Fiscal Policy Under Low Interest Rates • Fiscal Policy Under Low Interest Rates

Chapter 4| Debt sustainability

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With the ground having been prepared, the remaining three chapters turn to the implications of low interest rates for fiscal policy. There are two separate questions to be answered, which are sometimes mixed up:

- How much "fiscal space" does a country have? Or more precisely, how much room does the country have to increase its debt until this raises issues of debt sustainability?
- How should this fiscal space be used? The fact that there is space does not mean that it should be used. Fiscal policy is about whether, when, and how to use that space.

This chapter is about the first question. It has seven sections.

Section 1 starts with the arithmetic of debt dynamics under certainty, focusing on the role of (r-g). It shows the respective roles of (r-g), debt, and primary balances. It shows some of the dramatic implications of (r-g)<0: Governments can run primary deficits and keep their debt ratios stable. Formally, there is no issue of debt sustainability: Whatever primary deficits governments run, debt may increase but it will not explode. Put another way, governments appear to have infinite fiscal space...

Section 2 shows however that this conclusion is too strong, for two reasons. First, fiscal policy, in the form of higher debt or deficits, increases aggregate demand, and thus increases the neutral rate r*. To the extent that the monetary authority adjusts the actual rate r in response to r*, this increases (r-g) and thus reduces fiscal space. Second, uncertainty is of the essence. Debt sustainability is fundamentally a probabilistic concept: A tentative operational definition might go as follows: Debt is sustainable if the probability of a debt explosion is small (one still must define "explosion," and "small," but this can be done). With this in mind, the section discusses the various sources of uncertainty and their potential effects on debt sustainability. It shows the respective roles of the debt ratio, the maturity of the debt, the distribution of current and future primary balances, and the distribution of current and future (r-g). It shows how "stochastic debt sustainability analysis" (SDSA) can be used by governments, investors and rating agencies. It shows how realistic reductions in debt from current levels have little effect on the probability that debt is sustainable; in contrast, it shows the importance of contingent plans in case (r-g) increases and reverses sign.

Section 3 looks at the case for fiscal rules to ensure debt sustainability. SDSAs can only be done in situ, for each year, for each country. The assumptions they require, for example about the future evolution of (r-g), leave room for disagreement. Can one design second best, more mechanistic, rules as guard rails, and still leave enough room for fiscal policy to perform its macroeconomic role? This is the question for example currently under discussion in the European Union. I express skepticism that a mechanistic rule can work well, but, if a rule is nevertheless going to be adopted, I suggest the direction it should explore. I argue that the analysis in Section 2 suggests a rule that adjusts the primary balance in response to debt service, defined as (r-g) times debt—rather than debt—over time.

Section 4 discusses the relation between public investment and debt sustainability. For political reasons, fiscal austerity has often led to a decrease in public investment rather than in other forms of spending. The transparency case for separating the current account and the capital account (known as “capital budgeting”) is a strong one. The case for full debt financing of public investment, which is sometimes made, is however weaker: To the extent that public investment generates direct financial returns to the government, it can indeed be at least partially financed by debt without affecting debt sustainability. One may also argue that, by increasing growth, it increases future fiscal revenues. But much of public investment, even if it increases social welfare, does not generate financial returns for the state, and has uncertain effects on growth. Thus, it can affect debt sustainability, and this must be taken into account in the way it is financed. The section shows how this can be integrated in an analysis of debt sustainability.

Section 5 looks at the risk of sudden stops, and the potential role of central banks in this context. Sovereign debt markets (and many other markets as well) are subject to sudden stops in which investors either drop out or ask for large spreads even in the absence of large changes in fundamentals.

This has been more of an issue in emerging economies’ markets, but, as the Euro crisis has shown, is also relevant for advanced economies. Even if fundamentals suggest little debt sustainability risk and justify low rates, another equilibrium may arise where investors worry, ask for a spread over safe rates, increasing debt service and increasing the probability that debt is unsustainable, and thus justifying their worries in the first place. Given their nature, these equilibria are often referred to as “sunspot equilibria.” I argue that the issue is relevant, but that it takes extremely low levels of debt to eliminate the scope for multiple equilibria, levels far below current debt levels. Realistic reductions of debt over the next decades will not eliminate this risk.

I then look at whether central banks can reduce or even eliminate this risk. I distinguish between two sources for the increase in spreads, sunspots or deteriorations in fundamentals. I argue that central banks, by being large stable investors, can prevent multiple equilibria and eliminate spreads when those are due to sunspots, but that the conclusion is less obvious when spreads are due, at least in part, to deteriorated fundamentals. The reason in short, is that central banks are parts of the consolidated government, and their interventions change the composition but not the size of the overall consolidated government liabilities, nor the overall risk. I discuss why this may be different in the case of the European Central Bank, for example in its ability to decrease Italian spreads during the Covid crisis.

Section 6 takes up two issues which have come up about the relation of central banks to debt sustainability. Some observers have argued that, through quantitative easing (QE) and the large scale purchases of government bonds, central banks are monetizing the deficits and bailing out governments. I argue that this is not the case. Others have argued that, to alleviate the debt burden, central banks should simply write off the government bonds they hold on their balance sheet. I argue that it is not needed, and if it were to be done, it would do nothing to improve the budget constraint of the government.

Section 7 concludes. Negative (r-g) makes the dynamics of debt much more benign. This does not make however the issue of debt sustainability disappear, both because of endogeneity and the effect of fiscal policy back on the neutral interest rate, and because of uncertainty, in particular with respect to r.

The best way to assess debt sustainability is through the use of stochastic debt sustainability analysis, or SDSA, an approach which allows to take into account the specificities of each country and each year. Given the complexity of the assessment, I am skeptical that one can rely on quantitative rules. If however, such rules are used, they should be based on requiring the primary surplus to adjust to debt service, defined as (r-g) times debt, rather to debt itself. It cannot avoid including exceptions however, such as the need to allow for larger primary deficits when the central bank is constrained by the ELB.

