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At the IMF/NIPFP Conference on Fiscal Policy in India
Taj Mahal Hotel, New Delhi, India
January 16-17, 2004

The Widening Gyre: The Dynamics of Rising Public Debt and Falling Growth[1]

Abstract: *Conventional analysis of fiscal policy and public debt dynamics often overlooks the indirect channel by which fiscal policy affects debt dynamics – by affecting economic growth. This paper offers a theoretical and empirical basis for the idea of a vicious circle (a "widening gyre") of rising public debt, rising public deficit, falling ratio of private to total credit, and falling growth. Fiscal adjustment to close the intertemporal fiscal gap could reverse the spiral, setting up a virtuous circle in which the above variables move in the opposite direction.*

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[1] Paper presented at conference, Fiscal Policy in India, sponsored by India's National Institute of Public Finance and Policy and the International Monetary Fund. Thanks to seminar participants for comments on the paper.The title is taken from a line in the poem "The Second Coming" by WB Yeats. Maybe the title will seem less pretentious if I confess I had to look up "gyre" in the dictionary.

Introduction

The determination of what conditions fiscal policy must satisfy for the government to be solvent are well known in the literature. The required noninterest surplus for solvency depends on interest rates, the growth rate, and the public debt stock. While much literature analyzes the dynamic behavior of the public debt, there has not been much attention to how these dynamics are affected if the growth rate itself is a function of fiscal policy variables. For example, a well known empirical result is that there is a partial correlation between the per capita growth rate and the budget deficit – high budget deficits lower growth. If we can interpret this partial correlation as causal (a big if), this suggests some virtuous fiscal arithmetic – reducing the budget deficit to move towards fiscal solvency may attain solvency even faster because the growth rate will simultaneously increase.

A similar result is that the share of the private sector in total credit has a positive effect on growth. If causal (for example, because private financial intermediation facilitates growth by finding high return projects), then again there is virtuous fiscal arithmetic – reducing the domestic financing of the budget deficit will free up credit to the private sector and raise growth, speeding the path to solvency. The flipside of these results is that high or rising deficits will lower growth both directly and through the private credit channel, causing the debt to GDP ratio and the distance from solvency to increase even faster than in conventional calculations. These results suggest that considering the effect of fiscal policy on growth is important in dynamic analysis of public debt and evaluating required fiscal adjustment to attain solvency.

The intertemporal budget constraint

Many authors have identified the government's intertemporal budget constraint as the ultimate constraint on the government's fiscal activities (see for example Buiter 1985, Buiter and Patel 1997, Anand and Van Wijnbergen 1988, Blanchard et al. 1990, Auerbach 1997).

$$(1) \qquad \int_0^\infty e^{-rt}\left(T_t + S_t + A_t - G_t\right)dt \geq D_0$$

where all variables are defined in real terms as follows:

T_t=Tax revenue at time t

S_t=Seignorage revenue at time t

A_t=Aid receipts at time t (including the grant-equivalent component of concessional financing which is given by nominal amount of new concessional loans minus the present value of their debt service evaluated at discount rate r)

G_t=Government spending at time t

D_0= Public debt at time zero

r= discount rate

Define the noninterest surplus (also known as primary surplus) B_t as follows:

$$B_t = T_t + S_t + A_t - G_t$$

The intertemporal budget constraint says that the present value of the government's non-interest surpluses over time must be equal to or greater than the initial public debt stock. Intuitively, the government is only solvent if it runs a surplus large enough to cover not only the interest on the debt but also some payment towards the principal of the debt as well.

If we think of a long run steady state where all these revenues and expenditures form a constant ratio to GDP, then it is easy to get a closed form solution for the required non-interest surplus to satisfy the intertemporal budget constraint. To illustrate consider the case where the primary balance relative to GDP is at its steady state value in time zero. In the future, real tax revenues will grow at the rate of GDP growth g. Then the present value of primary surpluses is

$$(2) \qquad PVB = \int_0^\infty e^{-rt} B_0 e^{gt} dt = \int_0^\infty e^{-(r-g)t} B_0 dt = \frac{B_0}{r-g}$$

Or we can put things in terms of ratios to GDP as follows:

$$(3) \qquad \frac{PVB}{Y_0} = \frac{B_0/Y_0}{r-g} = \frac{b}{r-g}$$

where b is the steady state ratio of the primary surplus to GDP. This present value is only finite if $r>g$, which is the usual condition.[2] An increase in growth will raise the present value of future primary surpluses. Budget planners in the US are familiar enough with this result as to rely on optimistic growth projections to make future budgets balance. Surprisingly enough, however, there is little talk of the role of growth when designing fiscal adjustment packages in developing nations.

