

FISCAL POLICY, DEBT CRISES, AND ECONOMIC GROWTH

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It is very well known that growth rates play a role in debt dynamics. Despite this widespread knowledge, real world narratives of public debt crises often focus almost exclusively on budget deficits and neglect the role of growth. This paper presents the simplest arithmetic possible to illustrate how growth slowdowns could contribute to rapid increases in public debt to GDP ratios. It shows that growth slowdowns have indeed played a role in a wide variety of well known debt crises. It then considers what would be good practice for precautionary fiscal policy, focusing in particular on conservative forecasts of future growth. Unfortunately, political economy incentives cause policymakers to violate such good forecast practices, with a systematic tendency to excessive optimism about future growth. There even appears to be some anecdotal examples of even worse optimism biases when the debt crises are worse.

There are many things this paper does not do. It does not present or test a well developed theory of fiscal policy making and policymakers' expectations formation, relying instead on simple arithmetic and descriptive analysis of outcomes. The focus is on medium-run to long-run growth, not on cyclical fluctuations or cyclicalities of deficits or debt. The paper considers only the effects running from growth changes to public debt ratios. It does not consider any effects running the other way, from fiscal policy to growth. Obviously, these effects deserve consideration, but this paper omits them to keep the paper focused and of manageable length.

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There is already an important literature that tests for biases in growth and budget forecasts, often confirming an optimistic bias. Frankel (2011a) examines official growth forecasts across 30 countries for upward bias, and Frankel (2011b) considers the Chilean case. The literature on the U.S. includes McNab and others (2005), Auerbach (1994), Auerbach (1999), and Frendreis and Tatalovich (2000). The literature considering over-optimistic growth and budget forecasts in the Eurozone includes Strauch and others (2004), Jonung and Larch (2004), and Marinheiro (2010). Other papers on biased official growth forecasts cover Japan (Ashiya 2007), and Canada (Mühleisen and others 2005). Easterly (2013) provides further extensions of some of the same results presented in this paper.

1. SOME UNPLEASANT FISCAL AND GROWTH ARITHMETIC

1.1 Debt Dynamics

The simple arithmetic equation for the dynamics of public debt to GDP is extremely well known. I repeat it here for ease of exposition, giving the version in continuous time.

D = Public debt in constant prices

Y = GDP in constant prices

F = Primary Fiscal Deficit in constant prices

r = Interest rate on government debt

g = growth of real GDP

$$d = \frac{D}{Y}, \tag{1}$$

$$f = \frac{F}{Y}, \tag{2}$$

$$\Delta d = f + (r - g)d. \tag{3}$$

Let f^* be the primary fiscal deficit that stabilizes the debt ratio at its current level d (which actually has to be negative, i.e. a primary

surplus, because $r-g$ in the long run is positive). Substituting f^* for f in equation (3) will by definition make $\Delta d=0$, so

$$f^* = (r - g)d. \quad (4)$$

1.2 Effect of Growth Change if Fiscal Policy Unchanged

Now suppose that the growth rate g changes.¹ Since we are assessing the possible role of growth rates on debt dynamics, let us go to the extreme case that fiscal policy f stays at its old value set in (4), which keeps the debt ratio stable for the OLD growth rate. I don't consider what combination of reasons or possible theories could predict such a lack of response of fiscal policy: unanticipated growth changes, lack of knowledge that growth has changed, or political economy factors that keep fiscal policy rigid and unable to adjust to a new long-run situation.

The interest rate also does not change, and the debt ratio of course does not immediately change either. So the only change in equation (3) is the growth change. Debt dynamics will now depart from the stable debt ratio achieved by (4) in the following amount:

$$\Delta d = (-\Delta g)d. \quad (5)$$

Given the assumptions above, this (admittedly simplistic) unpleasant arithmetic of growth predicts that debt ratios will start rising for decreases in growth, and will fall for increases in growth. These effects are larger, the larger is the initial debt ratio when the change in growth occurs.

