131.9	163.1	150.2	138.2	145.1	158.0	164.4	192.9	202.4	203.4
Black Market Exchange Rage Premium (%)	84.4	53.2	51.1	191.8	79.9	41.7	70.3	50.3	47.06	76.16	14.93	32.07	30.23	22.14
Gross Domestic Investment (% of GDP)	18.8	23.0	21.1	15.9	18.9	21.0	19.4	19.1	21.5	21.5	21.1	21.0	20.0	20.5
Gross National Saving (% of GDP)	13.2	11.5	10.0	7.5	15.2	17.5	18.4	19.1	22.7	20.3	16.7	12.6	4.9	15.5
Exports (% of GDP)	30.3	25.2	22.0	21.3	26.7	29.9	30.9	31.2	30.0	30.2	30.1	32.7	33.8	40.1
Imports (% of GDP)	33.3	32.5	27.9	24.5	26.1	28.7	26.5	27.1	24.8	27.8	29.9	35.6	44.6	37.1
Consolidated Public Sector Deficit (% of GDP)	9.5	13.1	13.5	14.4	12.7	14.3	14.4	10.9	10.4	-	-	-	-	-
Central Government Deficit (% of GDP)	12.6	9.8	7.8	8.9	10.5	10.6	10.5	12.7	9.4	10.8	8.6	9.4	7.6	11.2
Current Account Balance (% of GDP)	-5.6	-11.5	-11.1	-8.4	-3.7	-3.5	-1.0	0.0	1.2	-1.2	-4.4	-8.4	-15.1	-5.0
Foreign Debt (% of GDP)	14.7	19.6	27.3	35.1	42.3	55.5	52.7	53.1	42.1	43.7	48.6	43.5	61.9	69.1

Source: World Bank

Figure 6 Fiscal balance, macroeconomic instability, and per capita growth



Public deficit financing has relied successively on foreign and domestic sources. External financing during the early 1980s led to a significant rise in the foreign debt: from 15% of GDP in 1980 to 56% in 1985. Subsequently deficit financing relied on issuing domestic debt and money, reflected in an increasing domestic public debt and a record inflation of 46% in 1992 that doubled the previous peak reached in 1983.

Public sector deficits are the driving force behind Zimbabwe's current account deficits. During 1981-85, declining current account deficits were associated with a cumulative 56% depreciation of the real exchange rate. Subsequently, from 1985 to 1990, the real exchange rate did not change much while the current account deficit showed a small deficit. As a result of partial trade liberalization since 1991, and mainly due to the recent drought, the current account deteriorated in 1991 and attained a record level of 15.1% of GDP in 1992. A significant current-account correction was achieved in 1993, supported by a 23.1% cumulative real exchange rate depreciation between 1990 and 1993.

Zimbabwe's large public sector disequilibrium has contributed to a systematic erosion of macroeconomic stability. Its index of macroeconomic instability, which at 1.5 in the early 1980s was only slightly above Africa's average 1970-1990 level of 1.22, has deteriorated steadily to reach 2.6 in 1993. But macroeconomic policy failures are only partly to blame for Zimbabwe's unsatisfactory performance. In fact, a large array of trade and factor market distortions have hampered investment and growth. Domestic price controls have been prevalent in agriculture, utilities, and transport; controlled

interest rates have seldom exceeded domestic inflation rates. Foreign trade has been subject to large tariff and quantitative trade restrictions, and foreign exchange has been rationed by the government on a discretionary basis. These trade barriers have maintained significant import substitution at the cost of severely affecting the development of a more efficient production structure.

An ambitious adjustment program, initiated in 1991, has focused on more stringent fiscal and monetary policies, supported by a devaluation of the nominal exchange rate. Progress has been made in the areas of domestic price liberalization, private investment deregulation, and trade liberalization. However, much more progress is required in liberalizing domestic goods and financial markets as well as external trade, restructuring and privatizing state enterprises, and deregulating private sector production and investment. These structural measures should complement further fiscal adjustment as prerequisites for Zimbabwe's convergence toward a path of higher and sustained growth.

VI Conclusions

This paper has provided empirical backing to the relations between fiscal adjustment, macroeconomic performance, and growth observed across the world and during the 1960 - 1990 period. The long-run world experience has provided an explicit reference for assessing Africa's performance during the last three decades.