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[2] Otherwise the economy is dynamically inefficient. In any case, the solvency constraint does not apply if r<g.

We assume the economy is in steady state at time zero.[3] Let the public debt ratio to GDP be defined as $d_t = D_t / Y_t$ Then the steady state condition for the intertemporal budget constraint to be satisfied is:

(4) $\qquad \dfrac{b}{r-g} = d_0$

This is a familiar condition for the primary surplus from the fiscal solvency literature (Blanchard et al. 1990, Buiter 1990, Buiter and Patel 1997, Cuddington 1997).[4] This is simply accounting; it does not address the issue of whether the public debt is optimal (nor will I address this issue in this paper, which sticks to a positive analysis of debt problems).

Equation (4) also is a condition for stabilizing the debt to GDP ratio. The primary surplus (including seignorage) that keeps the debt to GDP ratio stable is the b that satisfies equation (4). To derive it another way, write down the equation for the change in the debt to GDP ratio

(5) $\qquad \dot{d} = -b + (r-g)*d$

Setting the change in the debt to GDP ratio to zero, we get equation (4) for the sustainable primary surplus b. The government is solvent if it is able to run a primary surplus that keeps the current debt to GDP ratio constant.

We can define the required fiscal adjustment at time t (a_t) as the difference between the actual primary surplus (preferably cyclically adjusted or purged of temporary fluctuations with time series techniques) and the primary surplus from (4) that ensures solvency (Blanchard et al. 1990 have a similar expression for the tax rate, Buiter and Patel 1997 have an analogous expression that they call the "primary gap", Auerbach 1997 and Auerbach and Gale 2000 call it the "fiscal gap").

(6) $\qquad a_t = -b + (r-g)d_t$

Note that the required fiscal adjustment in (6) is the same as the increase in debt in (5). In other words, if the required fiscal adjustment is not carried out, the debt ratio will increase by this same amount. A quick short-cut to calculate the required fiscal adjustment is to calculate

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[3] Calderon, Easterly, and Serven 2000 also find that government expenditures are cointegrated with GDP, with a coefficient of unity.

[4] Calderón, Loayza, and Serven.2000 point out that a flaw in the analogous sustainability condition for the current account of the balance of payments is that the external debt at any one point in time is not necessarily the desired debt from a portfolio allocation perspective.

how much the debt ratio is increasing each year (although I am gliding over the difference between the current values of r and g – which affect debt dynamics from year to year – and the long run values of these variables – which are what is relevant for required fiscal adjustment).

The role of growth in required fiscal adjustment

We can see that in addition to the usual focus on the current primary balance and the debt ratio, growth plays an important role in whether there is a intertemporal fiscal imbalance. The effect of growth on required fiscal adjustment will be larger, the greater is the stock of initial debt (see the interaction term between growth and debt in equation 6). Although the role of growth in debt sustainability is well known, not much attention has been paid to the fiscal impact of changes in growth on solvency.

Empirical results are suggestive that the growth rate is affected by budget deficits. Suppose there is a linear relationship between growth and the total budget deficit to GDP ratio (b-rd) as follows:

$$g = \gamma_0 + \gamma_1 (b - rd)$$

Substituting for growth into (6), taking time derivatives, and using (6) for a, we can analyze the dynamic path of the required fiscal adjustment a_t as follows:

$$\dot{a} = \left[(r - g) + \gamma_1 rd\right] a$$

The dependence of growth on budget deficits introduces additional instability into the fiscal solvency picture. Note that the percent growth in the required fiscal adjustment a is a positive function of the level of the public debt to GDP ratio! The other important result is that the required fiscal adjustment to attain solvency increases more rapidly than in the case where $\gamma_1=0$ – the growth effect of deficits makes a spiral into greater and greater insolvency more likely.