4.1 The surprising debt dynamics when (r-g)<0

The dynamics of public debt are given by the following relation:

$$B = (1+r)B(-1)–S, \text{ or equivalently } B - B(-1) = rB(-1) - S$$

where B is the real value of end-of-period debt, B(-1) is its lagged value (think of the time interval as, say, one year), r is the real interest rate on debt, and S is the real value of the primary balance, defined as taxes minus non-interest spending (The mnemonic S stands for surplus: other things equal, a positive primary balance—a positive value of S—decreases debt).[1] [2]

What matters in a growing economy is not debt however, but rather the ratio of debt to GDP, the “debt ratio” for short.[3] Define the growth rate of output g so that (1+g) = Y/Y(-1), divide both sides of the equation above by Y to get:

$$b = \frac{(1+r)}{(1+g)} b(-1) - s$$

where b ≡ B/Y is the debt ratio, and s ≡ S/Y is the ratio of the primary balance to GDP. Reorganize to get:

$$b - b(-1) = \frac{r-g}{1+g} b(-1) – s \qquad (1)$$

This is the fundamental equation for debt dynamics. The change in the debt ratio depends on two terms: The primary balance ratio, and the product of the (lagged) debt ratio and (r-g). Why (r-g)? For the reason given in Chapter 1: Assuming a primary balance of zero, debt increases at rate r, output increases at rate g, so the debt ratio increases at (r-g). The term (1+g) must be there but is inessential to the discussion. As g is a small number, (1+g) is very close to one.[4]

The standard discussion of debt dynamics has typically assumed that (r-g) was positive. This implies that, to stabilize the debt ratio, the government must run a primary surplus: To see that, put b=b(-1) in Equation 1:

The required primary balance is then given by

$$s = \frac{(r - g)}{(1 + g)} b \qquad (2)$$

The larger the debt (let me forget the "ratio" part in places, to make the writing lighter), the larger the required surplus. So, if the government runs deficits and increases debt, then sooner or later, in order to stabilize debt, it will have to generate a larger primary surplus, either through an increase in taxes or a decrease in spending. If it does not, then debt will explode over time.

Now suppose, as is currently the case, that (r-g)<0. Then, to stabilize the debt ratio, the required primary balance is still given by Equation 1 above. But now, given that (r-g)<0, the government does not need to run a primary surplus. Instead it can run a primary deficit. Indeed, the larger the debt ratio, the larger the primary deficit it can run while keeping the debt ratio stable!

This last result seems paradoxical. The way to understand it is as follows. The government must pay interest r on the debt, thus leading to interest payments of (r b). But, because output increases at rate g over time, it can issue new debt every year in amount (g b) and still keep the debt ratio constant. If g exceeds r, then the revenues from new issues are larger than the interest payments, and the higher the debt, the larger is the difference between the two.[5]

The implications of Equation 1 can be stated in even more striking ways:

- Suppose that starting again from a stable debt ratio, the government further increases the primary deficit permanently by some amount. Then, from Equation 1, the debt ratio will increase. But it will not explode, converging instead to a value of s(1+g)/(r-g) (inverting Equation 2 to think of b as a function of s, and remembering that a primary deficit is a negative value of s). Thus, if we think of debt sustainability as the statement that debt will not explode, then under the assumption that (r-g)<0, debt is always sustainable. It may increase but it will eventually converge rather than explode. Put in terms of "fiscal space," governments have infinite fiscal space. The notion that debt cannot explode may however be more convincing theoretically than empirically. If (r-g) is close to zero, and if the government runs a large primary deficit, debt may increase for a long time and converge to a very high level: For example, if s=-3%, g=2%, and (r-g)=-1%, debt will still converge, but converge to a high 306% of GDP. In practice, such a large increase may be impossible to distinguish from an actual explosion. I shall return to this below.

- Suppose that initially, the debt ratio and the primary balance satisfy Equation 2, so the debt ratio is stable. Now suppose the government runs a larger primary deficit for one year, say, by reducing taxes for one year. It then returns to the same primary balance thereafter. The debt ratio will initially increase, but over time, it will return to its initial level.[6] In other words, the government can issue debt and never raise taxes to pay for the additional debt!

These are striking results and force us to question the standard discussion of debt (along the lines of: "Our children will have to pay for the debt through higher taxes"). And the implications of (r-g)<0 can be seen in the data. For example, despite the worries about the high levels of debt, and the large primary deficits, the IMF forecasts that 18 out of 27 advanced economies will have decreasing debt ratios by 2026, with debt ratios increasing by slightly more than 2 percentage points in only three countries, Belgium, South Korea, and the United States.[7]

In short, debt dynamics are much more favorable when (r-g)<0. But taking the results above at face value would be wrong. For two reasons, which will parallel the warnings made in the previous chapter about the course of interest rates in the future:

- *Endogeneity*. The interest rate depends, in part, on fiscal policy. Sustained large deficits, either domestically, or globally (with the relative weights of the two depending on the degree of integration of financial markets), are likely to increase the neutral rate r*, and by implication the actual rate r, making debt dynamics less attractive. I argued in the previous chapter that a sign reversal of (r-g) was unlikely for a long time to come, but, if it happened, debt dynamics would become much worse and governments would have to run primary surpluses in order to stabilize the debt.
- *Uncertainty*. Even if the mean forecasts of (r-g) are negative over a long horizon, these forecasts come with substantial uncertainty (although not necessarily more now than in earlier times). The next step is thus to think about debt dynamics, debt sustainability, and fiscal space, taking uncertainty into account.

4.2 Uncertainty, sustainability, and fiscal space

Take into account uncertainty, and go back to Equation 1. The evolution of debt over time depends on the realizations of current and future (r-g)and s. Unless we are willing to put an upper bound on the distribution of (r-g), the probability that debt explodes may be very small, but it is not zero. This suggests the following operational definition of debt sustainability:

"Debt is sustainable if the probability that debt is on an exploding trajectory n years out is small."

This makes it clear that sustainability is a probabilistic statement. This clearly does not settle it, as one has to decide what an "exploding trajectory" is, what n should be, and what "small enough" actually means. But it suggests doing the following exercise, known as a stochastic debt sustainability analysis, or SDSA:

- Compute the distribution of debt over the next n years, based not just on the mean forecasts but also on assumed distributions of (r-g) and s around these forecasts.
- Choose n by assessing the trade-off between the quality of the forecasts—which deteriorates sharply for large values of n, say more than 10 years—and the need to allow for non-explosive movements in debt: An increase in the debt ratio for a few years is not worrisome and does not necessarily threaten debt sustainability.
- Choose an operational definition of "explosion." This may be for example a positive slope for the trajectory in the debt ratio as the horizon gets to n—so, following on the earlier discussion, not making a difference between rapid convergence to a high debt level and strict debt explosion, a distinction which may be impossible to make in practice.