The three major developing-country regions (Africa, Latin America and the Caribbean, and other LDCs) show a remarkably similar fiscal picture. Their average long-term public deficit at 6.0% of GDP is almost three times the comparable level found in OECD countries. Tax revenue is low in the three regions, falling 20 percentage points of GDP short of the OECD's tax collection. However, other LDCs (mostly Asian economies) display more macroeconomic stability than African and LAC countries and a growth performance that, at the same level as that of OECD countries, is a multiple of the low growth achieved by Africa and LAC.

Fiscal and macroeconomic variables influence each other in both directions. On the causality from macroeconomic variables to public deficits, we conclude that deficits are very sensitive to short-term domestic and foreign macroeconomic shocks but that policy makers — not the macro shocks — are to blame for persistent deficits and to be praised for sustained fiscal adjustment.

Cross-country econometric evidence drawn from a world sample on the long-term sensitivity of the level of tax revenue collection to macroeconomic variables shows that the level of development (measured by GDP per capita) is the single most important determinant of tax revenue. Inflation inhibits tax collection in all regions except Africa. But adverse terms-of-trade shocks are more important in Africa than in other regions in inhibiting tax collection. Finally, OECD countries are able to collect 8-10 percentage points of GDP more in taxes than developing nations, after controlling for their higher level of development and lower inflation.

Turning to the reverse causality — from fiscal variables to macroeconomic performance — the paper followed a two-stage approach: from fiscal adjustment to macroeconomic stability and to growth. Long-run cross-country regression results show that a prudent fiscal stance and central bank independence are significant determinants of macroeconomic stability across the world. However, once controlling for these two determinants, macroeconomic stability is still significantly lower in Africa than in all other regions.

What can be said about the contribution of fiscal adjustment to growth, inferring from cross-country growth regressions for a large world sample? First, lower public deficits

do not contribute to higher growth by providing more resources for domestic investment; the empirical non-significance of the fiscal balance in growth regressions confirms its theoretical ambiguity. Second, fiscal adjustment does make a very significant and positive (but indirect) contribution to growth by reducing macroeconomic instability. The latter is, however, not influenced only by fiscal adjustment. Third, while macroeconomic stability is a principal and systematic growth determinant, its individual components (inflation, real exchange rate variability, foreign debt, and the black market premium) are typically not significant as growth determinants when taken individually. Hence partial indicators of macroeconomic health or stability, on which previous cross-country growth studies have relied, seldom contribute significantly to growth. Finally, Africa (and LAC) is different: its growth performance falls well below that in other LDCs and in OECD economies, after controlling for all relevant growth determinants.

Ghana and Zimbabwe represent strikingly dissimilar country cases in Africa that illustrate vividly the links between fiscal adjustment, macroeconomic stability, and growth. Their experience suggests that deep fiscal adjustment is necessary for achieving high growth. Both countries also illustrate that sustainable fiscal adjustment can only be achieved as a result of a broader public sector reform that stabilizes general government budgets, eliminates public enterprise deficits, and strengthens monetary policy by keeping it immune from fiscal or quasi-fiscal demands. Finally, macroeconomic stabilization must be complemented by financial and trade liberalization in order to attain a path of high private investment and growth.

Notes

1. A comprehensive survey of fiscal deficit measurement is Blejer and Cheasty (1991). Other references on alternative deficit measures include Blejer and Chu (1988), Buiter (1987), Kotlikoff (1988), Easterly and Schmidt-Hebbel (1993b, 1994a), Fischer and Easterly (1990), and Tanzi (1985). International Monetary Fund (*1986) and United Nations (1968) discuss differences between cash and accrual measures in more detail. Robinson and Stella (1988) and Teijeiro (1989) survey issues concerning quasi-fiscal deficits.

2. Nominal-deficit measures are criticized by three recent approaches as irrelevant for assessing the sustainability of fiscal policy or its effects on inter-generational equity. Hence they focus on the inter-temporal path of fiscal policy, deficits, and their financing. A first and very popular method, pioneered by Buiter (1983, 1985, 1987) and van Wijnbergen (1989), compares actual deficits to sustainable deficit levels consistent with a stationary macroeconomic equilibium. An alternative approach, due to Hamilton and Flavin (1986), Grilli (1989), Wilcox (1989), and Buiter and Patel (1990), focuses directly on how public debt evolves, checking for public sector solvency by comparing the rate of growth of the public debt ratio (to output) to the real interest rate. The third method, pioneered by Kotlikoff (1992) and associates (Auerbach, Gokhale, and Kotlikoff, 1991, 1992, 1994). fosuces on the inter-temporal budget constraint of the public sector and on the inter-generational consequences of fiscal policy. It consists of computing the effects of all explicit, implicit, and contingent government programs on taxes paid by and payments received by each cohort, subject to government and cohort inter-temporal budget constraints. This allows evaluation of all intergenerational transfers among current and future generations.