A similar story can be told with the share of private credit in total credit. This ratio measures the importance of private sector financial intermediation, which many studies find to be related to long-run growth. Denoting private credit as C_P and total credit as C_T, and assuming for illustrative purposes that all public debt is domestic, then we would get the following relationship between the evolution of the private credit ratio and required fiscal adjustment:

$$\Delta\left(\frac{C_P}{C_T}\right) = \frac{-a}{C_T / Y}$$

The ratio of private to total credit will decline the greater is the required fiscal adjustment, divided by the total credit to GDP ratio. Let us include the ratio of private to total credit in the growth equation:

$$g = \gamma_0 + \gamma_1 (b - rd) + \gamma_2 \left(\frac{C_p}{C_T} \right)$$

Then an expression for the change in the required fiscal adjustment will now include an effect on growth through the private financial intermediation channel:

$$\dot{a} = \left[(r - g) + \gamma_1 rd + \frac{\gamma_2}{C_T / Y} \right] a$$

In words, the story is as follows. If the necessary fiscal adjustment (a) is not made this period, the required fiscal adjustment will grow according to the following 4 steps: (1) the debt ratio is increasing, which requires a higher primary surplus to maintain solvency, (2) the budget deficit increases and the private credit ratio falls with the rise in the public debt ratio, (3) the growth rate falls because of the effect of the rising budget deficit and the falling private credit ratio, and (4) the lower growth rate requires a yet further increase in the primary surplus to maintain solvency. This is the "widening gyre" of rising public debt and falling growth.

I could do similar exercises with other fiscal policy variables. Some studies show that growth is negatively related to government consumption, while others find a negative growth effect of inflation. Since seignorage revenues and government consumption are components of the primary balance b, we could separate out the growth effects of those components and discuss the dynamic implications. For example, a common view is that the fiscal gap in many countries will eventually be closed by a burst of inflation, so a higher fiscal gap could imply higher expected future inflation. Depending on the composition of fiscal and monetary policies chosen, the widening gyre could include rising inflation as well as increasing public debt and falling growth.

Growth <u>is</u> an important determinant of debt crises

We can get some idea of the importance of growth in determining debt problems by comparing countries that developed debt crises with those that did not. What is the combination of fiscal deficits and poor growth that made highly indebted countries become highly indebted? Table 1 shows data on 5 groups of economies: the highly indebted poor countries (HIPCs), the not highly indebted poor countries, the highly indebted middle income countries, the not highly indebted middle income countries, and the industrial countries. The

classification of a country as "highly indebted" is from the World Bank's *Global Development Finance* and refers to the end of the period.[5] We show data on their debt in 1975 and 1994. The data on the present value of publicly guaranteed external debt obligations is constructed for this paper from the World Bank's *Global Development Finance* database for low income countries. For middle income countries the public external debt data for 1975-94 is taken from Loayza et al 1998. (The reason for the different sources is that low income countries have access to concessional official lending, and so the present value of debt obligations is a better measure of debt burden than the face value of the debt. Middle income countries are presumed to borrow at market interest rates.) To exclude exchange rate valuation effects, I evaluate the 1975 foreign debt at the 1994 real exchange rate for each country.

I also have data on public domestic debt for 1975-94 from Loayza et al. 1998 (unfortunately I don't have data on the terms of domestic debt, so these are taken at face value). All debt stocks are net of government financial assets like international reserves for net foreign debt and government deposits for net domestic debt.

From the debt ratios in 1975 and 1994 and the GDP growth rate, we can calculate the implied primary fiscal deficit from (5).[6] Table 1 shows the results. One group of economies that got into high public debt problems because of slow growth were the industrial economies, whose growth was significantly below that of developing countries that were not highly indebted (Table 1). Their primary deficit was lower than that of the developing non-highly-indebted countries, but their slow growth compared to those countries yielded much higher debt ratios. One obvious explanation for the lower GDP growth of industrial countries was their much lower rate of population growth (0.6 percent per annum over 1975-94, compared to 2.6 percent in low income countries).[7] Rapid population growth may be good or bad from other welfare points of view, but it does help to service the public debt!

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[5] For middle income countries, highly indebted includes "severely indebted" and "moderately indebted". For low income countries, highly indebted includes only the "severely indebted". This difference in classification is because there are many more severely indebted poor countries, so I need this breakdown to have a decent size not-highly indebted control group.

[6] Evaluated at the geometric average of the end of period and beginning of period debt to GDP ratios, which is a good approximation to the solution iteratively solving year by year for the primary deficit that would yield the 1994 debt ratio as the endpoint, starting with the 1975 debt ratio.

[7] This assumes that population growth does not just lower per capita growth one for one, leaving aggregate growth unchanged. Most cross-country regressions in the literature have either a small negative effect of population growth on per capita growth, none at all, or argue that it is not robust (Kelley and Schmidt 1994, Kling and Pritchett 1994, Pritchett 1996).