As already mentioned in the introduction, I am considering the effects of growth on debt crises, and not the reverse. Reverse causality in which debt crises decrease growth (such as the “lost decade” of growth often attributed to the Latin American debt crisis) would simply amplify the negative correlation already predicted in (5). However, we are assuming away any changes in fiscal policy in the thought experiment analyzed in this paper.

1. I leave some ambiguity about whether I am talking about the short-run or long-run growth rate. It is usually the latter because I am thinking of long-run fiscal policy f , but (3) also holds arithmetically for short-run growth rates ex-post.

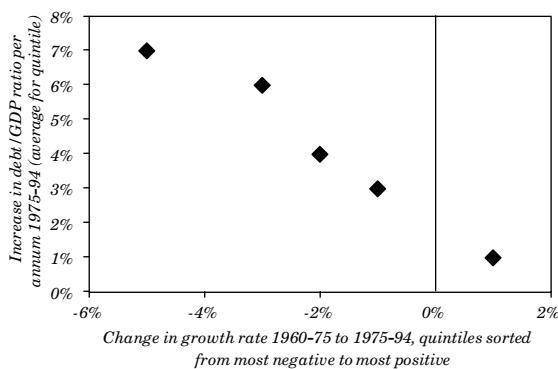
2. PUBLIC DEBT PROBLEMS AND GROWTH SLOWDOWNS

2.1 Previous Results, HIPCS, and Middle Income Debt Crises of 1980s

I showed in an old paper (Easterly 2001) that indeed growth slowdowns were strongly associated with rising debt ratios among all developing countries for 1975-94. I reproduce here figure 3 from that paper illustrating those results (figure 1).

Figure 1 includes two different sets of debt crises—those of low income countries and those of middle income countries (both in 1980s and early 1990s). The low income countries eventually got debt relief under the Highly Indebted Poor Countries (HIPC) program of bilateral and multilateral aid agencies. The old paper ran counterfactual exercises in which the debt ratios would have remained stable or even declined if growth had continued at the 1960-75 rate for cases as diverse as Costa Rica, Cote d'Ivoire, Gabon, and Togo, and hence these countries would not have become HIPCs or middle income debt crises. The point is not that it was reasonable to expect the old growth to continue, but that debt crises occurred partly because fiscal policy failed to adjust to the new growth rate.

Figure 1. Change in Growth and Rise in Public Debt Ratio to GDP for Developing Countries, 1975-94



Note: Replicated from Easterly (2001), figure 3.

Replication of old results with new data is an exercise that should be performed more often to make sure that results are robust (especially with the constant fear among audiences that results are reported selectively to make a strong case, i.e. data mining). Data mining would be exposed if new data fail to fit the already specified previous result). In the rest of this section, I consider new debt crises that have occurred more recently. The most recent public debt problems are not among the poor countries, but among the rich countries: the Eurozone countries (especially Portugal, Ireland, Greece, and Spain, the unfortunately named group PIGS) and the United States.

2.2 Eurozone Debt Crises

Figure 2 below corresponds to figure 1 for the Eurozone countries over the successive decades 1980s to 1990s to 2000s.

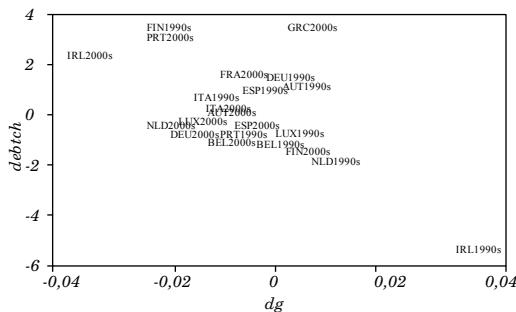
The graph indicates a negative relationship between debt increases primarily because of 4 extreme observations. The way to think of this graph is not so much as a test of significance of the correlation in this one sample alone (which only has 22 observations). Rather the test is whether the prediction of such a negative relationship in the earlier paper will fit out of sample with the new data.