3. The four regions are sub-Saharan Africa (noted as Africa, with a maximum of 36 countries), Latin America and the Caribbean (noted as LAC, with a maximum of 21 countries), North Africa, Middle East and Asia (noted as other LDCs, with a maximum of 16 countries), and OECD member countries (noted as OECD, with a maximum of 18 countries). Countries, data definitions, and sources are listed in the Appendix.

4. For a recent study of money demand and seignorage-maximizing inflation rates in high-inflation developing countries, see Easterly, Mauro and Schmidt-Hebbel

(1994).

5. The terms macroeconomic stability and health are used interchangeably. This lack of precision is justified by the combination of first and second moment variables in the index of macroeconomic stability (or health) introduced below.

6. The inflation cost measure is defined as: inf = (annual CPI inflation)/(1 + annual CPI inflation). This measure reflects the capital loss caused by inflation to money holders, i.e., the tax rate corresponding to the inflation tax revenue (see Easterly, Mauro, and Schmidt-Hebbel, 1994). In addition to the inflation measure, different measures of inflation variability were initially considered for the index of macroeconomic instability, but were dismissed because of their high correlation with the inflation cost measure.

7. On the components of mins it can be said that inf is bounded between 0 and 1 and that the other three variables are also positive and rarely exceed 1. All-country sample averages for mins and its components are: mins = 0.99, inf = 0.12, rercv = 0.23, debt = 0.39, and prem = 0.26

8. To a first approximation, each major type of financing corresponds to a macroeconomic imbalance, if used excessively. Money creation to finance the deficit often leads to inflation; domestic borrowing leads to a credit squeeze and crowding out of private investment and consumption; external borrowing leads to current account deficits and real exchange rate appreciation.

9. Easterly and Schmidt-Hebbel (1994a) report statistically significant correlations between CNFPS deficits and per capita GDP growth (negative), private consumption (positive), the current account deficit (positive), and the black-market exchange rate premium (positive), for a cross-country sample of 50-59 OECD and developing countries.

10. These variables also affect public expenditure so that the net impact on the public deficit is often ambiguous, as illustrated by the case of Zimbabwe discussed above. For a detailed discussion see Easterly and Schmidt-Hebbel (1994a). Dornbusch, Sturzenegger, and Wolf (1990) discuss how inflation affects tax collection and expenditure.

11. A more general usage of the Keynes-Olivera-Tanzi effect than the tax erosion effect is when one refers to the overall impact of inflation on the primary deficit, including the effects on public expenditure (See Olivera, 1967, and Tanzi, 1977, 1978).

12. Most of the estimated tax revenue functions are reported in the country studies in Easterly, Rodriguez, and Schmidt-Hebbel (1994). The regressors of tax revenue include macroeconomic variables (which affect tax bases) and tax rates (or tax regimes).

13. Note that tax revenue excludes the surplus of the National Coffee Fund, which increases with a devaluation. For Colombia's budget structure of the late 1980s it was estimated that the overall public deficit grew with a real exchange rate devaluation (Easterly, 1994).

14. Recent volumes on fiscal, macroeconomic, international finance, and international trade dimensions of taxation, based on general-equilibrium models, are Helpman, Razin, and Sadka (1988), Razin and Slemrod (1990), and Frenkel and Razin (1992). On tax systems and tax reforms in developing countries, see Gillis (1989), Ahmad and Stern (1991), Ito and Krueger (1992), and Burgess and Stern (1993).

15. Some feedback effects from tax revenue to both per capita GDP levels and inflation cannot be ruled out. In addition, other potential determinants of tax collection have been excluded from Equation 2. See Tanzi (1991) for empirical measures including otherr regressors and Burgess and Stern (1993) for a discussion.