For the middle income countries, the highly indebted ones had the same growth rates but slightly higher primary deficits as a ratio to GDP than other middle income countries. This was costly because the highly indebted middle income countries already had higher public debt to GDP ratios in 1975 than other middle income countries (which was going to make them more vulnerable to the decline in growth after 1975 – see below). We don't have information on public debt prior to 1975, so we don't know what was the decomposition of the highly indebted countries' debt ratio evolution prior to 1975 between growth and primary deficits. We do know that the highly indebted middle income countries already had 1.2 percentage point lower growth than other middle income countries in 1960-75, although this difference is not statistically significant. The development of the debt crisis in some middle income countries, compared to the lack of debt crisis in other middle income countries, was some combination of higher initial debt to GDP (reflecting some combination of higher borrowing and lower growth before 1975) and slightly higher primary deficits. Because of the higher initial debt, the primary balance should have been better in the highly indebted countries than the primary balance in other middle income countries to attain solvency.

Table 1: The Evolution of Public Debt

	1975			1994						
	Net domestic debt	Net foreign debt	Total net public debt	Net domestic debt	Net foreign debt	Total net public debt	GDP Growth rate 75-94	Implied primary deficit/GDP, 75-94	Obs. on debt	Obs. on growth
Highly indebted poor countries	8%	41%	48%	9%	82%	94%	1.8%*	-0.44%	15-30	36
Not highly indebted poor countries	17%	10%	28%	17%	27%	41%	4.4%	0.14%	9	14
Highly indebted middle-income countries	14%	12%	27%	13%	39%	56%	3.4%	0.52%	20-23	28
Not highly indebted middle income countries	12%	-3%	9%	18%	6%	24%	3.4%	0.40%	17-24	32
Industrial countries	32%	-3%	29%	54%	5%	59%	2.4%**	0.06%	21-22	23

* HIPC growth significantly less than non-HIPC poor country growth.
** Industrial country growth significantly less than Not Highly Indebted poor or middle income countries.
World real interest rate is calculated at 6% for 1978-94 (LIBOR-Dollar Inflation).

For the poor countries, what is interesting is that the HIPCs became HIPCs NOT because of higher primary deficits. They actually ran a primary surplus over 1975-94 (shown as a negative deficit), while the non-HIPC poor countries were running a small primary deficit. The glaring difference between HIPC and non-HIPC poor countries was in their growth rate -- the non-HIPCs grew twice as fast as the HIPCs over 1975-94, a difference that is statistically significant.

Another important dimension in debt crises is the change in growth, as shown in Table 2. The HIPCs and the industrial countries appear to have developed debt problems in part because of a fall in growth from 1960-75 to 1975-94. The poor countries that did not become highly indebted, in contrast, actually had a small acceleration in growth. As far as middle income countries go, both highly indebted and not highly indebted countries had a fall in growth from 1960-75 to 1975-94. The former were more vulnerable to a fall in growth, however, because of a higher initial debt ratio.

Table 2: Growth Decreases and Public Debt Increases

	Total net public debt, 1975	Total net public debt, 1994	Growth rate 60-75	Growth rate 75-94	Change in debt ratio 75-94
Highly indebted poor countries	48.3%	94.1%	3.6%	1.8%	45.7%
Not highly indebted poor countries	27.6%	40.6%	3.7%	4.4%	13.0%
Highly indebted middle-income countries	26.9%	56.2%	4.9%	3.4%	29.2%
Not highly indebted middle income countries	9.1%	24.0%	4.9%	3.4%	14.9%
Industrial countries	29.0%	58.7%	4.5%	2.4%	29.7%

Looking across countries, we see that increases in public debt to GDP ratios are inversely related to changes in growth rates (Figure 2).