Ireland and Portugal are examples of recent debt crises in which there was a major growth slowdown from 1990-2000 to 2000-2010. Ireland had earlier benefited from the “Celtic tiger” growth acceleration from 1980-1990 to 1990-2000 to achieve falling public debt ratios in 1990-2000 (the idea of sticky fiscal policy could apply to positive growth changes as well as negative ones). Another example of a growth slowdown associated with exploding public debt ratios was Finland in the 1990s.

Figure 3 shows the growth slowdown for the PIGS countries, where we can see the large growth changes in particular in Ireland and Portugal. All of the PIGS countries have a slowdown by 2010 of course, because of the deep crisis in 2007-2010.

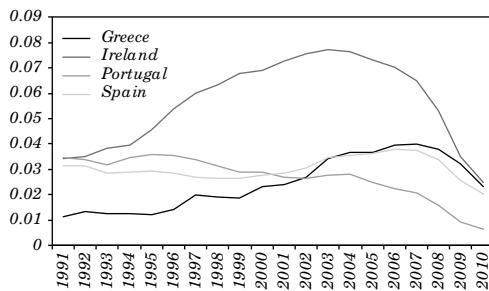
This also contributed to increasing debt ratios over that short period. The debt ratios over 2007-2010 would have increased anyway because of large deficits in those years, but the growth collapse added further to the debt ratio increase. This is most important for Greece, because it already had the highest debt to GDP ratio in 2007 (105 percent), and as shown earlier, high debt countries show the largest effects of growth slowdowns. The Greek debt ratio would have been 10 percentage points lower in 2010 if the growth collapse had not occurred.

Figure 2. Debt Ratio Change per Annum and Change in Growth per Decade for Eurozone Countries, 1980-2010



Source: See appendix. Note: Debt ratio change per annum, 1990-2000 and 2000-2010 (vertical axis), and change in growth from one decade to next, 1980-1990 to 1990-2000, and 1990-2000 to 2000-2010 (horizontal axis).²

Figure 3. 10-Year Moving Average GDP Growth Rate Ending in Year Shown



Source: See appendix.

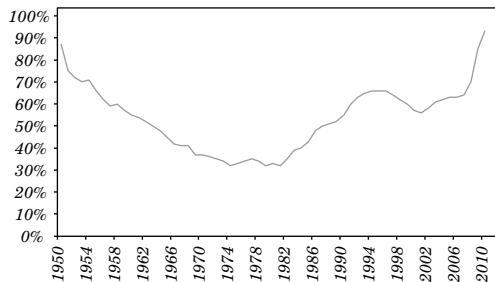
2. The figure omits transition countries in the Eurozone because the transition featured extreme and unreliably measured changes in growth, and transition countries did not have comparable growth data for the 1980s.

3. U.S. DEBT CRISIS

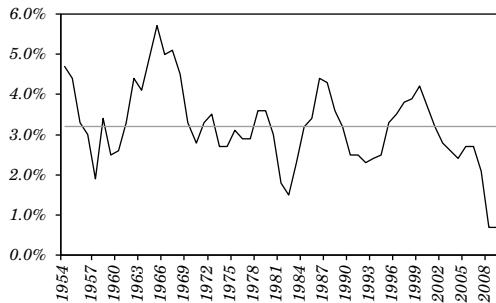
Analysts of the recent crisis with U.S. government debt usually focus on large deficits in the new millennium. Did growth slowdowns have any role in the U.S., like they did for some Eurozone countries, the HIPC s, and the 1980s middle income debt crisis?

Figures 4 and 5 shed some light on that question. The acceleration of growth in the 1960s played some role in the steady decline in the U.S. federal government debt to GDP ratio from its World War II high to a low around 1970. Another similar episode (although shorter and smaller) was the decline in the debt ratio during the Clinton years as growth accelerated in the second half of the 1990s. Finally, the recent climb in U.S. debt ratio corresponds to a collapse of the U.S. growth rate in the new millennium. The 2008-2010 crisis was of course very important here, but the growth rate was already sharply decelerating during the George W. Bush years before the crisis.