16. Other regional dummy variables were found to be not significant.

17. They report a barely significant contribution of the log of per capita GNP and a low overall fit ($R^2A = 0.04$). While our sample is smaller than their group of 82 developing countries, it is much more representative in the time dimension, extending over 32 years instead of their three-year averages around 1987.

18. Among the latter it has even been argued that severe but credible fiscal adjustment can be expansionary in the short run, based on Denmark's and Ireland's adjustment experiences during the 1980s (Giavazzi and Pagano, 1990).

19. One should also point out that the contribution of fiscal adjustment to higher national saving (and hence to both higher domestic investment and lower foreign saving) is particularly strong due to the empirically-observed interest-insensitivity of private saving. The reason is that the possible interest-rate reduction brought by fiscal adjustment will not depress private saving. There is a growing empirical consensus that private saving is insensitive to the real interest rate (i.e., that the income, substitution, and wealth effects of interest rates approximately neutralize each other), based on the studies for developing countries by Giovannini (1983, 1985), Corbo and Schmidt-Hebbel (1991), and Schmidt-Hebbel, Webb, and Corsetti

(1992), and the country studies in Easterly, Rodriguez, and Schmidt-Hebbel (1994).

20. Among the surveys of empirical studies on Ricardian Equivalence in industrial economies, four conclude that Ricardian Equivalence is rejected (Hayashi, 1985; Hubbard and Judd, 1986; Bernheim, 1987; and Leiderman and Blejer, 1988), while only one survey finds broad support for the hypothesis (Seater, 1993).

21. While this relation offers the advantage of simplicity, this comes at the potential cost of specification and simultaneity biases. Simultaneity problems should not be too important. First, the measure of central bank independence (torb) is probably not much influenced by mins or its four components. Second, two components of mins (the black market premium and RER variability) have no direct effect on the size of the fiscal balance, and a third component (inflation) contributes little to deficits in the long term, as was concluded in the preceding sub-section. This leaves only the stock of foreign debt as having potential influence on the size of the fiscal balance through foreign interest payments.

22. Regional dummies for LAC and other LDCs were found to be not significant.

23. Other variables of political development and stability, such as coups, revolutions, and assassinations, were found to be not significant.

24. Korea and Japan are two of the high-growth outliers noted in section 2. A dummy variable for the third outlier (Botswana) was found to be not significant in these regressions. A third regional dummy for other LDCs was also not significant.

25. Part of the low significance of fibal obviously reflects the inclusion of mins. The way to address this would be by using an instrument for fibal that is orthogonal to mins, but such an instrument is not readily available for this large sample of countries.

26. The LAC dummy was not significant in the smaller sample regressions reported in Table 16.

27. On the relation between fiscal adjustment and macroeconomic performance see Islam and Wetzel (1994) for Ghana and Morandé and Schmidt-Hebbel (1994) for Zimbabwe.

References

Ades, A. and H. Chua. 1993. "Regional Instability and Economic Growth: Thy Neighbour's Curse", Center Discussion Paper No. 704, Economic Growth Center, Yale University.

Ahmed, E. and N. Stern. 1991. *The Theory and Practice of Tax Reform in Developing Countries*. Cambridge University Press.

Auerbach, A.J., J. Gokhale, and L.J. Kotlikoff. 1991. "Generational Accounts: A Meaningful Alternative to Deficit Accounting", in *Tax Policy and the Economy*, vol. 5, National Bureau of Economic Research.

Auerbach, A.J., J. Gokhale. and L.J. Kotlikoff. 1992. "Generational Accounting - A New Approach to Understanding the Effects of Fiscal Policy on Saving", *Scandinavian Journal of Economics*.

Auerbach, A.J., J. Gokhale, and L.J. Kotlikoff. 1994. "Generational Accounting - A Meaningful Way to Assess Generational Policy", *Journal of Economic Perspectives*.

Barro, R. 1974. "Are Government Bonds Net Wealth?," *Journal of Political Economy*, Vol. 81, pp. 1095-1117.

Barro, R. and J.W. Lee, 1993. "International Comparisons of Educational Attainment", *Journal of Monetary Economics*, Vol. 32, pp. 363-394.

Bernheim, D.B. 1987. "Ricardian Equivalence: An Evaluation of Theory and Evidence", in *NBER Macroeconomics Annual 1987*, MIT Press.

Blejer, M. and A. Cheasty. 1991. "The Measurement of Fiscal Deficits: Analytical and Methodological Issues", *Journal of Economic Literature*, Vol. XXIX, No. 4, December.