Figure 3: Change in growth and rise in public debt ratio to GDP
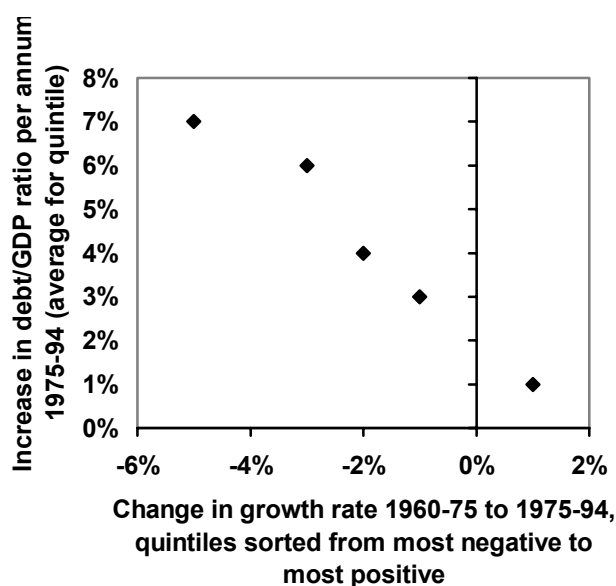
The lesson to take away from this section is that the causality between public debt and growth goes both ways. An exogenous fall in growth would lead to rising public debt ratios if other fiscal policy variables remain unchanged. In the next section, we will discuss the evidence for the causation from debt to growth – testing the hypothesis that higher public deficits reduce growth.

Growth is related to budget deficits, private credit, and other fiscal policy variables

How is growth related to fiscal policy variables? Previous literature identifies partial correlations between growth and both budget deficits (as a ratio to GDP) and government consumption (as a ratio to GDP).[8] The theoretical basis for both variables is similar, they may be good predictors of future tax increases necessary to close fiscal gaps, which discourages technology adoption, investment, and innovation. There is also an empirical literature relating growth to variables that are direct consequences of fiscal policy, like the inflation rate[9] and the ratio of private credit to total credit (the latter was used as a measure of financial development by King and Levine 1993 and subsequent work by Levine and Zervos 1998, and Levine Loayza and Beck 2001). I here synthesize past results by running new regressions on an updated dataset for the years 1960-2000, using a panel of five year averages. I first run a regression of growth and these four direct or indirect indicators of fiscal policy. The set of right hand side variables is determined a priori by what seems to reflect fiscal policy.

However, we know from Levine and Renelt 1992 that variables are often not robust to alternative specifications. I then introduce additional controls to see if the fiscal policy correlations are robust. Following the literature, I concentrate on the most common measures of macroeconomic policies, price distortions, and trade openness. The variables are listed in Table 3. In addition to the fiscal policy measures, I include a measure of institutional quality (argued to affect growth or income by Knack and Keefer 1997, and Acemoglu et al. 2001), black market premium (Fischer 1993, Easterly and Levine 1997, Sachs and Warner 1995, and many others), real overvaluation (Dollar 1992), trade openness (Frankel and Romer 2000, Sachs and Warner 1995), and initial income and schooling (Barro and Sala-i-Martin 2003).

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[8] Easterly and Schmidt-Hebbel 1994, Easterly and Rebelo 1993, Fischer 1993, Barro 1991, 1998

[9] De Gregorio 1992, 1993, Fischer 1993, Sarel 1996, Gylfason 1998, Bruno and Easterly 1998, Barro 1995, 1998

Table 3: Variables used in analysis

Variable name	Definition	Source
LGDPG	Log per capita growth rate	World Bank 2002
INFL	Log (1+inflation rate)	World Bank 2002
BB	Government budget balance/GDP	World Bank 2002
LREALOVR	Log (Overvaluation index/100) (above zero indicates overvaluation)	World Bank 2002
LBMP	Log (1+black market premium on foreign exchange)	World Bank 2002
TRADE	(Exports + Imports)/GDP	World Bank 2002
GOVC	Government consumption/GDP	World Bank 2002
PRIV	Private sector credit/Total Credit	World Bank 2002
ICRGE	Index of institutional quality from International Country Risk Guide	Easterly, Levine, and Roodman, 2003
LGDP	Log of per capita GDP	Summers-Heston 1991 updated using LGDPG
LTYR	Log of total schooling years	Barro-Lee 2000

Table 4 shows the variables' summary statistics.

Table 4: Summary statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
GROWTH	0.017	0.019	0.276	-0.736	0.051	1306
BB	-0.037	-0.028	0.391	-0.417	0.054	958
GOVC	15.790	14.681	58.310	3.915	6.700	1241
INFL	0.159	0.084	3.447	-0.569	0.325	967
LBMP	0.254	0.067	8.311	-1.058	0.558	1024
LGDP	8.107	8.058	10.445	5.775	1.040	921
LREALOVR	0.060	0.077	1.612	-1.206	0.387	609
LTYR	1.277	1.458	2.476	-2.453	0.820	832
ICRGE	5.102	5.133	9.600	1.580	1.800	832
PRIV	0.355	0.245	2.085	0.000	0.329	916
TRADE	70.202	59.378	380.308	1.846	45.353	1270

Table 5 shows the correlation coefficients between these variables and growth as well as between distinct policies. All of the bivariate correlations of policy variables with per capita growth are statistically significant at the 5 percent level. Most of the pairwise correlations between policy variables are also statistically significant, indicating the problem of collinearity that has plagued the literature. Bad policies tend to go together along a number of dimensions.

