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The Role of Growth Slowdowns and Forecast Errors in Public Debt Crises[1]

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Abstract: According to the well-known arithmetic of debt dynamics, a growth slowdown results in rising debt ratios if fiscal policy does not adjust. This mechanical effect plays a role in a surprisingly wide variety of public debt crises, from the Latin American debt crisis of the 80s and 90s to the low income HIPC crisis of the same period to the current Eurozone debt crisis and US debt crisis. Growth slowdowns often result in growth projections by fiscal authorities that are too optimistic, one of the possible reasons for which fiscal policy fails to adjust. Sound forecasting practices of projecting mean reversion and being more conservative the worse the debt situation are ignored in some major debt crises.

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I.   Introduction

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.

This paper updates an analysis in Easterly (2001) of the effect of growth slowdowns on the middle income debt crisis of the 80s and 90s, and on the low income debt crisis of the same period (Highly Indebted Poor Countries, or HIPCs). Now that it is the rich countries having debt crises, the same methodology will in this paper be applied to discuss the Eurozone debt crises and the debt crisis in the US.

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 cyclicality 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.

This draft of the paper is still lacking a good review of the previous literature on these areas. I mention only two important recent papers by Frankel (2011a, 2011b), which also found a tendency towards optimistic bias in growth projections but with more of a cyclical focus.

II.   Some unpleasant fiscal and growth arithmetic

This section considers the simple arithmetic by which debt crises may be provoked or worsened by growth slowdowns. This is meant to be an accounting of how high debt came about, not a theoretical analysis of policymakers' behavior.

     a.   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

(1) $d = \dfrac{D}{Y}$

(2) $f = \dfrac{F}{Y}$

(3) $\Delta d = f + (r - g)d$

Let f^* be the primary fiscal deficit that stabilizes the debt ratio at its current level d (which actually has to be negative in the long run, 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

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

The determination of f^* is still pure arithmetic, I do not mean to imply that it is automatically optimal to stabilize debt at its current level. Equations (3) and (4) hold even if we are considering very short run debt dynamics, but in the short run, it is obviously necessary to have some discussion of cyclical policy on f. This paper does not consider managing business cycles. As a pure accounting matter, Equation (3) still helps us decompose the rise in short run debt to the part attributable to the primary deficit f and the part attributable to short run growth g, but has nothing to say on whether the rise in debt is suboptimal.

At the other extreme, in the very long run, equations (3) and (4) help us address the well-known long run budget constraint of the government. Suppose we take g now to be the steady state permanent growth rate, f is the permanent ratio of primary surplus to GDP, and d is the initial debt to GDP ratio at time zero. Then the long run budget constraint is that the present value of primary surpluses in the future must be equal to or greater than the current debt:

(5) $\int_0^\infty e^{-rt}(-f)e^{gt}dt \geq d$

When all variables g, r, f (as well as the initial, current debt ratio d) are constant in the steady state, the simple closed form solution to Equation (5) is:

(6) $\frac{-f}{r-g} \geq d$

Equation (4) thus gives us the primary surplus $-f^*$ that will satisfy the solvency condition (6). If it seems difficult politically or otherwise to attain this primary surplus, then there is a high risk of default on debt. This is of course what is usually meant by "debt crisis."

Now if the permanent growth rate should change, we can discuss how the primary surplus must change in the very long run to keep the government solvent. Note that we must assume in the long run that r>g for the present value of primary surpluses in (5) to be finite.

Of course, how long a period corresponds to the long run is imprecise. I mean this budget constraint discussion to be illustrative of the idea that the primary surplus must permanently increase in response to any permanent decrease in the growth rate. If it fails to do so, then the debt ratio will start increasing. Of course, the latter is still arithmetically true even if we are not sure about whether the long run budget constraint is relevant.

The bottom line is that the identity (3) is always useful for descriptive accounting of changes in debt ratios and changes in growth rates, regardless of whether we are discussing the short run or long run. We can get closer to normative analysis of how the primary surplus should respond to changes in growth as we move towards the long run in which the solvency condition is relevant.

b. Effect of growth change if fiscal policy unchanged

Now suppose that the growth rate g changes. 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.

The interest rate also does not change, and the initial 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:

$$(7) \Delta d = (-\Delta g)d$$

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.

In this thought experiment, the primary surplus had been set to the old growth rate to satisfy equation (4) for a stable debt ratio. To evaluate the rise in debt with a growth slowdown, it helps to set out three extreme cases: (1) the growth change was permanent, (2) the old growth rate was temporary but the new one is permanent, (3) the old growth rate was permanent but the new one is temporary. Remember again I am considering ONLY the role of fiscal policy in the long run to avoid debt crises and neglecting all other considerations, such as counter-cyclical policies. In case (1), the old fiscal policy was appropriate to stabilize the debt, but now must adjust to the new permanent growth rate. In case (2), the old fiscal policy was already incorrect because the old growth rate was not the permanent one, the new growth rate is permanent, and so fiscal policy should again adjust to the new growth rate. In case (3), if indeed the new growth rate is temporary, then there is no long run reason to change fiscal policy.

Of course, in the real world, the new growth rate is unpredictable, and it is difficult to assess whether any growth rate is permanent or temporary. We will discuss evidence for permanent changes in growth using averages for as long a period as possible. We will also discuss mean reversion to consider temporary fluctuations in growth rates.

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).

Even if this paper abstracts from responses of policymakers, there are also mechanical effects of the growth slowdown on the primary surplus to consider. Most obviously, if the growth change in the short run is a short run cyclical phenomenon, there is the well-known effect of recessions increasing deficits and booms lowering them. This paper is not focusing on such cyclical effects, but they may be too important in the data to ignore, especially in the crisis of 2008 to the present. Second, a growth

slowdown may make private borrowers as well as public ones insolvent, possibly leading to bank

bailouts with government money (as in the post-2007 crisis). More subtly and returning to thinking more

in the medium to long run, if future spending plans were geared to the OLD growth rate (such as

through forecasts geared to the old growth rate), while revenue reflects the actual NEW growth rate,

then a growth slowdown would increase the deficit.[2] So this paper will do some exercises looking at the

primary surplus and growth slowdowns.

III.   Public debt problems and growth slowdowns

This section looks at how much growth slowdowns can account for some well-known debt crises.

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[2] This effect is well known in the literature, I am grateful to Steven Pennings for suggesting it be included here.

a. Previous results: HIPCS, and middle income debt crises of 1980s

I showed in the earlier 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

Figure 3: Change in growth and rise in public debt ratio to GDP
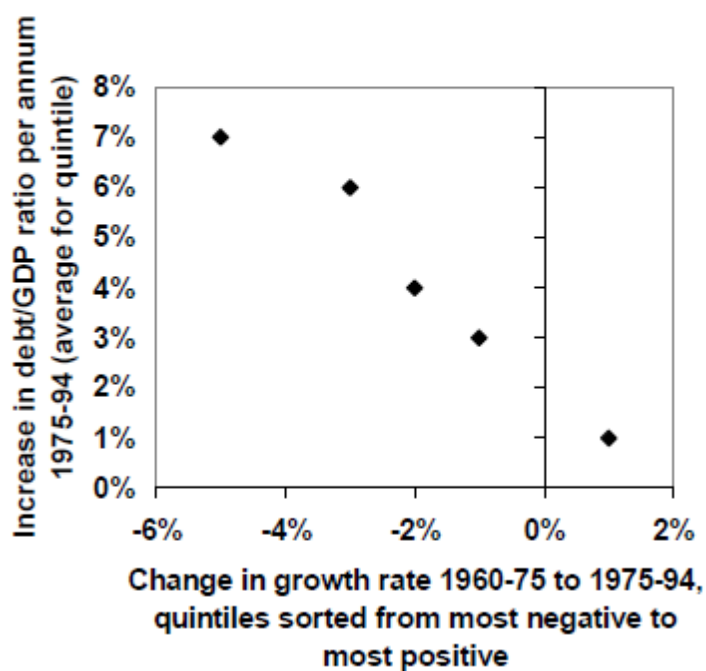
paper illustrating those results.