What the government will do if debt appears to be on an exploding path is clearly central to the assessment. Thus, it is useful to think of the exercise as proceeding in two steps.

1. The first step is to do the exercise above under existing policies.[8] If these policies lead, with high probability, to a non-exploding debt ratio as the horizon gets to n, there is no need for the second step. If, however, existing and announced policies lead to an exploding debt ratio with high enough probability, then a second step is needed.
2. The second step depends on who does it. If it is the government doing the exercise, then it needs to announce how it intends to modify existing or announced policies. If there is a fiscal agency or a fiscal council in place, its role may be to ask or even require the government to present a credible adjustment plan so debt appears sustainable.[9] If it is an outside observer, say an investment fund or a rating agency, doing the exercise, then it has to assess the government's plan, whether, how, and

when the government will actually adjust, whether it is likely to succeed, and thus whether debt is then sustainable or not.

The first and second steps are quite different in nature and require different types of information.

Formally, the first step requires assumptions about the joint distribution of r, g, and s.

First moments, namely mean forecasts for the three variables, are likely to be available from standard forecasting sources. The difficult task is to make assumptions about the distributions. This is likely to require combining different sources of information: quantitative evidence on the covariations between the variables in the past, in the form for example of vector autoregressions; macro model stochastic simulations to take into account the effects of policies and other shocks on output and government revenues; market information when available, such as the probability distributions for the US nominal rate we saw at the end of the previous chapter; and specific information about the future, for example information about implicit liabilities, for example, the likelihood that the public retirement system will need to be partly financed from the general budget.

To the extent that uncertainty in r may be the most important issue at this juncture, the average maturity of the debt matters very much: A longer maturity of debt protects the government from a temporary increase in the short run interest rate; and it gives it more time to adjust to a permanent increase. The currency denomination of debt matters very much as well: Because of exchange rate movements, debt in foreign currency is likely to imply a much wider distribution for the ex-post interest rate, and thus for end-of-horizon debt.

A difficult practical issue is how to take into account the effect of sustainability risk itself on the interest rate and resulting debt dynamics: If, under the assumption that the country is able to borrow at the safe rate (or at the safe rate plus a fixed, say historically given, risk premium) the SDSA shows a non-negligible positive probability of a debt explosion. This implies, if the investors have access to the same information, that they will ask for a risk premium and a higher rate. This higher rate in turn will lead to worse debt dynamics, leading to a higher probability of a debt explosion, and in turn a higher risk premium, etc. The nonlinearity makes solving for the endogenous risk premium and the equilibrium distribution of debt more difficult. In on-going work with Gonzalo Huertas and Michael Kister 2021, we have made some progress, but the work has convinced me of the difficulty of doing it in realistic SDSA settings. In practice, the best practical approach may be to first ignore the feedback effect, assume a fixed risk premium, but if the probability of explosion turns out to be non-negligible, to redo the simulation by adding the spread implied by the probability of explosion to the initial path for the interest rate, and iterating.

What do rating agencies actually do?

What do rating agencies do, and how much weight do they give to the level of debt in their ratings?[10]

A detailed description of the methodology used, for example, by Standard and Poors to determine its ratings, is given in S&P 2021. The rating agency builds its ratings on five "pillars," institutional (such as quality of governance, transparency, debt history…), economic (income per capita, growth, volatility,…), external (currency status, external liquidity, external position…), fiscal (debt ratio, debt service, performance, flexibility) and monetary (exchange rate regime, independence of the central bank, credibility…).

Going from words to deeds: A literature review of the econometric determinants of ratings of sovereign debt shows that the explanatory variables which appear most often are GDP per capita, past default, the rate of inflation, debt, and deficits.[11]

To explore the role of debt itself, I started from a Goldman-Sachs study (Ardagna 2018) which considered ratings from Standard and Poor's, Moody's, and Fitch for 21 OECD countries from 1984 to 2017 (subject to data availability for some countries). It mapped each of these ratings into 11 bins, from 1 to 11, with 11 being the best (AAA for all three rating agencies). It then ran an ordered probit for each of the three sets of ratings on a number of variables, the main ones being the log of real GDP per capita, the GDP growth rate, the unemployment rate, the inflation rate, the ratio of the current account balance to GDP, the ratio of the net international investment position to GDP, and two fiscal variables, the ratio of government debt to GDP, and the ratio of the primary deficit to GDP. The most consistently significant variables were the log of real GDP per capita and the two fiscal variables, with t-statistics above 10 for the ratio of debt to GDP.

To assess the contribution of the ratio of debt to GDP, I replicated the regression and computed, for each country, each year, and each rating agency, the estimated probability that a country had the highest ranking.[12] I then plotted the estimated probability against the ratio of debt to GDP for each country/year/rating agency. The scatter is shown in Figure 1 below.