Blejer, M. and K. Chu. (eds). 1988. *Measurement of Fiscal Impact: Methodological Issues*, IMF Occasional Paper 59, Washington, D.C.

Buiter, W. 1983. "Measurement of the Public Sector Deficit and Its Implications for Policy Evaluation and Design", *IMF Staff Papers* 30, No. 2, June.

Buiter, W. 1985. "A Guide to Public Sector Debt and Deficits", *Economic Policy*, November.

Buiter, W. 1987. "The Arithmetic of Solvency", in *Principles of Budgetary and Financial Policy* by W. Buiter, Cambridge, Massachusetts: MIT Press, 1990.

Buiter, W. and U. Patel. 1990. "Debt, Deficits and Inflation: An Application to the Public Finances of India", NBER Working Paper 3287, March.

Burgess and Stern. 1993. "Taxation and Development", *Journal of Economic Literature*, Vol. 31, No. 2, pp. 762-830, June.

Chua, H. 1993. "Regional Spillovers and Economic Growth", Center Discussion Paper No. 700, Economic Growth Center, Yale University.

Corbo, V. and Rojas. 1993. "Investment, Macroeconomic Stability and Growth: The Latin American Experience", *Revista de Analisis Economico*, Vol. 6 (1); pp. 19-35.

Corbo, V. and K. Schmidt-Hebbel. 1991. "Public Policies and Saving in Developing Countries", *Journal of Development Economics*, Vol. 36 (1); pp. 89-116.

Cukierman, A., S. Webb, and B. Neyapti. 1992. "Measuring the Independence of Central Banks and its Effect on Policy Outcomes", *World Bank Economic Review*, Vol. 6 (3); pp. 353-98.

Dornbusch and Reynoso, 1989. "Financial Factors in Economic Development", NBER WP No. 2889, March.

Dornbusch, R., F. Sturzenegger, and H. Wolf. 1990. "Extreme Inflation: Dynamics and Stabilization", *Brookings Paper on Economic Activity* 2.

Easterly, W. 1992. "Projection of Growth Rates", *Outreach* 5, World Bank, Policy Research Department, Washington, D.C.

Easterly, W. 1994. "Colombia: Avoiding Crises through Fiscal Policy", in W. Easterly, C.A. Rodriguez, and K. Schmidt-Hebbel; *Public Sector Deficits and*

Macroeconomic Performance. Oxford University Press.

Easterly, W., and R. Levine. 1994. "Is Africa Different? Evidence from Growth Regressions", *manuscript*, World Bank, April.

Easterly, W. and K. Schmidt-Hebbel. 1993a. "Fiscal Adjustment and Macroeconomic Performance", *Outreach* No. 10, May, World Bank, Policy Research Department, Washington, D.C.

Easterly, W. and K. Schmidt-Hebbel. 1993b. "Fiscal Deficits and Macroeconomic Performance in Developing Countries", *World Bank Research Observer*, Volume 8, Number 2, July.

Easterly, W. and K. Schmidt-Hebbel. 1994a. "The Macroeconomics of Public Sector Deficits: A Synthesis", in W. Easterly, C. Rodriguez and K. Schmidt-Hebbel, *op. cit.*

Easterly, W. and K. Schmidt-Hebbel. 1994b. "Statistical Appendix", in W. Easterly, C. Rodriguez and K. Schmidt-Hebbel, *op. cit.*

Easterly W., M. Kremer, L. Pritchett, and L.H. Summers. 1993. "Good Policy or Good Luck? Country Growth Performance and Temporary Shocks", *Journal of Monetary Economics*, Vol. 32, pp. 459-483.

Easterly, W., P. Mauro, and K. Schmidt-Hebbel. 1994. "Money Demand and Seignorage-Maximizing Inflation", *Journal of Money, Credit and Banking*, forthcoming.

Easterly, W. and S. Rebelo. 1993. "Fiscal Policy and Economic Growth: An Empirical Investigation", *Journal of Monetary Economics*, Vol. 32 (3), pp. 417-58.

Easterly, W., C. Rodriguez, and K. Schmidt-Hebbel. 1994. *Public Sector Deficits and Macroeconomic Performance*, Oxford University Press.