Figure 4. U.S. Federal Debt to GDP



Source: See appendix.

Figure 5. U.S. Real GDP Growth, 5 Year Moving Average

Source: See appendix. Five-year moving average ending in the year shown on horizontal axis.

4. PROBLEMS OF GROWTH PROJECTIONS AND EXPECTATIONS

If debt crises can occur partly because of a growth slowdown to which fiscal policy fails to adjust, it is particularly important to have sound growth forecasting practices. This will give as much lead time as possible to precautionary fiscal policy to avoid debt crisis. Unfortunately, we will see some suggestive evidence and anecdotes that the reverse seems to occur. As debt crises start to develop, policy makers seem to use optimistic and unrealistic growth forecasts as a way to evade fiscal adjustment.

4.1 Sound Forecasting Practices

Regression to the Mean

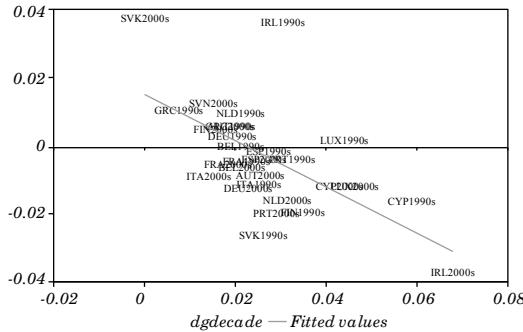
A well known property of growth rates both within countries and across countries is regression to the mean. Regression to the mean is not necessarily 100 percent, as there could be permanent changes in growth rates within countries and permanent growth differences between countries. However, a vast body of evidence suggests these permanent changes or differences are small relative to the total variation of growth rates, so mean reversion is quantitatively large.

To see the importance of mean reversion in the examples just discussed, the following two graphs show it within the Eurozone countries and within the U.S. alone. Both graphs show the change in growth has a negative relation to the initial growth rates. Above

average growth regresses partly back towards the mean, while the below average growth regresses upward towards the mean.

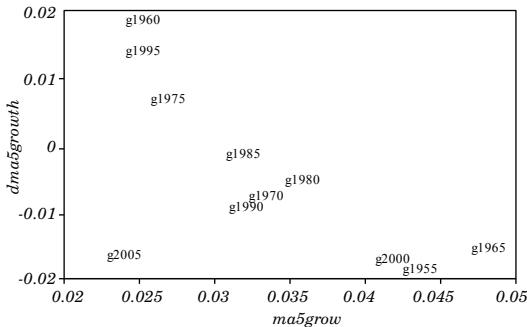
Another way to state regression to the mean is there is low persistence in growth rates, and growth accelerations are temporary. This has received abundant confirmation in a wide variety of panel data sets on GDP growth rates (Easterly, Kremer, Pritchett, and Summers 1993, Hausmann, Rodrik, and Pritchett 2005).

Figure 6. Change in Decade Average GDP Growth Against Initial Decade Average Growth in Eurozone Countries, 1980-2010



Source: See appendix. Note: Decades included are 1980s and 1990s and 2000s. Vertical axis $dgdecade$ is the change in average growth from one decade to the next. The horizontal axis is growth in the initial decade. So for example, IRL2000s is the change in growth in Ireland from 1990-2000 to 2000-2010 on the vertical axis and the growth in Ireland for 1990-2000 on the horizontal axis.

Figure 7. Regression to the Mean in U.S. Growth Rates



Source: See appendix. Vertical axis $dma5growth$ is change in average U.S. growth from one five-year period to the next. Horizontal axis $ma5grow$ is average growth in the initial five-year period.