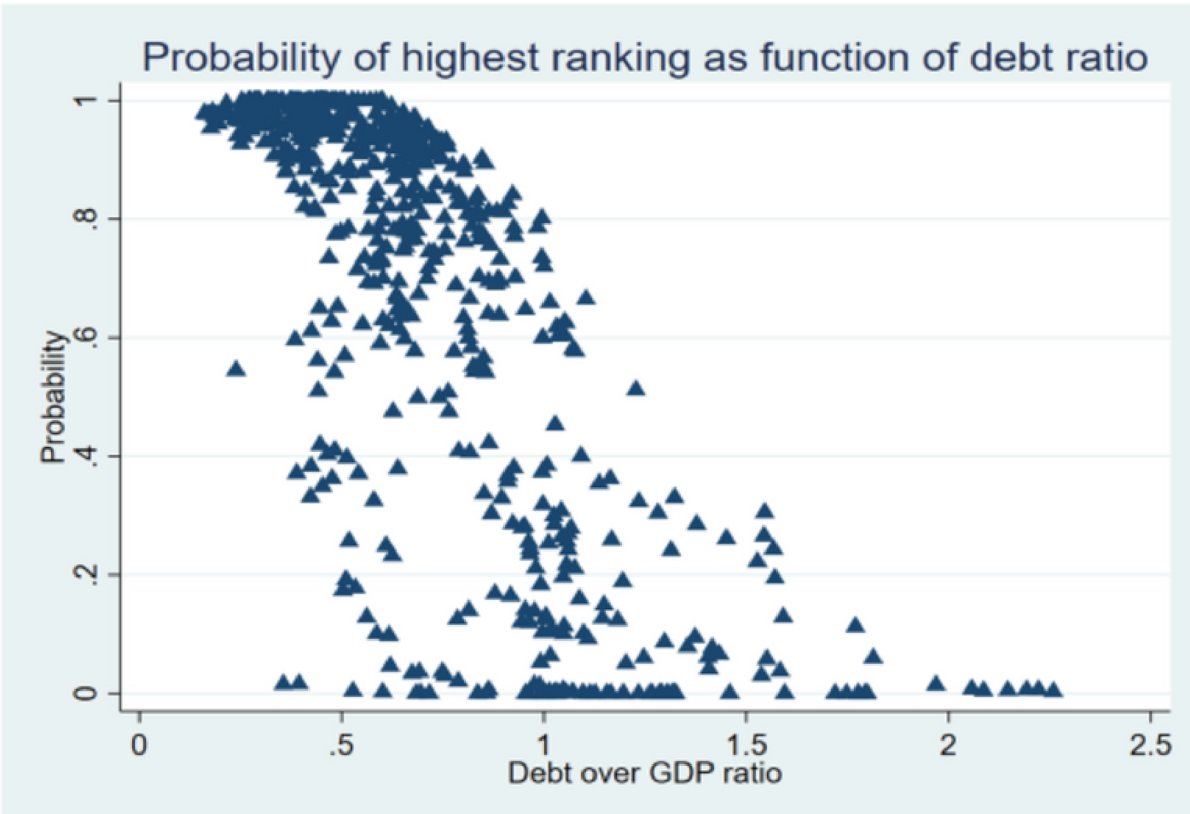

Figure 1
Ratings and debt ratios

Figure 1 yields a simple and strong conclusion. Relatively low debt has been a necessary but not a sufficient condition to obtain the highest ranking with high probability.

Look first at the outer envelope of the set of points. A necessary condition to obtaining the highest ranking with a probability close or equal to one has been to have a debt-to-GDP ratio below approximately 70%. As debt increased beyond this level, the probability of obtaining the highest ranking decreased to approximately 70% for a ratio of debt to GDP of 100%, and 30% for a ratio of debt to GDP equal to 150%. Look however at the set of points below this envelope. For many countries, a low debt-to-GDP ratio has not been sufficient to ensure a high rating, and other factors dominated.

In short, looking at how rating agencies have assessed debt sustainability in the past, it is clear that they looked at many factors beyond debt. At the same time, they have penalized countries with relatively high levels of debt. The question is whether, in the new low interest environment, they will change the relative weights they give to debt versus other factors. (In the rest of the chapter, I am arguing they should.) (I am hoping to have, for the final version of the book, a set of results allowing for coefficients to differ across decades, to see how the weights have changed over time.)

From the point of view of the government, the second step is straightforward. Starting now, what changes can it make to existing or announced policies to reduce the probability of a debt explosion? And if, nevertheless, there is still a need for a sharp adjustment at some point in the future, what measures is it ready to take?

For outside observers, the second step is more difficult and involves qualitative assessments. First, whether the measures announced by the government are credible and decrease the risk sufficiently, and if not, whether the government will be willing and able to avoid a debt explosion, were it to appear likely. This in turn depends on many factors:

- It depends on the size of the required adjustment: Having to shift from a large primary deficit to a large primary surplus is likely to be difficult.
- It depends on the maturity of the debt: a longer average maturity gives more time for the government to adjust the primary balance in response to a sustained increase in short rates.
- It depends on the effects of the required fiscal consolidation on output, thus on the room for monetary policy to offset its adverse effects, and thus on the degree to which the ELB is binding.
- It depends on the initial level of taxes: If the level is already very high, the room to increase them is limited.
- It depends on the nature of the government (not just now, but also in the future, which makes it hard to predict): a coalition government may be less able to achieve a strong adjustment. So may a Parliamentarian system of government.
- It may even depend on the personality of policy makers. For example, the nomination of Mario Draghi as prime minister of Italy in February 2021 clearly reassured markets about debt evolutions in Italy.

In short, assessing debt sustainability is as much art as it is science.

Does this lead one to be nihilistic, and to conclude that while simple measures such as debt or current deficits indeed come short, there is little hope of doing better? I do not think so.

The first step of an SDSA is extremely useful on its own. I have seen this when I was at the IMF. The IMF did not have a full SDSA at the time but worked out rather several alternative scenarios.[13] The discussions about the scenarios were extremely useful. At worst, an SDSA puts together a lot of information, leads to useful discussions about the assumptions, for example about the distribution of (r-g), the likelihood that implicit liabilities become explicit, etc.

In the current environment, based on the conclusion reached in Chapter 2 that the probability that (r-g) will durably reverse sign over the coming decade is positive but small, the first step is likely to generate for most advanced economies at most a small probability of a rapidly increasing debt, say, 10 years out. But the second step of the process, if needed, is likely to be extremely useful both for governments and for outside observers. It leads governments to think of a plan B in case of an (r-g) reversal.

So far, I have discussed methodology. Turning to content, the logic of SDSAs leads me to draw three major conclusions about the role of debt in affecting debt sustainability in the current environment:

- The main and obvious conclusion is that, just as was the case under the assumption of certainty earlier, (r-g)<0 leads to much more favorable debt dynamics. The presence of uncertainty leads to more prudent conclusions, but moderate primary deficits are unlikely to raise issues of sustainability.
- If sustainability is perceived as an issue, the effect of realistic decreases in debt ratios on the probability that debt is sustainable is small. Suppose that a government, through prolonged fiscal austerity, succeeds in reducing the debt ratio over 10 years from 110% to 90% (the goal of returning to 60%, the target debt in the existing EU rules is definitely unreachable over the next decade, short of very high inflation and very low nominal rates). And suppose that (r-g) jumps from -3% to 0%, leading to a corresponding increase in debt service. Absent the adjustment in debt, the increase in debt service is 3.3% of GDP; given the debt adjustment it is still 2.7%, not a large difference in exchange for a long and potentially painful period of fiscal austerity.
- By contrast, the effect of a good contingent plan, for example a credible plan to improve the primary balance if (r-g) were to become less favorable, for example by being ready to increase the VAT rate, has a much larger effect on debt sustainability. If for example, debt is sustainable under the currently low (r-g), a contingent plan to improve the primary balance one-for-one, but some distributed lag, in response to a persistent increase in (r-g), eliminates issues of debt sustainability altogether.[14]

To summarize: A two-step stochastic debt sustainability analysis is the best way to discuss and assess debt sustainability. In the current environment in which low (r-g) is a likely but not certain outcome, a contingent policy to improve the primary balance in response to increases in (r-g) is a better way to ensure debt sustainability than a long period of fiscal austerity in anticipation of a potential increase.