Edwards, S. 1992. "Trade Orientations, Distortions and Growth in Developing Countries", *Journal of Development Economics*, Vol. 39 (1).

Elbadawi, I.A. and B. Ndulu. 1994. "Long-Term Development and Sustainable Growth in Sub-Saharan Africa", presented in SAREC International Colloquium of New Directions in Development Economics: Growth, Equity and Sustainable

Development, Stockholm, March 9-11.

Fischer, S. 1993. "The Role of Macroeconomic Factors in Growth", *Journal of Monetary Economics*, Vol. 32 (3), pp. 485-512.

Fischer, S. and W. Easterly. (1990). "The Economics of the Government Budget Constraint", *The World Bank Research Observer*, Vol. 5, No. 2, pp. 127-42, July.

Frankel, J. 1992. "Measuring International Capital Mobility: A Review", *The American Economic Review*, Vol. 82, No. 2, pp. 197-202, May.

Frenkel, J.A. and A. Razin. 1992. *Fiscal Policies and the World Economy*. Cambridge, Massachusetts: MIT Press.

Giavazzi, F. and M. Pagano. 1990. "Can Severe Fiscal Contractions be Expansionary?" NBER Macroeconomics Annual.

Gillis, M. 1989. *Tax Reform in Developing Countries*. Durham, North Carolina; Duke University Press.

Giovannini, A. 1993. "The Interest-Elasticity of Savings in Developing Countries", *World Development*, Vol. 11, No. 7.

Giovannini, A. 1985. "Saving and the Real Interest Rate in LDCs", *Journal of Development Economics*, Vol. 18, Nos. 2-3.

Grilli, V. 1989. "Seignorage in Europe", in M. de Cecco and A. Giovannini (eds.): *A European Central Bank?* Cambridge University Press.

Hamilton, J. and M. Flavin. 1986. "On the Limitations of Government Borrowing: A Framework for Empirical Testing", *American Economic Review*, Vol. 76.

Haque, N.U. and P. Montiel. 1989. "Consumption in Development Countries: Tests for Liquidity Constraints and Finite Horizons", *Review of Economics and Statistics*, Vol. 71, No. 3.

Hayashi, F. 1985. "Tests for Liquidity Constraints: A Critical Survey", NBER Working Paper 1970, October.

Helpman, E., A. Razin, and E. Sadka. (eds.) 1988. *Economic Effects of the*

Government Budget. Cambridge, Massachusetts: MIT Press.

Hinrichs, H.H. 1966. "A General Theory of Tax Structure Change During Economic Development", *manuscript*, Harvard Law School International Tax Program.

Hubbard, R.G. and K.L. Judd. 1986. "Liquidity Constraints, Fiscal Policy and Consumption", *Brookings Papers on Economic Activity* 1.

Ito, T. and A.O. Krueger. 1992. *The Political Economy of Tax Reform*. NBER, University of Chicago Press.

International Monetary Fund. *Government Financial Statistics Yearbook*, various issues.

International Monetary Fund. *International Financial Statistics*, various issues.

International Monetary Fund. 1986. *A Manual on Government Finance Statistics*. Washington, D.C.: IMF.

Islam, R. and D. Wetzel. 1994. "The Macroeconomics of Public Sector Deficits: The Case of Ghana", in W. Easterly, C.A. Rodriguez and K. Schmidt-Hebbel, *op. cit.*

Khan, M. and M. Kumar. 1993. "Public and Private Investment and the Convergence of Per Capita Incomes in Development Countries", IMF Working Paper WP 193/51, June.

King, R.G. and R. Levine. 1993. "Finance, Entrepreneurship, and Growth: Theory and Evidence", *Journal of Monetary Economics*, Vol. 32, pp. 513-542.

Kotlikoff, L.J. 1988. "The Deficit is Not a Well Defined Measure of Fiscal Policy", *Science*, Vol. 241, pp. 791-95, August.

Kotlikoff, L.J. 1992. *Generational Accounting*. London: The Free Press.

Leiderman, L. and M. Blejer. 1988. "Modelling and Testing Ricardian Equivalence: A Survey", *IMF Staff Papers* 35, No. 1, March.

Levine, R. and D. Renelt. 1992. "A Sensitivity Analysis of Cross-Country Growth Regressions", *American Economic Review*, Vol. 82, pp. 942-63.