Figure 3 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.

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, Italy, Greece, and Spain, the unfortunately named group PIIGS) and the United States.

b. Eurozone debt crises

There was indeed a growth slowdown in the Eurozone, as shown in the next figure with 10 year moving average growth.[3] As far as the PIIGS countries, Greece, Portugal, and Spain had the most severe growth slowdown, after growth in those countries was highest in the Eurozone in the 60s and early 70s. Italy went from one of the highest Eurozone growth rates in the 60s and early 70s to the lowest in the 1990s and 2000s. Ireland is atypical with a growth boom in the 1990s and a collapse in the 2000s. All of the Eurozone countries have a slowdown by 2010 of course, because of the deep crisis in 2007-2010, with Portugal and Italy at the bottom.

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[3] I omit more recent entrants into the Eurozone after 2001, which excludes Cyprus, Estonia, Slovakia and Slovenia.

10 year moving average GDP growth rate ending in year shown in Eurozone countries
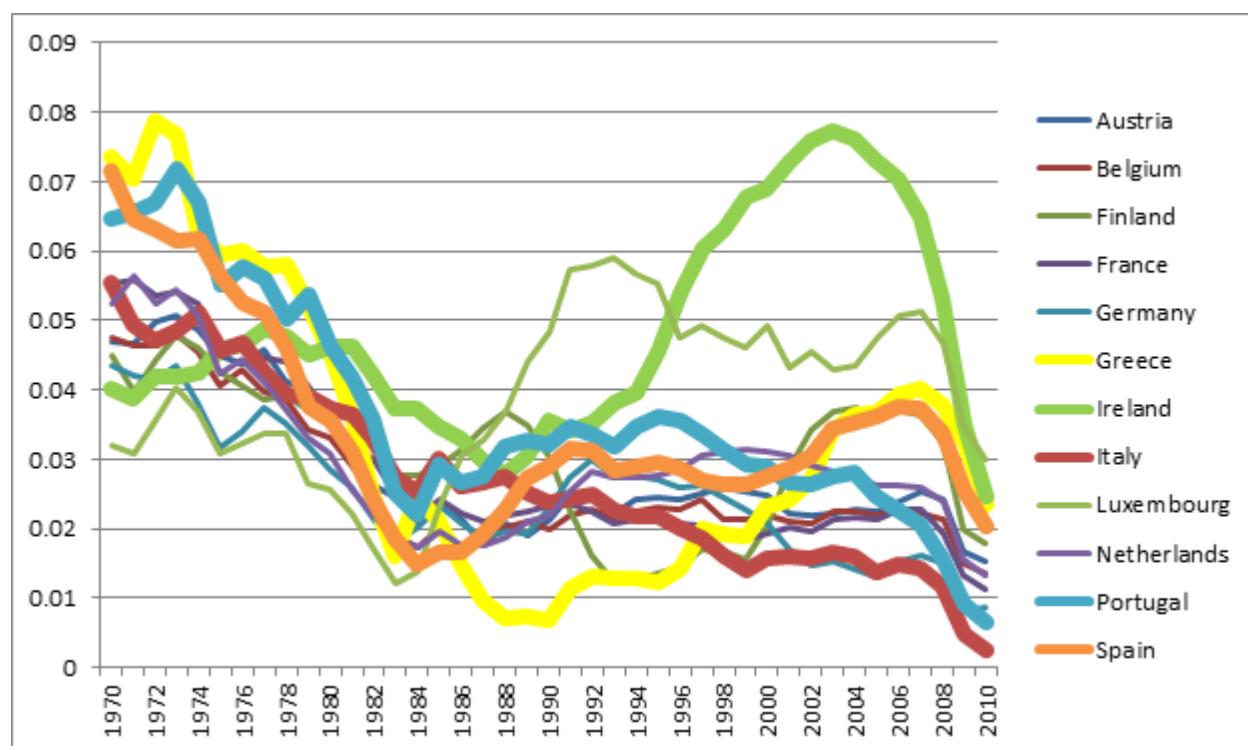
We can see more evidence for a permanent growth slowdown in a simple fixed effects panel regression for Eurozone countries. The table shows that PIIGS have a higher growth over the whole period 1960-2010, but also have a larger slowdown from 1960-85 to 1986-2010. There seems to be a strong common element in the slowdown of each group, as we cannot reject the hypothesis of zero fixed effects within each group. The large standard deviation of the pure time-varying error term (assumed to be iid in this panel regression) is suggestive that mean reversion will be an important factor in the short to medium run.

Fixed effects Regressions for Eurozone Annual Growth Rates, 1960-2010

VARIABLES	growth	growth	growth	growth	growth	growth
post1985				-0.0130***	-0.0102***	-0.0170***
				(0.00223)	(0.00258)	(0.00392)
Constant	0.0320***	0.0296***	0.0354***	0.0385***	0.0347***	0.0439***
	(0.00114)	(0.00132)	(0.00203)	(0.00157)	(0.00183)	(0.00277)
Observations	600	350	250	600	350	250
Group	Eurozone	non-PIIGS	PIIGS	Eurozone	non-PIIGS	PIIGS
Number of countries	12	7	5	12	7	5
Standard error of time-varying error term	0.028	0.025	0.032	0.027	0.024	0.031
Significance level for fixed effects	0.045	0.334	0.167	0.032	0.307	0.140

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The next figure looks at increases in the debt ratio per annum associated with the growth change from 1960-85 to 1986-2010. Note from equation (7) above that the predicted effect of growth slowdowns are larger, the larger is the initial debt ratio. So the horizontal axis here is the change in debt times the initial debt ratio. This graph gives more insight into the longer-run debt problems of Greece, Italy, and Portugal among the PIIGS (as well as France (!)). Ireland actually had debt reduction over this period due to growth acceleration – we will see in the following graph that Ireland's debt changes only show up as associated with growth changes when broken down by decade. Spain did not experience as large a debt increase associated with the growth slowdown.

The regression above is suggestive that the slowdown was permanent, which suggests a policy failure to adjust the primary balance to the new growth rate. Greece is the most notable example here.