How an SDSA may look, and some implications.

It is interesting to show how, in a simple simulation, the results of an SDSA might look, and to strengthen two of the conclusions in the text.[15]

So assume the following:

Assume that $(r-g)$ is the sum of a random walk, x, with small variance, and a white noise term, u.

$$(r-g) = x + u$$

$$x = x(-1) + e_x, e_x N(0, s_x), x_0 = 0.0$$

$u = a_u + e_u, e_u N(0, s_u)$, u and e uncorrelated

This captures the notion that while expected future $(r-g)$ is equal to its value today, it may either increase or decrease over time, permanently (if x) or temporarily (if u).

Choose the following calibration:

Assume $sx = 0.3$. The standard deviation of x, n periods ahead, call it $\sigma(x_n)$, is equal to $\sqrt(n) * s_x$. Assume that the horizon of the simulation n is 10 years. So $\sigma(x_n) = 3.3 * s_x = 1$%, and the probability that the permanent component of $(r-g), x_n$ increases by 2% or more over the 10 years is equal to 2.5%.

Take a_u (the value of $(r - g)$ today at time 0, before the realizations of e_u and e_x) to be -2% and take the standard deviation of the white noise component to be $s_u = 1\%$.

Take the debt accumulation equation to be (i.e. ignore the $(1 + g)$ term for simplicity)

$$b - b(-1) = (r - g)b(-1) – s$$

Assume the primary balance s to equal a constant as plus white noise e_s, plus a feedback term allowing the primary balance to respond to debt service, as discussed in the text.

$s = a_s + e_s + c[(r - g)b(-1)], e_s N(0, s_s)$, e_s uncorrelated with e_u and e_x

Start with a benchmark in which there is no feedback, so c is equal to zero. The exercise is then to compute the probability distribution of debt and the deficit n years out. Assume that b0 is equal to 100%, and that the primary balance is as = −2%. Together with the assumption that au = −2%, this implies that under certainty $(s_x = s_u = s_s = 0)$, the debt ratio would remain constant.

Take the increase in debt by year 10, (b10 − b1), as a measure of debt explosion. Figure 2 below shows its distribution based on 1,000,000 draws for e_x, e_u, e_s. Under the assumption that $c = 0.0$ the outcome is given by the distribution in blue (the other two cases correspond to positive values of c and are discussed below)

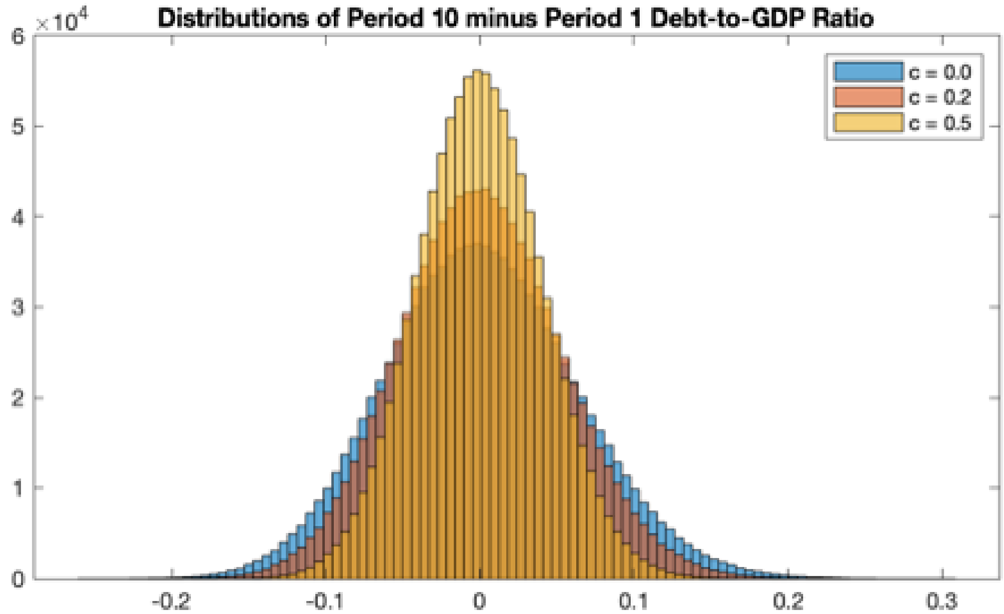

Figure 2
Distribution of the change in the debt ratio

Under this benchmark, the probability p that the increase in the debt ratio over ten years exceeds 10% is 5.8%. Now consider alternatives: Suppose initial debt is 0.9 rather than 1. Then, the probability of an increase of debt in excess of 10% increases to 7.8%! That lower debt would increase the probability of a debt increase is surprising. But it is not a mistake in logic or in programming. When (r-g) is negative, which, starting from -2%, is likely to remain true for a while, investors are in effect willing to pay to hold the debt, and lower debt is bad… One should not make too much of the result, but it indicates that lowering debt may not be that useful.

Consider instead the case where the primary balance adjusts in part to debt service, defined as $(r - g)\, b(-1)$, so c is positive. As shown in the figure, with $c = 0.2$, the distribution is narrower and the probability of a debt increase in excess of 10% is now only 3.3%, down from 5.8% when $c = 0.0$. With $c = 0.5$, the probability is down to 0.8%. This shows how useful it is to have a contingent adjustment to debt service to insure debt sustainability.

Finally, consider the case where the standard deviation of the permanent component, s_x is 0.2% instead of 0.3%. In this case (and with $c = 0$, the probability decreases to 2.7% (instead of 5.8% under the benchmark).

By contrast, a decrease in the standard deviation of the transitory component, from 1% to 0.5% only decreases the probability to 4.4%. This shows the importance of assessing whether movements in (r-g) are transitory or permanent.