Marshall, J. and K. Schmidt-Hebbel. 1989a. "Un Marco Analitico-Contable para la Evaluation de la Politica Fiscal en América Latina", *Serie Politica Fiscal* 1, Economic Commission for Latin America and the Caribbean, Santiago, Chile.

Marshall, J. and dK. Schmidt-Hebbel. 1989b. "Economic and Policy Determinants of Public Sector Deficits", World Bank WPS 321, December.

McMahon, G. and K. Schmidt-Hebbel. 1995. "A Macroeconomic Adjustment and Tax Reform in Developing Countries", in G. Perry and J. Whalley (eds.), *Fiscal Reform and Structural Change*. New York: McGraw-Hill, forthcoming.

Morandé, F. and K. Schmidt-Hebbel. 1994. "Fiscal Disequilibria and Low Growth in Zimbabwe", in W. Easterly, C.A. Rodriguez and K. Schmidt-Hebbel, *op. cit.*

Musgrave. 1959. *The Theory of Public Finance*. New York: McGraw-Hill.

Musgrave. 1969. *Fiscal Systems*. New Haven, Connecticut: Yale University Press.

Olivera, J. 1967. "Money, Prices and Inflation Lags: A Note on the Dynamics of Inflation", *Banca Nazionale del Lavoro Quarterly Review*, Vol. 20, pp. 258-67.

Pindyck, R. and A. Solimano. 1993. "Economic Instability and Aggregate Investment", in O. Blanchard and S. Fischer (eds.), *NBER Macroeconomics Annual*, MIT Press.

Razin, A. and J. Slemrod. (eds.), 1990. *Taxation in the Global Economy*. NBER and University of Chicago Press.

Rodriguez, C. 1994. "External Effects of Public Sector Deficits", *Public Sector Deficits and Macroeconomic Performance* in W. Easterly, C. Rodriguez and K.Schmidt-Hebbel, Oxford University Press.

Robinson, D. and P. Stella. 1988. "Amalgamating Central Bank and Fiscal Deficits", in M. Blejer and K. Chu, eds., *Measurement of Fiscal Impact: Methodological Issues*, IMF Occasional Paper 59, Washington, IMF.

Sachs, J. 1989. *Developing Country Debt and Economic Performance*. NBER - Chicago University Press.

Schmidt-Hebbel, K., S.B. Webb, and G. Corsetti. 1992. "Household Saving in Developing Countries: First Cross-Country Evidence", *World Bank Economic*

Review, Vol. 6, No. 3, pp. 529-547, September.

Seater, J. 1993. "Ricardian Equivalence", *Journal of Economic Literature*, Vol. 31, No. 1, pp. 142-190, March.

Servén, L. and A. Solimano. (eds.). 1994. *Striving for Growth after Adjustment: The Role of Capital Formation*, World Bank Regional and Sectoral Studies, The World Bank, Washington, D.C.

Tanzi, V. 1977. "Inflation, Lags in Collection, and the Real Value of Tax Revenue", *IMF Staff Papers*, Vol. 24, pp. 154-67.

Tanzi, V. 1978. "Inflation, Real Tax Revenue, and the Case of Inflationary Finance: Theory and Application to Argentina", *IMF Staff Papers*, Vol. 25, No. 3. pp. 417-451.

Tanzi, V. 1985. "Fiscal Management and External Debt Problems", in Hassanali Mehran, ed., *External Debt Management*, Washington, D.C., IMF.

Tanzi, V. 1991. "Structural Factors and Tax Revenue in Developing Countries: A Decade of Evidence", *mimeo*, International Monetary Fund, Washington, D.C.

Teijeiro, M. 1989. "Central Bank Losses: Origins, Conceptual Issues and Measurement Problems", World Bank WPS 293.

United Nations. 1968. *A System of National Accounts*. New York: United Nations.

van Wijnbergen, S. 1989. "External Debt, Inflation and the Public Sector: Towards Fiscal Policy for Sustainable Growth", *World Bank Economic Review*, Vol. 3, September.

Wilcox, D. 1989. "The Sustainability of the Government Deficits: Implications of the Present Value Borrowing Constraint", *Journal of Money, Credit and Banking*, Vol. 21.