Eurozone countries' growth change from 1960-85 and 1986-2010 (interacted with initial debt ratio in 1985) and debt ratio increase per year, 1986-2010
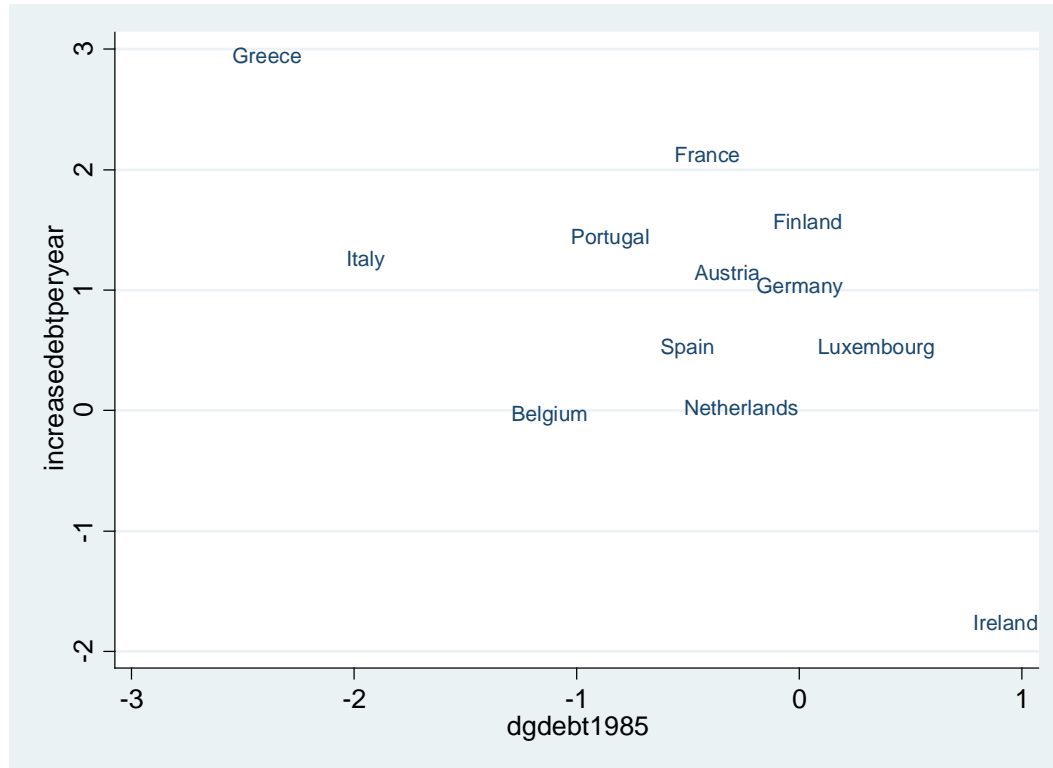

The next figure below looks at the Eurozone countries over the successive decades 1980s to 1990s to 2000s. The horizontal axis shows the change in average GDP growth from one decade to the next (again interacted with initial debt ratio at beginning of each decade), and the vertical axis shows the increase in the public debt ratio per annum in the latter decade.

The way to think of these graphs is NOT as a test of significance of the correlation in this one sample alone (which only has 22 observations, not to mention the even fewer observations in the previous graph). We are doing debt accounting based on an arithmetic identity, not testing a statistical hypothesis. Rather the location of points in the upper left hand corner and lower right corner show episodes where growth changes played an important role in debt changes.

Portugal is an example of the recent debt crises in which there was a major growth slowdown from 1990-2000 to 2000-2010. Italy's debt accumulation was associated more with the growth slowdown in the 1990s. One non-PIIGS example of a growth slowdown associated with rising public debt ratios was Finland in the 1990s. With decade averages, there is less confidence about whether growth slowdowns are permanent or temporary.

Ireland is a special case where temporariness is more likely. The boom of the 1990s seems like a temporary deviation from a longer run average. Hence allowing public debt ratios to fall in 1990-2000 with the boom, and then rise after the end of the boom could be sensible policy as opposed to adjusting fiscal policy to a temporary growth rate. The extent of the public debt rise in 2000-2010 may still have been excessive if policymakers expected the high 1990s growth to partially persist; we will revisit this issue with data on projections below.

Annualized debt change related to Growth change times initial debt, decades of 1990s and

2000s
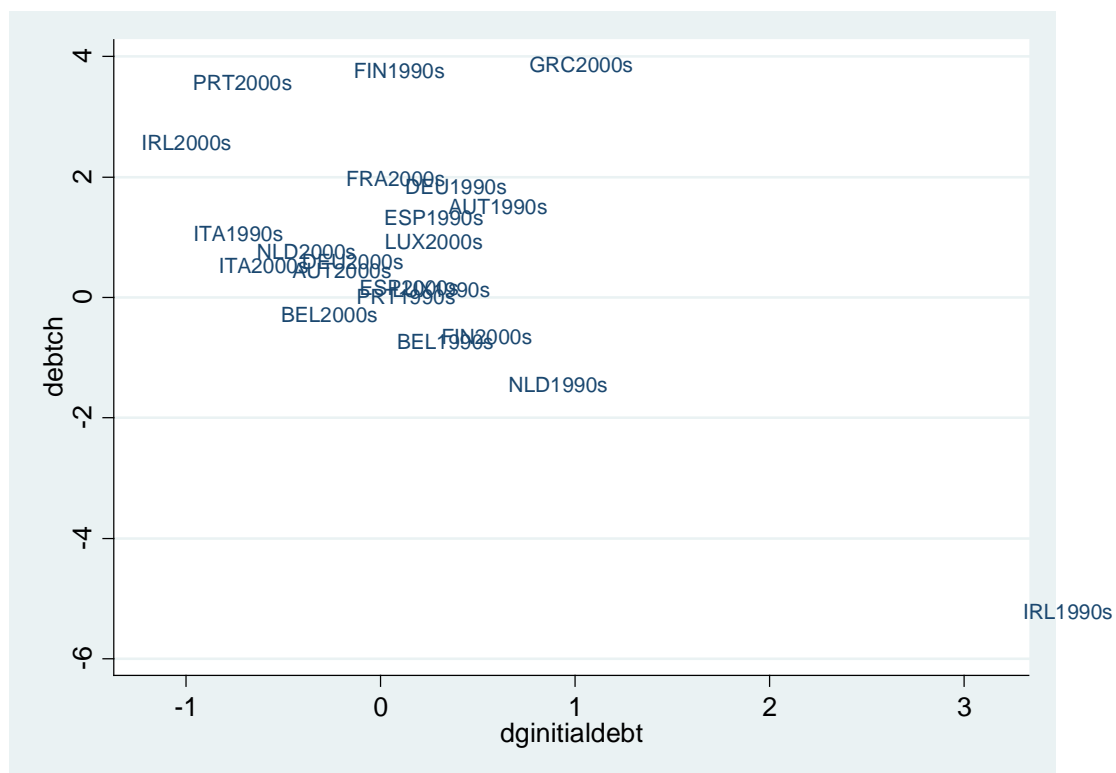
We suggested above that a growth slowdown could also affect the primary surplus. There is some evidence for this in the next graph, using five year averages for growth (change from one five year average to the next) and the average primary surplus to GDP ratio in the second five year period. The year part of each point shows the year in which the second five year period ended.