Table 5: Correlation coefficients of fiscal and other policy variables

	LGDPG	BB	GOVC	INFL	LBMP	LREALOVR	ICRGE	PRIV	TRADE
LGDPG	1.000	0.155	-0.130	-0.376	-0.321	-0.213	0.231	0.130	0.101
BB	0.155	1.000	-0.231	-0.201	-0.144	-0.141	0.197	0.110	0.094
GOVC	-0.130	-0.231	1.000	0.031	-0.036	0.228	0.044	0.215	0.276
INFL	-0.376	-0.201	0.031	1.000	0.287	0.078	-0.077	-0.212	-0.078
LBMP	-0.321	-0.144	-0.036	0.287	1.000	0.247	-0.175	-0.241	-0.178
LREALOVR	-0.213	-0.141	0.228	0.078	0.247	1.000	-0.244	-0.028	-0.056
ICRGE	0.231	0.197	0.044	-0.077	-0.175	-0.244	1.000	0.472	0.351
PRIV	0.130	0.110	0.215	-0.212	-0.241	-0.028	0.472	1.000	0.161
TRADE	0.101	0.094	0.276	-0.078	-0.178	-0.056	0.351	0.161	1.000

In table 6, I regress growth on all four fiscal policy variables, and then try adding more controls. In the base specification, three of the four fiscal policies are statistically significant at the 5 percent level, with government consumption falling well short. When I add dummies for each time period (coefficients on time dummies not shown), the results are unchanged. When I add institutions and other policy variables, to address the concern that fiscal policy

might be proxying for other bad policies, or add the initial income and years of schooling, the coefficient on private credit is often insignificant. The results on budget deficits and inflation are robust however.

Table 6: Regression of Per capita growth on fiscal policy variables and other controls, OLS on panel of 5 year averages, 1960-2000

Regression	1	2 (including time dummies)	3	4	5	6	7
constant	**0.032**	**0.038**	**0.013**	**0.034**	**0.025**	**0.029**	**0.018**
T-stat	*7.777*	*6.571*	*1.764*	*7.277*	*5.068*	*6.783*	*1.030*
BB	**0.128**	**0.110**	**0.080**	**0.109**	**0.117**	**0.110**	**0.117**
T-stat	*4.601*	*3.898*	*2.302*	*3.771*	*3.832*	*4.059*	*3.133*
INFL	**-0.035**	**-0.032**	**-0.030**	**-0.032**	**-0.024**	**-0.035**	**-0.030**
T-stat	*-6.328*	*-6.220*	*-4.826*	*-5.268*	*-3.741*	*-6.033*	*-4.894*
PRIV	**0.008**	**0.011**	**-0.002**	**0.007**	**0.006**	**0.008**	**-0.003**
T-stat	*2.058*	*2.810*	*-0.204*	*1.572*	*1.739*	*2.047*	*-0.736*
GOVC	**-0.00024**	**-0.00003**	**-0.00099**	**-0.00037**	**0.00003**	**-0.00051**	**-0.00051**
T-stat	*-1.007*	*-0.136*	*-2.435*	*-1.349*	*0.121*	*-2.063*	*-1.649*
ICRGE			**0.005**				
T-stat			*3.811*				
LBMP				**-0.012**			
T-stat				*-2.570*			
LREALOVR					**-0.015**		
T-stat					*-3.437*		
TRADE						**9.29E-05**	
T-stat						*3.121*	
LGDP							**0.00077**
T-stat							*0.289*
LTYR							**0.010**
T-stat							*2.780*
#observations	708	708	411	637	519	706	548
R-squared	0.147	0.203	0.187	0.162	0.140	0.158	0.147

Table 7 shows the effect on growth of a one standard deviation improvement in each of the fiscal policy variables on growth. The biggest effect is for inflation, although the budget deficit effect is also quite large.