4.3 Can one design good sustainability rules?

What I have suggested doing is an assessment, not a rule. Conceptually, designing a debt sustainability rule is far from obvious.

One needs to distinguish between two types of rules: rules to conduct fiscal policy, and rules to ensure debt sustainability.

These do not have the same goal. What we are talking about in this chapter, as well as in the discussion of the EU rules, is about the second type: Leaving countries to follow their preferred fiscal policy while making sure that they do not raise issues of sustainability, which would affect other members.[16] A country may well have a lot of fiscal space, i.e. be able to support higher debt and deficits, but decide not to use the space (think Germany). In that sense, these fiscal rules are different from the monetary policy rules, say the Taylor rule, or the average inflation targeting (AIT) rule just adopted by the Fed.

This introduces an obvious conceptual issue: Fiscal space, equivalently debt sustainability, depends on actual current and intended fiscal policy. For example, a credible commitment to decrease primary deficits in the future in response to higher interest rates, were they to increase, will increase the probability that debt is sustainable, and give more fiscal space today. This was clear in one of the simulations above: Given the level of debt and primary balance today, making the primary balance contingent on debt service in the future led to a tighter distribution of future debt, and a smaller probability that the increase in debt would exceed a given threshold. Two countries with the same debt and deficits today may have very different fiscal spaces.

This is not an issue with the SDSA approach described in the previous section. Each SDSA is done in situ, for each country and for each year. Thus, it can take into account specific current and announced policies, such as for example a credible commitment to adjust the primary balance based on debt service evolutions. But it is much more of an issue when designing rules: by their nature, they cannot come close to capturing all the elements that are captured in an SDSA.

If the goal were to write a rule that simply ensured debt sustainability, this would indeed be easy. . . One just would need to be extremely conservative. For example, a rule that the deficit must always be equal to zero, along the lines of the German "Black Zero," would do the job. And, on paper, so would rules such as the initial Maastricht rules. But they would do so by unnecessarily constraining fiscal policy. This is why the EU rules have not been respected and, even with all their extensions, are widely considered unacceptable today. The challenge is to find rules which ensure sustainability but leave enough space to use fiscal policy optimally, for example leave enough room to react to fluctuations in output, especially if there are constraints on monetary policy such as the ELB.

With these considerations in mind, Jeromin Zettelmeyer, Alvaro Leandro and I 2021 have argued that the EU should get rid of formal quantitative rules, and follow the approach sketched above. We argued that the EU commission, in combination with national fiscal councils, should do step 1 of the SDSA; that this should be followed by interactions and discussions with the relevant country, followed by step 2 if relevant; and, finally, that there should be an adjudication process, either at the Council of the European Union or a new specialized section of the Court of Justice, to require the country to present an adjustment plan or to be penalized in some way. I still believe this is the best way to go. But many policy makers are worried that this may be too weak an approach, that it may lead to unending disagreements and discussions, and believe that formal quantitative rules are needed.

This has led to many reform proposals.[17]

Some of the proposed reforms are a minima: Revised Maastricht numbers, for example keeping the 60% debt target but relaxing the constraints on the speed of adjustment to the target; or increasing the debt target to a more realistic level. Many have suggested expenditure rules, aimed at allowing for a stronger fiscal reaction to fluctuations, by constraining spending through the expenditure rule, but allowing for revenues to move cyclically, possibly more than implied by the automatic stabilizers.

In principle, one could and should set up the problem as a constrained maximization problem. Which of the large set of variables in the SDSA can be measured? Which ones affect the probability of sustainability the most? What is the cost of leaving out those which cannot be measured?

This has not been done. Given where we are, what might be the contours of an acceptable rule?

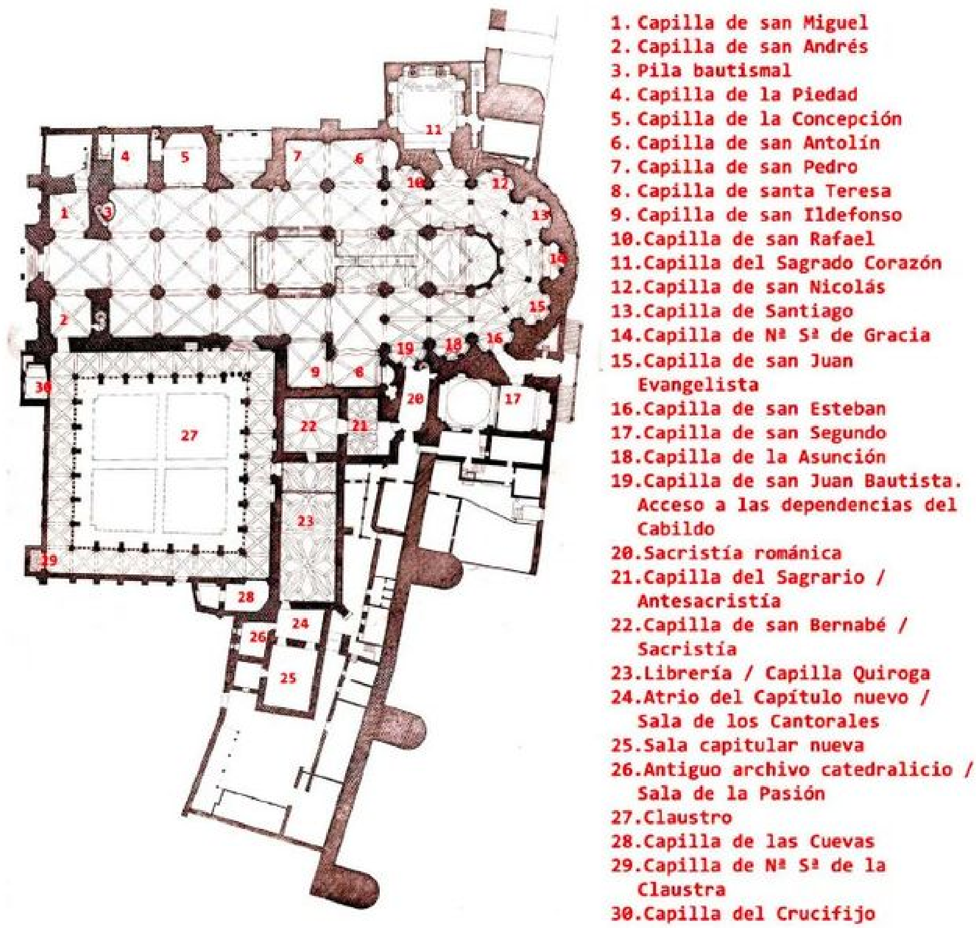

Figure 3
The cathedral of AvilaImage 5

- The search for simple rules is understandable but quixotic. This is the lesson to be drawn from the history of EU rules. The rules were simple to start, but as time went on and their shortcomings became evident, they became more and more complex. Few people can understand them today (for an attempt at description, see [Blanchard et al. 2021](). For an analogy, see the picture of the Cathedral of Avila, which shows the successive additions to the Cathedral across the centuries ([Figure 3]()). But their complexity reflects the complexity of reality and the needed assessment, not an excessive complexity of the rule.