Eurozone Growth change and Primary Surplus/GDP, five year averages
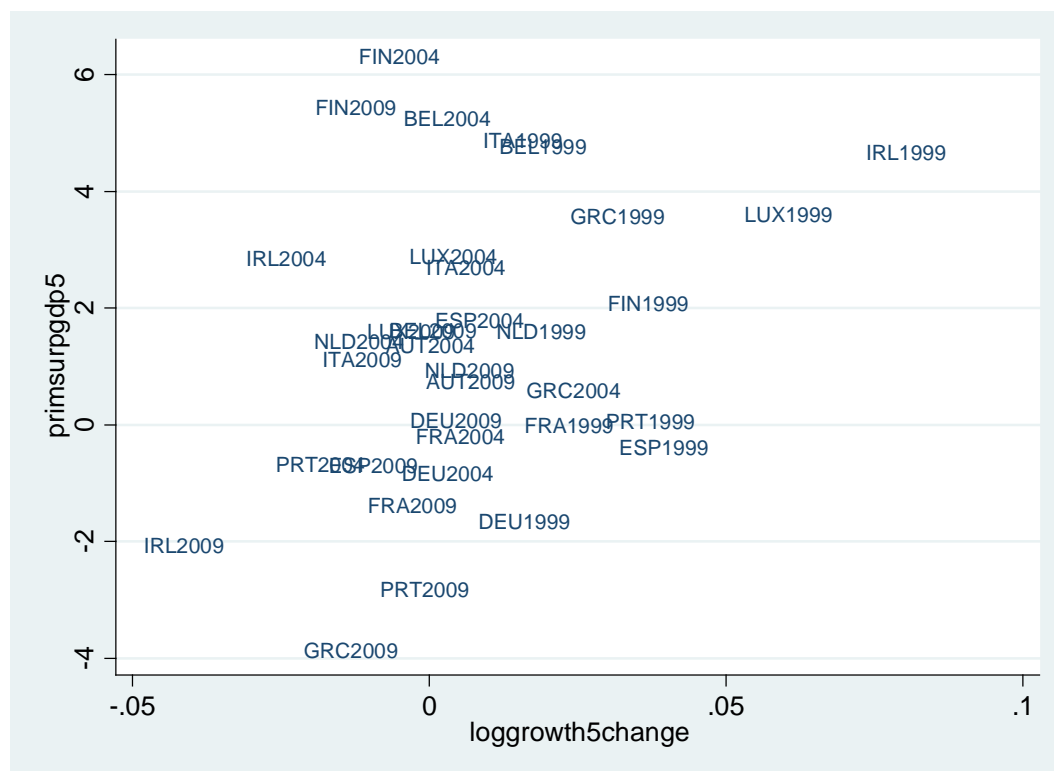

c.   US debt crisis

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

The federal debt ratio rose steadily for 20 years from 1975 to 1994 at the same time that US long run growth (shown here as a 20 year average) was slowing down. A very different episode 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 US debt ratio corresponds to a collapse of the US growth rate in the new millennium. The 2008-2010 crisis was of course very important here, but the growth rate was already decelerating during the George W. Bush years before the crisis.

US Federal Debt to GDP ratio, 1975-2010

## 20 year Moving Average US GDP Growth Rate (ending in year shown)
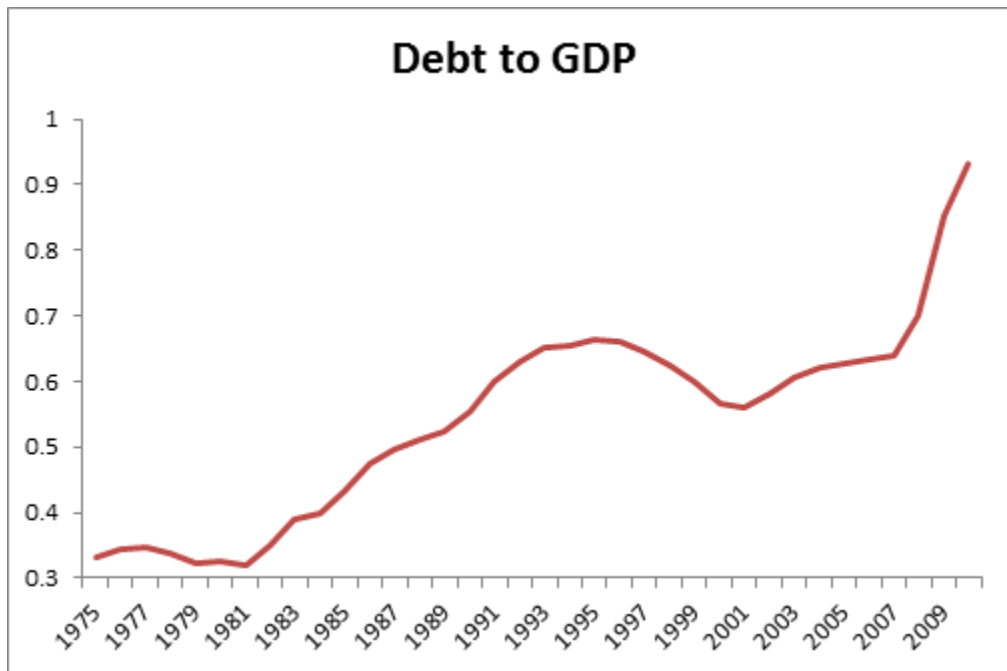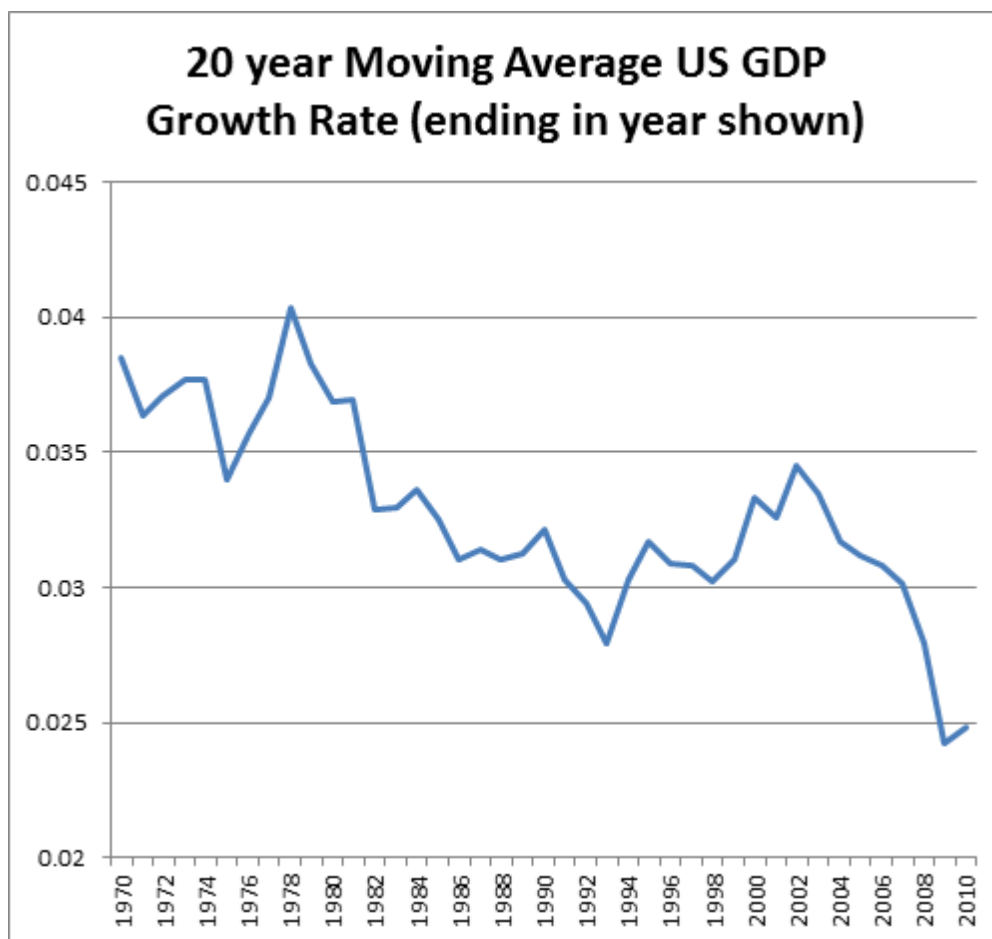
Below we will analyze growth forecasts made by the Administration every year since 1975.