The application of mean reversion to fiscal policy is obvious. For example, Ireland during the boom Celtic Tiger years of 7-8 percent GDP growth would have been foolish to expect these growth rates to continue indefinitely. Fiscal policy should have anticipated mean reversion at least a good part of the way back towards the Eurozone mean (as did in fact happen). Likewise, the U.S. at the end of the 1990s should not have expected the high growth of the late 1990s to continue indefinitely, and fiscal policy should have been gauged more to the U.S. long-run growth rate than to the temporarily high growth rate in the Clinton years.

Conservative Forecasts

Aside from mean reversion, countries should take into account how sensitive their debt paths are to growth slowdowns. As already suggested, countries that already have high debt are more sensitive to growth slowdowns. It makes sense that the higher is the initial debt, the more conservative should be the growth forecasts. In our examples for both the Eurozone and the U.S., the high debt countries should be more conservative about forecasts, and the U.S. should have been more conservative as the debt ratio got worse.

4.2 Actual Forecasting Practices

Mean Reversion in Growth Forecasts?

We have already seen that debt ratios rise strongly when there are growth slowdowns. Most slowdowns are the result of mean reversion (such as Portugal and Ireland in the new millennium, and the U.S. after the Clinton era boom). Hence it seems to follow that fiscal policy did not rationally anticipate the predictable mean reversion (or adjust quickly once it was already happening).

The failure to predict the predictable mean reversion could reflect at least two things: (1) the inability of politicians to engage in preemptive fiscal adjustment during the boom years, for political economy reasons, (2) the well known psychological cognitive bias that fails to anticipate mean reversion even when it is completely predictable (as confirmed in many psychology and behavioral economics experiments, beginning with the path-breaking work of Kahneman and Tversky (1973)).

More Conservative the Worse is the Debt Situation?*HIPCs*

HIPCs became HIPCs because in many cases they failed to adjust to the growth slowdown. In other cases, growth played a smaller role or no role, and the HIPCs simply ran excessive deficits to accumulate high debt relative to GDP. In either case it would seem to suggest that the HIPCs would need to do fiscal adjustment along with receiving debt relief to prevent the emergence of new debt crises all over again.

However, the HIPC program was determined in part by an international political campaign to grant debt forgiveness to poor countries. This campaign applied pressure not only to forgive the debts but also to maintain the same flow of official financing to poor countries (which partly consisted of loans and not just grants), which implied NOT doing any major fiscal adjustment in HIPC countries. This would result in the emergence of new debt problems eventually. The World Bank and IMF analysts who designed HIPC debt relief packages were required to do long-run debt and growth forecasts to demonstrate that the HIPCs debt after relief was “sustainable”, i.e. debt ratios would not increase again in the future.

How to reconcile these irreconcilable mandates? The answer appears in the next table: official HIPC programs prepared by IMF and World Bank staff exaggerated future growth prospects of the HIPCs. I gained access to a large database of growth forecasts in HIPC documents produced in the 1990s and early 2000s. I was also given growth forecasts made for non-HIPC countries for the same time periods by Bank and Fund staff. Now that I have access to actual growth data up through 2010, I can calculate the ex-post forecast errors (forecasterr in the regressions shown below) in both groups. There is a significant positive forecast error of HIPC countries of about 1 percentage point of growth relative to non-HIPC countries. Although many HIPC countries are in Africa, the results are not a spurious consequence of excessive optimism about Africa (there is indeed no evidence for the latter). To avoid the unpalatable expectation that debt ratios will start climbing again in the absence of fiscal adjustment in HIPCs (although from very low levels after debt forgiveness took effect in recent years), the analysts apparently resorted to high growth forecasts. A situation that called for conservative growth forecasts—countries with a long track record of fiscal mismanagement—instead generated the reverse.

Table 1. Regression of Annual Growth Forecast Errors

<i>Variables</i>	(1) <i>forecasterr</i>	(2) <i>forecasterr</i>	(3) <i>forecasterr</i>
Africa	0.145 (0.394)		0.605 (0.367)
Hipc	0.954** (0.380)	1.022*** (0.343)	
Constant	-0.0416 (0.307)	0.0111 (0.271)	0.152 (0.298)
Observations	156	156	156
R-squared	0.055	0.054	0.018

Robust standard errors in parentheses.