Appendix

Variable Definitions and Sources

tax: total conventional (direct and indirect) tax revenues as percentage of GDP (IMF Government Financial Statistics).

fibal: fiscal balance (negative for a deficit) as percentage of GDP. When available, consolidated public sector deficit is used (Easterly, Rodriguez and Schmidt-Hebbel, 1994). Alternatively the central government deficit is used (IMF Government Financial Statistics).

mins: the macroeconomic instability index is a combination of four equally-weighted indices (**inf**, normalized inflation, **prem**, the normalized black market premium, **rercv**, the real exchange rate coefficient of variation, and **debt**: foreign debt as percentage of GDP). Inflation and the black market premium (x) are normalized to $x/(1+x)$. The inflation rate is CPI inflation (IMF International Financial Statistics) and the black market premium is from Picks Currency Yearbook. The coefficient of variation of the real exchange rate is computed from 1970-1990 real exchange rate series (IMF International Financial Statistics). The index **mins** ranges from zero (total instability) to around four (maximum instability).

torb: turnover rate of the head of the central bank or monetary authority, defined as the average number of appointments in the 1950-1988 period. The rate ranges between zero (more stable) to 1 (more unstable) (Cukierman, Webb and Neyapti 1992).

lgdp: average real per capita GDP level in US$ (IMF International Financial Statistics).

g: geometric average growth rate of real per capita GDP during 1960-1990 (World Bank 1993 Growth Project).

$lgdp_{60}$: average real per capital GDP level in US$ in 1960 (World Bank 1993 Growth Project).

$enpri_{60}$: total primary school enrollment in 1960 (or closest available year) (World Bank 1993 Growth Project).

trade: volume of trade (exports plus imports) as percentage of GDP (World Bank 1993 Growth Project).

lly; total liabilities of the banking sector as percentage of GDP (World Bank

1993 Growth Project).

totsh: income loss from adverse terms of trade shocks as percentage of GDP (World Bank 1993 Growth Project).

civl: index of civil liberties, which ranges from 1 (more liberties) to 7 (more repressive) (WB 1993 Growth Project).

kor, jap, africa and latina:
dummies for Korea, Japan, Africa and Latin America and the Caribbean.

Data Coverage

All variables cover the period 1960-1990, except for the following, FIBAL, MINS, RERCV, DEBT (1970-1990) and TAXREV (1970-90) for Latin American countries and the OECD; 1960-90 for other regions.

Country Coverage

Africa	Latin America	Other LDCs	OECD
1 Benin	37 Argentina	58 Bangladesh	75 Australia
2 Botswana	38 Boliva	59 India	76 Austria
3 Burkina Faso	39 Brazil	60 Indonesia	77 Belgium
4 Burundi	40 Chile	61 Korea, Rep.	78 Canada
5 Cameroon	41 Colombia	62 Malaysia	79 Denmark
6 Central Africa Republic	42 Costa Rica	63 Pakistan	80 Finland
7 Chad	43 Dominican Republic	64 Papua New Guinea	81 France
8 Congo	44 Ecuador	65 Philippines	82 Germany
9 Cote d'Ivoire	45 El Salvador	66 Sri Lanka	83 Greece
10 Ethiopia	46 Guatemala	67 Thailand	84 Italy
11 Gabon	47 Haiti	68 Egypt, Arab Rep.	85 Japan
12 Gambia, the	48 Honduras	69 Iran, Islamic Rep.	86 Netherlands
13 Ghana	49 Jamaica	70 Jordan	87 NewZealand
14 Guinea	50 Mexico	71 Morocco	88 Norway
15 Kenya	51 Nicaragua	72 Syrian Arab Republic	89 Spain
16 Lesotho	52 Panama	73 Tunisia	90 Sweden
17 Liberia	53 Paraguay	74 Turkey	91 Switzerland
18 Madagascar	54 Peru		92 U.S.A
19 Malawi	55 Trinidad and Tobago		93 U.K.
20 Mali	56 Uruguay		
21 Mauritania	57 Venezuela		
22 Mauritius			
23 Nigeria			
24 Nigeria			
25 Rwanda			
26 Senegal			
27 Sierra Leone			
28 Somalia			
29 Sudan			
30 Swaziland			
31 Tanzania			
32 Togo			
33 Uganda			
34 Zaire			
35 Zambia			
36 Zimbabwe			

This work is licensed under a
Creative Commons
Attribution – NonCommercial - NoDerivs 3.0 Licence.

To view a copy of the licence please see:
http://creativecommons.org/licenses/by-nc-nd/3.0/