These forecasts during most of this period have a six year horizon, so I also present US data in the

current section in rolling 6-year averages. The next graph shows these rolling averages for the average

growth change from one six year period to the next, interacted again with the initial public debt to GDP

ratio at the start of each six year period on the horizontal axis. The vertical axis shows the public debt

ratio increase per annum in the second six-year period, beginning at the start date shown for each point

in the graph. Again the purpose of this graph is not statistical testing (there are too few data points and

they are not even independent because they are rolling averages) but illustration of which years have

the mechanical growth effect from equation (7) dominate. Growth accelerations in the late 70s and mid

90s show strong debt reduction, while growth slowdowns in the new millennium show strong debt
increases.

US Debt change per annum against change in growth*initial debt ratio, over six years

**beginning with start date shown**
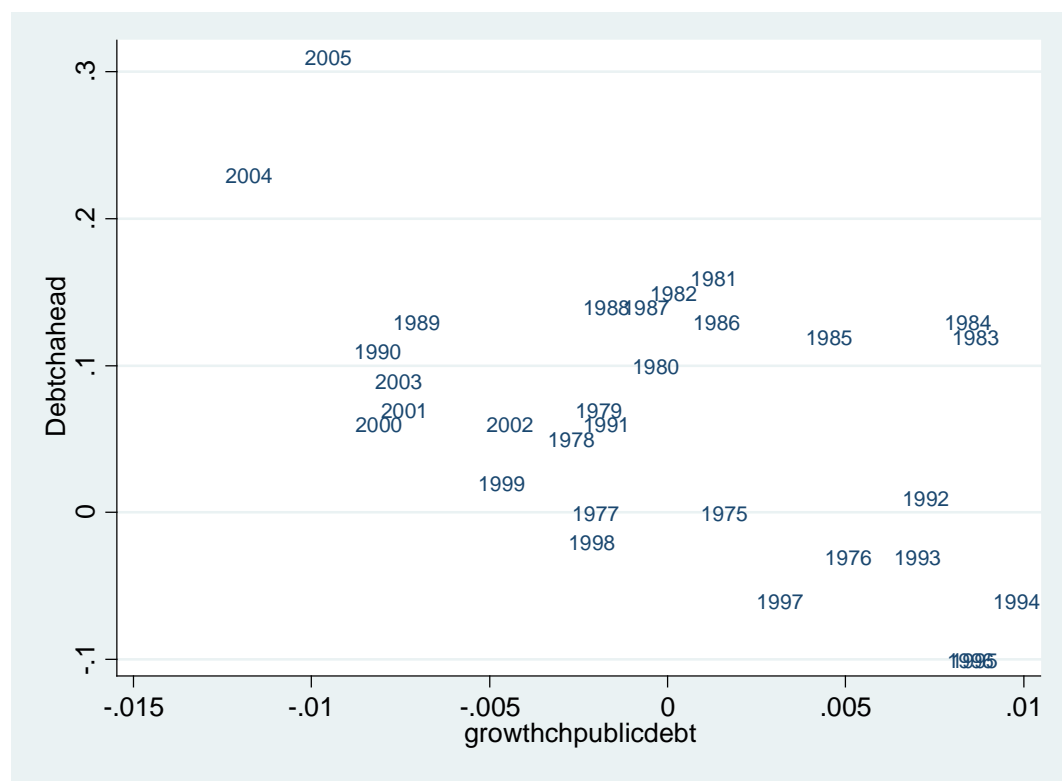
IV.   Problems of growth projections

If debt crises can occur partly because of a growth slowdown to which fiscal policy fails to adjust, it may

because the changes are unanticipated or because the change year by year is considered temporary

when it is in fact permanent. We can study these possibilities with actual data we have on growth

projections and outcomes.   The sensitivity of debt crises to growth slowdowns makes it particularly

important to have sound growth forecasting practices. This will give as much lead time as possible to

precautionary fiscal policy to avoid debt crises. We will also consider some principles of sound

forecasting and see whether they are observed in this section.

a.   Association between growth changes and forecast errors

Our data on Eurozone growth forecasts comes from countries' budget ministries' submission of

projections at the same time as they report budget plans. Unfortunately, these data are very time-

consuming to collect and for this paper it was only possible to collect data on the PIIGS countries in the

Eurozone. The projections are for a period between 3 and 5 years forward, and began only in 1998.

Hence, we have data on projections and actual outcomes for the period 1999-2010 for the PIIGS

countries. The first thing to document is the unsurprising link between growth changes and forecast
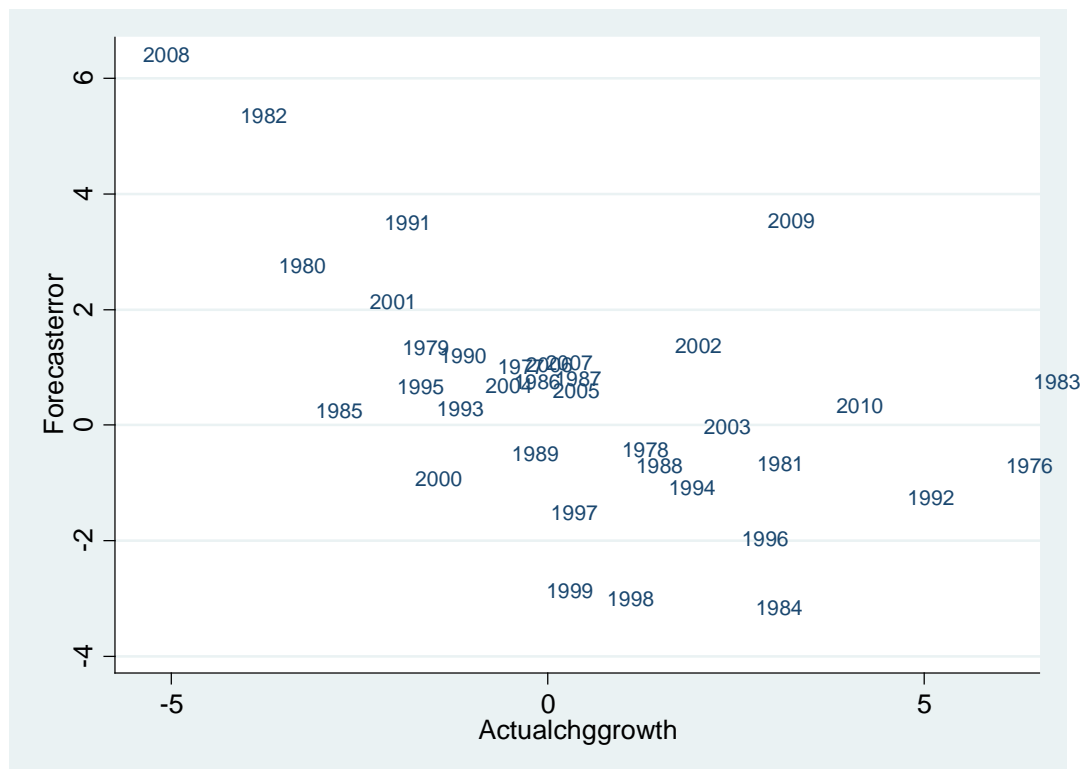
errors.