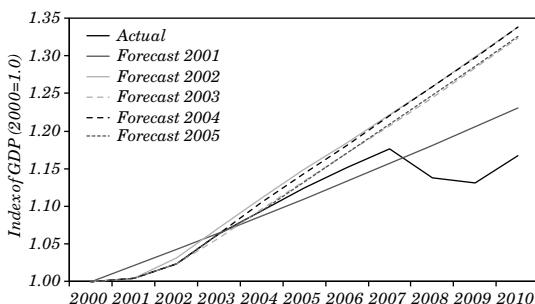
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: See appendix. Note: Regression of annual growth forecast errors ("forecasterr") and dummies for HIPC countries ("hipc") and sub-Saharan Africa ("Africa"), 1995-2010.

The U.S. during the new millennium

The final story is from U.S. growth forecasts made in budget documents prepared by the executive branch. The forecast paths for U.S. per capita income (set to an index of 1 in the year 2000) became more optimistic starting in 2002 and continuing with the same optimism for the next few years. The less optimistic forecast made in early 2001 (before 2001 data itself became available) turned out to be closer to the actual, which would have been true even if the 2007-2010 crisis had not happened and growth continued on the same trend as of 2006.

What happened? Ironically, the U.S. fiscal situation became worse from 2001 to 2002. 2001 was the last in a string of federal budget surpluses, and 2002 was the first in an ever worsening string of budget deficits (again, even before the financial crisis and recession). What's more the deficits could have been anticipated as a consequence of new spending for homeland security and the war in Afghanistan (and soon after Iraq) after 9/11/01 occurred. U.S. administration budget analysts are required to project future debt

Figure 8. Growth Projections in U.S. Budgets Against Actual

Source: See appendix.

ratios, and obviously do not want to show exploding debt to GDP. They seem to have resorted to more optimistic growth forecasts as a way of avoiding and disguising the unpalatable choice between rising federal debt to GDP and making other fiscal adjustments elsewhere in the budget to compensate for the new post-9/11 spending. Whether anybody was really fooled is another question. Perhaps politicians do not face any strong discipline to present rational expectations, since knowledge about what are reasonable growth forecasts is a public good in which voters may rationally under-invest.

The bottom line is that a worsening fiscal and debt situation should have called for more conservative growth forecasts, and that instead the opposite happened.

5. CONCLUSION

The unpleasant arithmetic of growth and public debt is that growth slowdowns call for sharp fiscal adjustments that (as in many examples shown here) politicians are unwilling or unable to make. As a result, debt crises often result in part from major growth slowdowns, a factor which has been underemphasized in the literature and in public discussion compared to the emphasis on budget deficits. This unpleasant arithmetic calls for sound forecasting of growth that acknowledges mean reversion and is more conservative the more precarious the debt situation. Unfortunately, political economy factors seems to result in analysts sometimes doing the reverse—making growth forecasts more optimistic to disguise the need for fiscal adjustment.

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APPENDIX: DATA SOURCES

GDP Growth: for 1951-1960 from Summers-Heston or Penn World Table, for 1961-2010 from World Bank on-line database.

Public debt: for Europe from OECD on-line database, for the rest from World Bank on-line database. I net out foreign exchange reserves from public external debt. The domestic debt is net of government deposits in the banking system. Where the country is eligible for concessional loans, I use the present value of debt service series from the World Bank, which is an internationally comparable measure of public external debt burden (removing the grant element of concessional loans). The data on the present value of publicly guaranteed external debt obligations is constructed from the World Bank's Global Development Finance database.

GDP Growth Forecasts: For the U.S. from the Office of Budget and Management, while for the rest of the countries the source is a large internal database produced by International Monetary Fund and World Bank staff, made available to the author.