- The analysis of debt dynamics above suggests a simple starting principle however: Go back to equation Equation 2. Whether debt is sustainable depends on generating a primary balance s sufficient to cover debt service, defined as ((r-g)/(1+g)) b(-1). To avoid an increase in the debt ratio, the government must generate a primary balance sufficient to cover debt service so defined.
- This suggests a rule making the primary balance a function of debt service, defined as above, with one-to-one passthrough in the long run. Given that movements in the average interest rate on debt can be abrupt (less so, the longer the average maturity of the debt), it makes sense to allow the adjustment of the primary balance to happen gradually, rather than at once.[18]
- The shift from casting a fiscal debt limit in terms of debt service rather than debt is a fundamental conceptual change, relative to existing rules which focus on debt. (To reinforce this message, in the summary presentation of the 2021-2022 budget, the US government has added to the line showing the forecast for debt as a ratio to GDP a line showing the forecast for debt service as a ratio to GDP.)[19]
- Should there be a role for debt in addition to debt service? The rule suggested above implies that the process for the debt ratio has a unit root,[20] and one may want to limit movements in the debt ratio through a feedback coefficient of the debt ratio on the primary balance. One reason is that there is, even just for political reasons, an upper limit on how large a primary surplus the government can sustain. If there is such a limit, call it s_{max}, then this, together with the distribution of (r-g)/(1+g) leads to an upper limit on debt. To be concrete, suppose that the maximum sustainable primary surplus is 3% of GDP, and that with small but positive probability, (r-g)/(1+g) can reach 2%. Then the maximum sustainable level of debt is given by b_{max} = ((1+g)/(r-g)) s_{max} = 3%/2% = 150%. This is the spirit of the proposal by Martin et al. 2021: Construct a maximum level for the debt ratio along these lines, building in addition a margin of safety. Then, aim not to exceed this level over time. In making the target debt ratio a function of the distribution of (r-g), and possibly of the factors determining s_{max}, this is indeed an improvement over the existing 60% EU debt ratio target. The analysis above suggests however that, within a realistic range, the effect of debt on the probability of sustainability is small, so the feedback coefficient of debt on the primary balance should be small as well.
- Finally, the rule should have some flexibility, allowing for increases in debt ratios if justified for macro stabilization purposes. If for example, private demand is very low, and the policy rate is constrained on the downside by the ELB, it could be that the government must run such large primary deficits to sustain demand that, even with the favorable debt dynamics (as r is low), the debt ratio increases. As argued in the

next chapter, the optimal policy may well be in this case to run those primary deficits and let the debt ratio increase for some time; the rule should thus take into account whether the ELB constraint is binding or not.[21]
Similarly, and for the usual reasons, it may make sense to state the rule in terms of the cyclically adjusted primary balance. This raises the issue of measuring whether changes in output are permanent or transitory, a difficult issue but one which cannot be avoided.

To summarize: I am skeptical of the use of quantitative rules to ensure debt sustainability. If rules are nevertheless going to be used, then a rule which makes the primary balance adjust over time to debt service is the direction to explore. (I return to the issue of the reform of EU rules, after the discussion of public investment in the next section.)

4.4 Public investment and debt sustainability.

Public investment has often been the victim of fiscal austerity: It is politically easier to cut spending that does not have an effect today than it is to cut transfers for example.

Decisions about public investment should proceed under a separation principle:

- First, whether or not financed by debt, public investment should proceed until the risk-adjusted social rate of return on the investment is equal to the real borrowing rate of the government over the life of the project.[22]
- Second, whether public investment affects debt sustainability depends on the financial returns accruing to the government, either directly or indirectly. Even if they have high social returns, most public investment projects have either no financial returns, or financial returns that are lower than market returns; this is indeed typically the reason why these investments are carried by the public sector. As such, public investments with low financial returns influence debt sustainability.

These considerations yield a clear conclusion. If a public investment yields no financial returns to the government, then, from the point of view of debt sustainability, it will have the same adverse effect on debt sustainability as government consumption. Even if expected financial returns are equal to expected market returns, uncertainty about those returns may still affect the distribution of future debt and thus debt sustainability. Thus, as desirable as public investment is, the proposition that it can be automatically financed by debt is wrong: It may affect debt sustainability, and thus may have to be financed in part by taxes.[23]

One practical issue is whether one should take into account indirect financial returns through the effects of public investment on potential output and thus on government revenues in general, even if the investment does not yield direct financial returns to the state. The issue is that such effects are typically hard to assess with any precision ex ante, and the risk is that the government will overstate the positive output effects. For this reason, I believe that assessing these indirect effects should be left to an independent authority, or, if this difficult, only in clear cut cases, should these indirect effects be considered. In any case, the uncertainty associated with these effects should be taken into account.[24]

All the effects of public investment on debt dynamics will in principle be captured by an SDSA, and thus there may not be a need to do more.

However, to make public investment more visible, and thus less subject to cuts when a government embarks on fiscal austerity, it makes sense to separate the government budget constraint between a current account and a capital account. Also, if a fiscal rule is introduced and puts constraints on the primary balance, the current account primary balance provides a better measure than the overall government primary balance.

One way to think about a current and a capital account might look like is to think of creating a government agency formally in charge of public capital and separate its account from that of the central government. (The separate accounting can take place without an explicit agency in charge, but it makes it simple to describe, and the existence of a formal agency is likely to increase the credibility of the separation between the two accounts.) (The algebra and its implications are given in the box below.)