The figure shows the association between forecast errors (projected GDP – actual GDP growth)

at horizon t+1 and the change in growth from t to t+1. There is indeed an association between declines

in growth and positive forecast errors, as well as examples of negative forecast errors when growth

accelerates.

PIIGS Countries, Change in growth and forecast error at horizon t+1
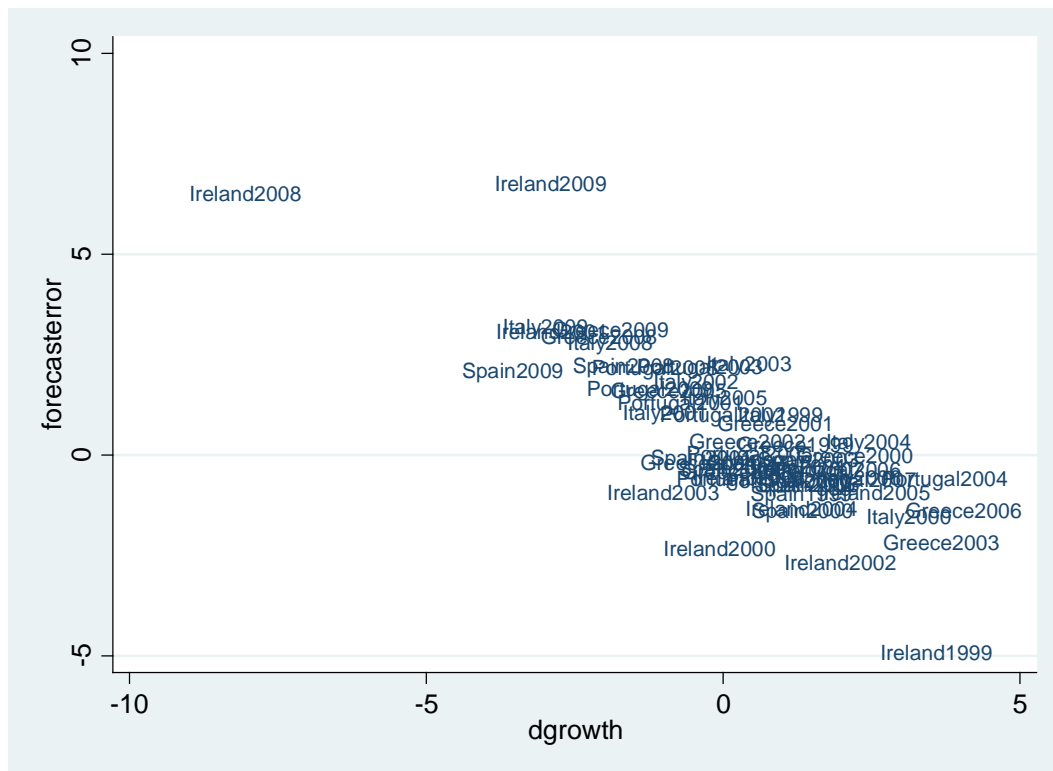
We show the growth changes and forecast errors for the time series for the US for 1975-2010 for every year at horizon t+1. Again, unsurprisingly, large growth changes produce forecast errors in the opposite direction.

US Annual data, forecast error and actual change in GDP growth, at horizon t+1

b. Association between forecast error and debt change and deficits

Another way to show the role of growth changes in debt is to show the link directly from the forecast error to the change in the public debt ratio. The next graph shows positive forecast errors and negative forecast errors important for some debt changes for the PIIGS countries.

GDP growth forecast error for t+1 and Public Debt to GDP ratio change in that year
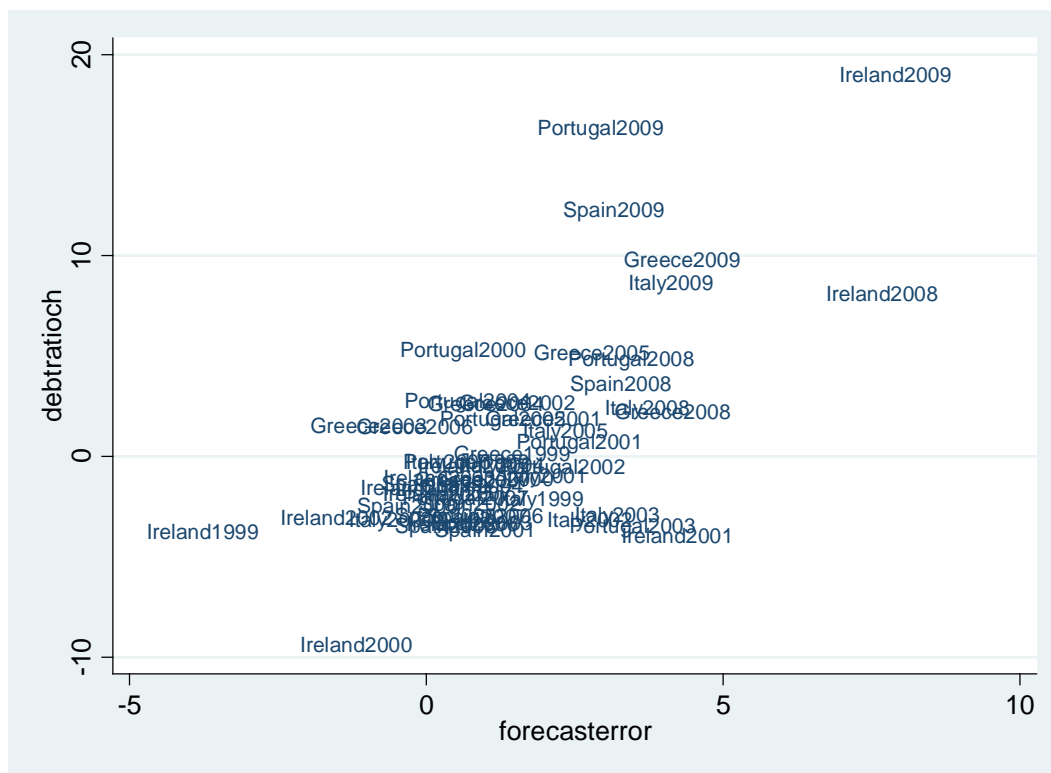
And a similar graph shows episodes of positive forecast errors associated with debt increases in the US, while negative forecast errors are associated with debt decreases (here using the rolling six year forward projections).