Table 7: Effects of one standard deviation change in fiscal policy
variable on growth

Policy	Standard deviation of variable	Coefficient on variable in growth regression	Effect on growth of one standard deviation improvement in variable
BB	0.0542	0.1278	0.69%
INFL	0.3254	-0.0354	1.15%
PRIV	0.3285	0.0080	0.26%
GOVC	6.7005	-0.0002	0.16%

However, note that the policy changes implied by a one standard deviation change are fairly large. The one standard deviation change in the policy variables is: reduction of .32 in log inflation, 5 percentage point improvement in the budget balance as a ratio to GDP, 33 percentage point increase in the share of private credit in total credit, and a reduction of 6.7 percentage points in government consumption to GDP. Such large changes are outside the experience of most countries with moderate inflation, modest budget deficits, reasonable share of private credit, etc. The thing that makes the standard deviations of policy variables so large is that the distribution of these policies is very skewed. For example, as Figure 2 shows, there is an extreme left tail in the budget balance distribution that blows up the standard deviation. Easterly 2003 has shown that the significance of the policy variables in regressions like those in Table 6 depend on extreme observations. Still, a country that is moving steadily away from fiscal solvency would eventually experience policy changes of the magnitudes indicated in table 7.
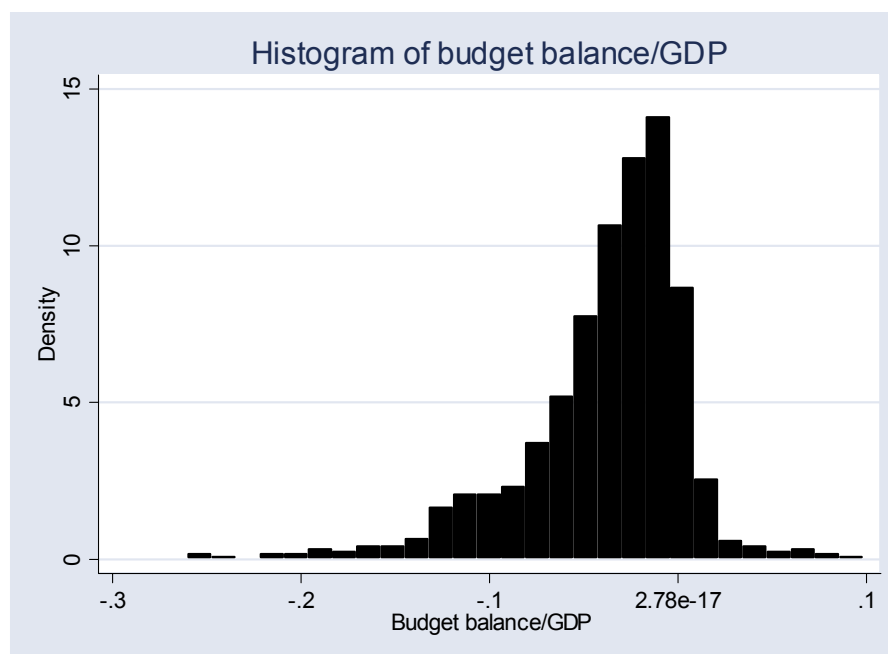
Figure 2

Figure 1 below shows the big differences in growth associated with large differences in budget deficits.

Of course, all the usual caveats apply for attributing causality to much-maligned growth regression results. The correlations identified here are consistent with either direction of causality – this paper itself argues that the theoretical relationship between public debt and growth goes both ways. It could also be that countries with negative growth have large budget deficits because revenue falls with GDP while spending does not, or it could be that countries engage in counter-cyclical fiscal expansion in response to negative growth.

Some progress has been made on causality by using dynamic panel methods with lagged RHS variables as instruments, as in Levine, Loayza, and Beck 2001 and Easterly and Levine 2001. These methods find policies to be significant and they pass the overidentification tests for valid instrumentation for the policy variables. While this is encouraging, we do know that overidentification tests have low power. So we should regard the evidence on fiscal policy and growth as suggestive but not decisively proven.