US Debt ratio change per annum and US GDP growth forecast error, over six years ahead with start date shown
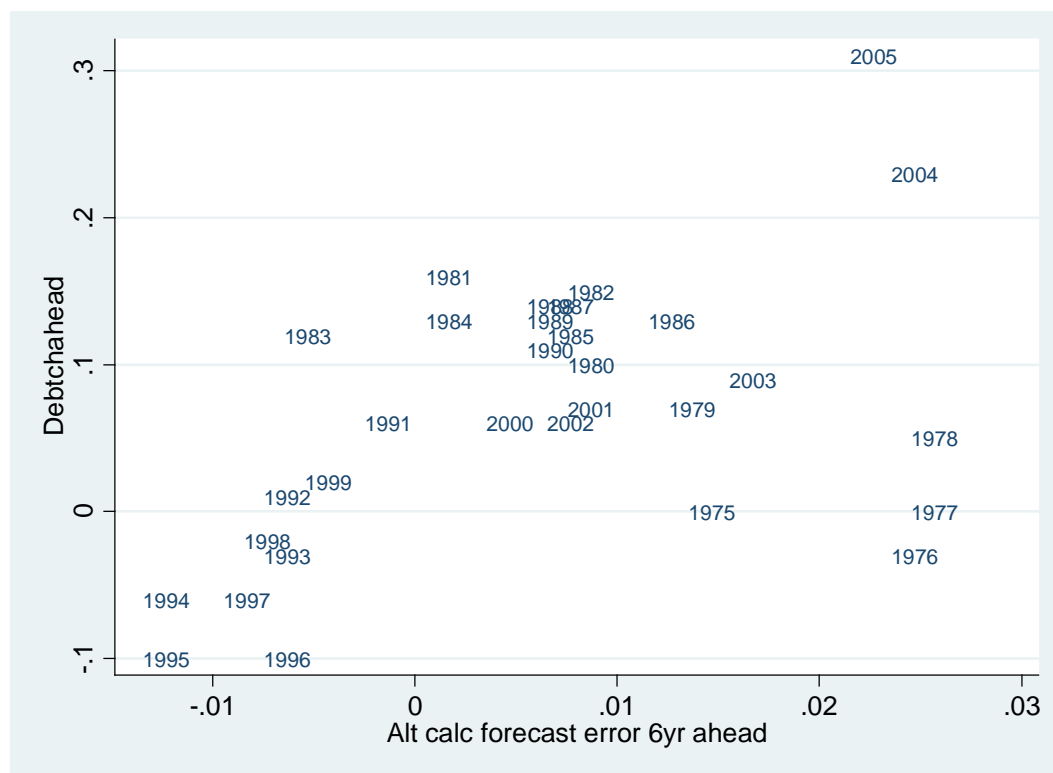
Forecast errors play a similar role in some large primary budget surpluses and deficits. The next figure shows forecast errors at horizon t+1 and primary surpluses in those years.

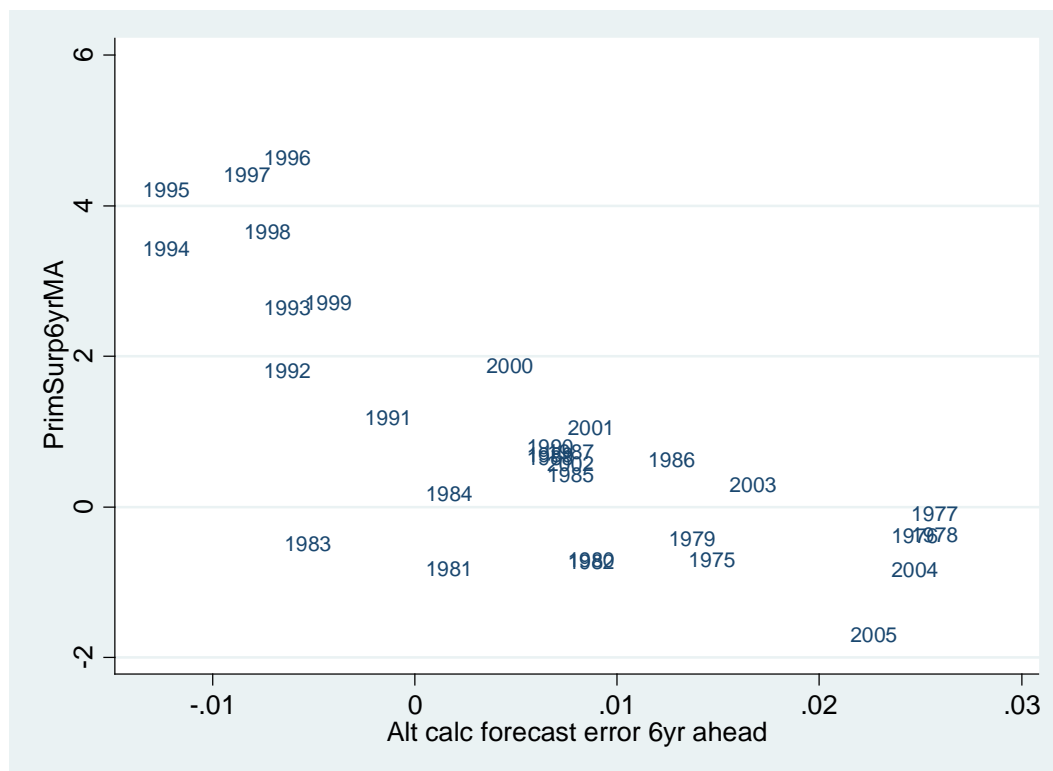Forecast errors in PIIGS countries at horizon t+1 and Primary Surplus to GDP in the same year
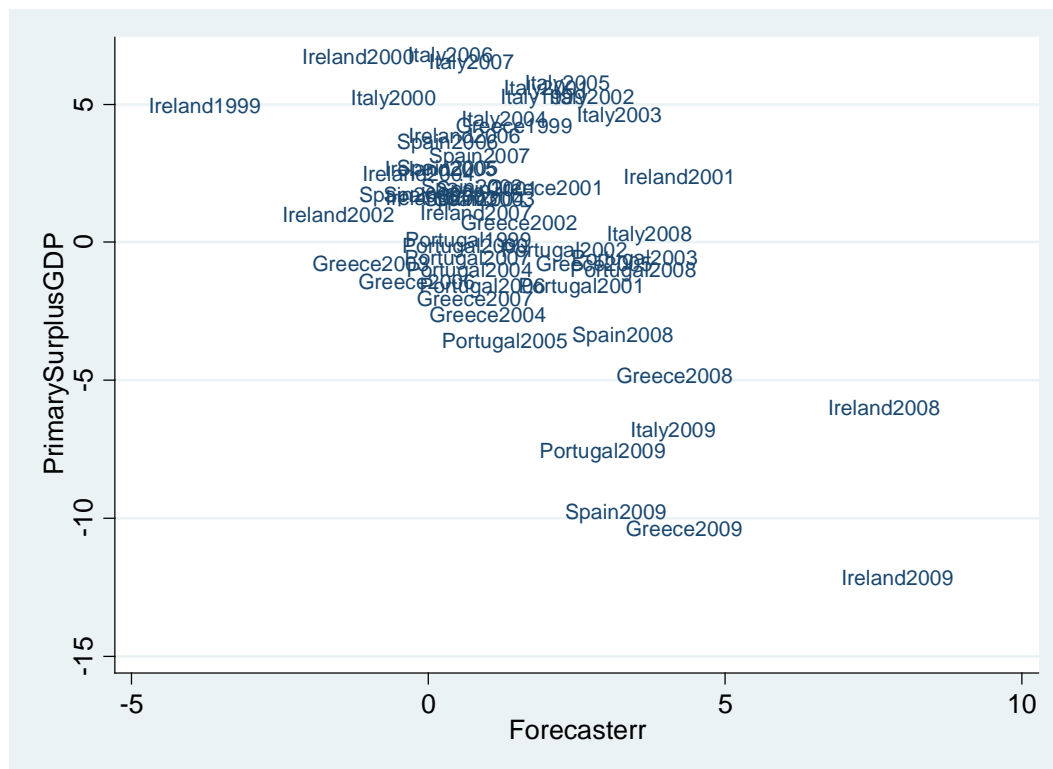
US GDP Growth Forecast error and US Federal primary Budget Balance to GDP, rolling averages six years ahead at start date shown

c. Sound forecasting practices and reality

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 the Eurozone, the high debt countries should be more conservative about forecasts, and the US should have been more conservative as the debt ratio got higher. We also have data on projections made for HIPC countries as an interesting post-debt-crisis example, where conservative forecasts should also have been desirable to prevent re-emergence of new debt crises.

The consideration of mean reversion should also play a role. High growth well above the countries' long run average should not be expected to continue when projections are made.

Of course, projections are not made by disinterested parties. It may be tempting for politicians to use optimistic projections to disguise the reality of debt problems and postpone the need for fiscal adjustment. The HIPC example will show an unusual case of this. Politicians may find it tempting to treat low growth as temporary and high growth as permanent, and so may not sufficiently anticipate growth slowdowns from temporary highs.

1. 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) and to NOT otherwise reduce public spending, 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. These results are even more surprising when we consider the positive shocks to many HIPCs through commodity prices. 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.

Regression of annual growth forecast errors ("forecaster") and dummies for HIPC countries ("hipc") and

sub-Saharan Africa ("Africa), 1995-2010

VARIABLES	(1) forecasterr	(2) forecasterr	(3) forecasterr
africa	0.145		0.605
	(0.394)		(0.367)
hipc	0.954**	1.022***	
	(0.380)	(0.343)	
Constant	-0.0416	0.0111	0.152
	(0.307)	(0.271)	(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

2. PIIGS over 1999 to 2010

Were the PIIGS conservative on their growth forecasts because of their precarious debt situations? The

table shows the average forecast errors over 1999-2010.

Significance of forecast errors, annual data for PIIGS countries, 1999-2010

Dependent Variable:	Forecast error for growth	Forecast error for growth	Forecast error for growth	Forecast error for growth
Average	1.286***	1.286***	1.286**	
	(0.182)	(0.25)	(0.426)	
Portugal				1.699***
				(0.271)
Ireland				1.367*
				(0.712)
Italy				1.731***
				(0.304)
Greece				1.142***
				(0.43)
Spain				0.434
				(0.299)
Observations	193	193	193	193
R-squared				0.235
Standard errors clustered by:		Country	Year forecast made	

Robust standard errors in parentheses

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

The forecast errors for the PIIGS over 1999 to 2010 were significantly positive on average. This result survives clustering the errors by the date of the forecast, or alternatively clustering by country. A simple sign test of whether forecast errors were positive confirms the significance at the one percent level.

The result is not entirely driven by the crisis period 2008-2010. The PIIGS' average forecast error is much smaller (0.31 percentage point per annum) over 1999-2007, but both the average error test and the sign test are still significant at 5 percent for positive forecast errors (not shown). Moreover, even if the depth of the crisis was unusual, a recession at some point during a 12-year period is NOT unusual, so it biases things the other way to simply exclude the bad years.

Looking at individual countries' forecast errors, those for Portugal, Italy, and Greece are large and statistically significant at the 1 percent level, Ireland is large but only significant at the 10 percent level, and Spain's forecast error is smaller and not statistically significant. The worst offenders against the maxim of being conservative when debt is already high were Italy and Greece, whose debt was already above 100 percent of GDP in 1998, yet forecasts over 1999-2010 were still too optimistic. Greece was also the worst offender against the principle of mean reverting forecasts, as the average growth projected for 1999-2010 was well above its previous long run growth rate.

3. The US during the new millennium

The next figure shows the forecast and actual US GDP growth as 6 year moving averages, going forward from the date shown. The excess optimism in the late 1970s was not that damaging because debt levels were not high. The conservative forecasts in the 1990s at higher debt levels contributed to the reduction in the debt ratio, as noted previously.

The final curious episode is the increase in projected growth even as the actual growth rate was falling, beginning at the new millennium. This began before the effects of the financial crisis would be

included in six-year-forward growth. This was the opposite of sound forecasting practice, which should

have anticipated the reversion to the mean after the boom of the 1990s (that did in fact happen).

One possible interpretation is that negative fiscal shocks after 9/11/01 -- such as the spending

associated with two new wars -- led to anticipated increases in the deficit. To avoid showing a projected

rise in debt ratios, the administration simply raised the projected growth rate. This was part of the

complex of problems that contributed to the debt crisis the US has today.

Forecast and Actual 6 year moving average growth in US
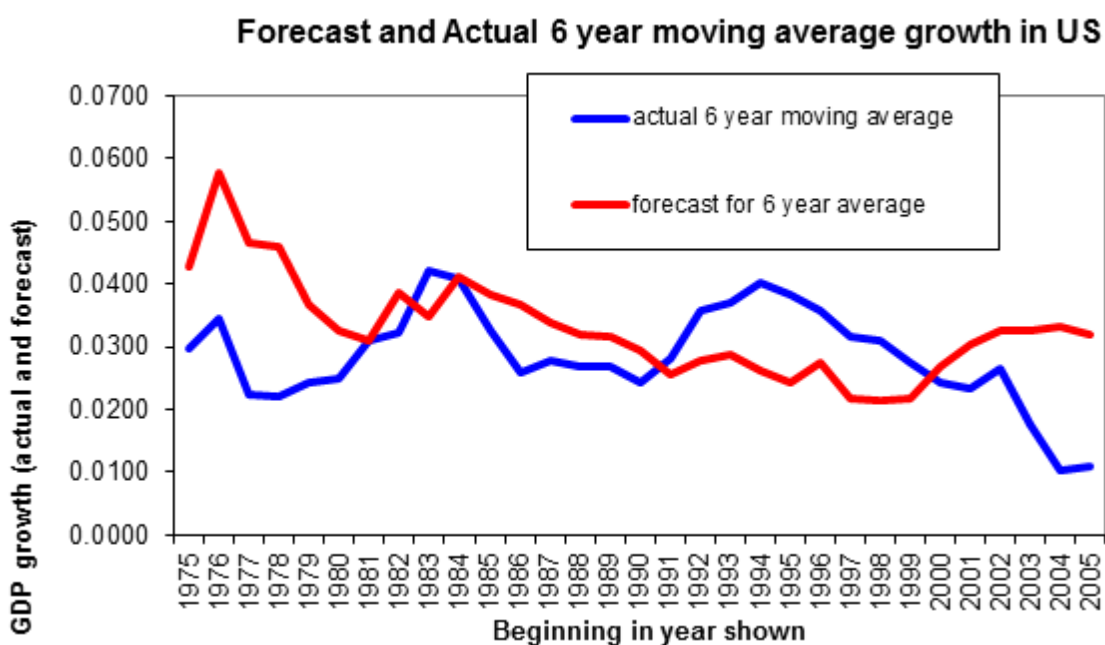
V.   Conclusion

The unpleasant arithmetic of growth and public debt is that permanent growth slowdowns call for 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 seem to result in analysts sometimes doing the reverse – making growth forecasts more optimistic to disguise the need for fiscal adjustment.

References

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Other references to be added