Figure 1

Budget deficits and per capita growth, 1960-94
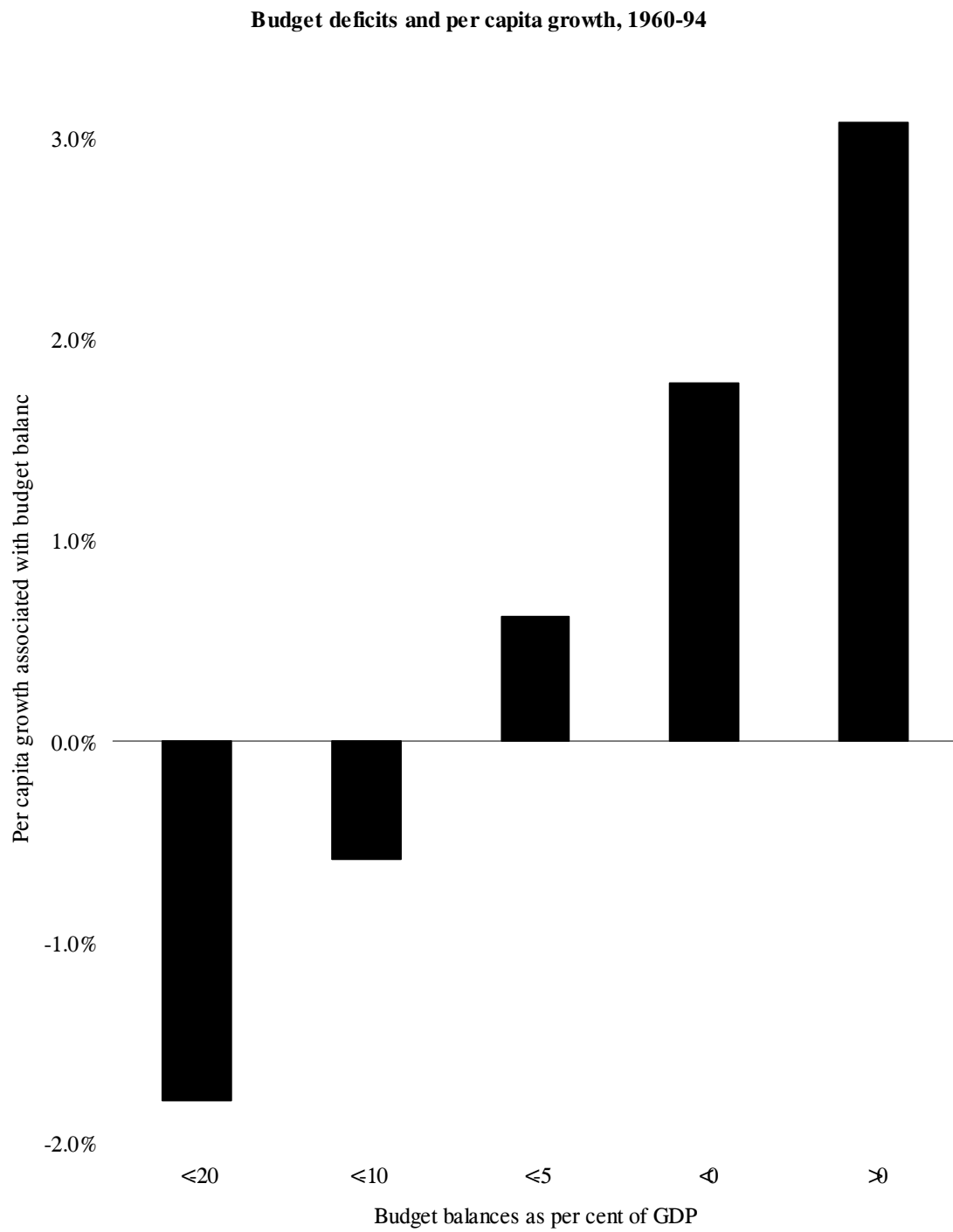
Conclusions

This paper discussed analytically the effect of growth on the government's intertemporal budget constraint. It suggests that an often overlooked component of debt dynamics is the role of growth, and in particular the effect of fiscal policy variables on growth. There could be a vicious circle of rising public debt, rising budget deficits, falling share of private credit in total credit, rising inflation, and falling growth. More positively, fiscal adjustment to close the intertemporal fiscal gap could bring a virtuous circle in the opposite direction on all of these variables.

The paper discussed the real world experiences with debt crises and found that low or falling growth often played an important role. The paper then examined the evidence that fiscal policy variables affect growth and found suggestive evidence, in line with the previous literature, that fiscal policy variables -- or variables affected by fiscal policy --like budget deficits, inflation, and the share of private in total credit do affect growth. Thus there seems to be some evidence supporting the perils and the promise of the fiscal "widening gyre."

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