So think of a government agency in charge of public investment and public capital. On the spending side of the agency’s balance sheet is gross investment spending. On the revenue side, the agency has two sources of revenues, apart from debt issuance: Gross financial returns from public capital; and, as these are typically less than market returns plus depreciation, transfers from the government to provide the difference between the two. The agency issues debt as needed, to finance the difference between revenues and investment.

Under this arrangement, the agency debt is fully backed by the revenues from public capital and the transfers from the central government.

Think now of the central government balance sheet. In the absence of a separation between current and capital accounts, government spending includes, in addition to interest payments on debt, both government consumption and government investment. Government revenues include, in addition to taxes, financial returns from public capital. In the new central government balanced sheet, spending does not include public investment; revenues do not include financial returns to public capital—both show up on the agency's balance sheet. What appears however on the spending side is the transfers from the central government to the agency. To the extent that financial returns are less than market returns plus depreciation, those transfers are positive, reducing the primary balance of the central government, potentially affecting debt sustainability. An SDSA will indicate the room for debt as opposed to tax finance. How and whether this room, if it exists, should be used, and what mix of debt and taxes should be used, will be discussed in the next chapter. A rule, based on the adjustment of the primary balance to debt service, may want to use this definition of the primary balance rather than the standard one.

The algebra of the separation between current and capital accounts

Write the standard budget constraint of the government, separating, on the expenditure side, primary spending between consumption spending and investment spending, and separating on the revenue side, revenues between taxes and financial returns from public capital (assume output growth to be equal to zero for notational simplicity)

$$b - b(-1) = (cg + ig) - (\tau + xk(-1)) + rb(-1) \tag{3}$$

where cg is public consumption, ig is public investment, k is public capital, τ is taxes, x is the financial rate of return on public capital. Public capital accumulation is given by:

$$k - k(-1) = ig – \delta k(-1) \tag{4}$$

where δ is the depreciation rate.

The financial rate of return (as opposed to the social rate of return) on public capital is typically less than the market rate of return on private capital, so $x \leq r + \delta$. For many public investments, x is indeed equal to zero.

Now separate the overall account between a current and a capital account.

It is easiest to think of a government agency that invests ig, receives the financial returns from public capital $xk(-1)$, and receives transfers from the central government if returns are less than market returns $((r+\delta)-x)k(-1)$.

The agency can issue debt, ba. The equation for agency debt dynamics is given by:

$$ba - ba(-1) = (ig – xk(-1) - ((r+\delta) – x)k(-1)) + rba(-1) \quad (5)$$

Or, equivalently:

$$ba - ba(-1) = ig – (r+\delta)k(-1) + rba(-1) \quad (6)$$

The central government spends cg, transfers $(r+\delta-x)k(-1)$ to the agency, receives taxes, and issues debt bc. The equation for the central government debt dynamics is given by:

$$bc – bc(-1) = cg + (r + \delta – x)k(-1) – \tau + rbc(-1) \quad (7)$$

Assume that, initially debt is transferred to the agency in relation to its capital, so $ba_0 = k_0$, Putting $k_0 = ba_0$ in Equation 6 above gives $ba(1) - ba(0) = k(1) - k(0)$. Thus, $ba = k$ from then on. Agency debt is equal to public capital and is fully backed up by the revenues from capital and the transfers from the central government.

One can thus focus on central government debt and primary balance. If the financial rate of return on a public investment is low, transfers to the agency will have to be high, the primary balance will be lower, potentially affecting debt sustainability. In short, public investment will typically affect debt sustainability.

Note that, under this arrangement, there is no incentive for the government to categorize components of cg as investment (for example, the salaries of teachers), at least for debt issuance purposes. As they do not yield direct financial returns, shifting them to the agency simply increases the required transfers and does not change the debt dynamics of the central government.

The reform of EU rules

The Covid crisis has led to the temporary suspension of EU budget rules, and those rules will probably be reformed before being reinstated. While consultations are still ongoing and no decision has been taken, there seems to be emerging a political consensus (or at least some political support) for keeping the rules, or at least the 3% deficit and 60% debt numbers enshrined in the Maastricht Treaty, but allowing in parallel for a green investment budget, partly at the national and partly at the EU level, along the lines of the NextGenerationEU package introduced by the European Union in 2021, financed by debt.

This would be an improvement over existing rules, and might balance the desire by some to return to the rules and by others to finance public investment, but it would be far from the best reform: Given that the official deficit is equal to the primary deficit plus nominal interest payments, one can rewrite the 3% limit on the official deficit, $s - ib(-1) \geq -3$% as $s \geq ib(-1) - 3$%. It is interesting to compare this to the rule we discussed in the previous section, which can be written (let me ignore for simplicity the$(1 + g)$ term) as $s \geq (r - g)b(-1)$, or using the identity relating the real interest rate, the nominal rate, and the inflation rate $r = i - \pi, s \geq ib(-1) - (g + \pi)b$. The difference between the two rules is the presence of a fixed 3% in the first, versus a term equal to nominal growth $g + \pi$ times debt, $b(-1)$, in the second. Thus, one can think of the 3% rule as a primitive and inferior version of a better rule—but perhaps one easier to explain.

The 60% debt ratio target was always arbitrary. For nearly all EU members, the increase in debt has made it unattainable any time soon. The analysis in this chapter has shown that there is no such thing as a universal threshold over which debt becomes unsustainable, and that the relevant debt level depends on many factors, in particular the real interest rate on debt.

Thus, it would be a major mistake to keep both the target and the required speed of adjustment to the target(1/20th of the distance between the actual debt ratio and 60%). Thus, while the 60% ratio may remain as a symbolic and distant target, the weight put on debt reduction should be extremely small.

Finally, while public investment should indeed be a high priority, allowing all such investment to automatically be financed by debt would not be wise. As discussed in this section, even if such investment has high social returns, the absence of financial returns to the state implies that, from the point of view of debt sustainability, there is no difference between, say, the wages of public employees and public investment. Both can potentially threaten debt sustainability, and whether public investment can be financed by debt should not be taken as a given. Furthermore, such a debt pass might lead governments to use too generous a definition of investment, or instead may lead countries to agree on too limited a list of qualifying projects, for example excluding measures to fight pandemics, improve medical care, or improve education.

4.5 Multiple equilibria, and the role of central banks

So far, (in Chapter 3 and in the description of the SDSA in this chapter) I have assumed that interest rates reflected fundamentals, that is saving/investment and risk/liquidity. What I ignored is that the equilibrium may not be unique, and that, in addition to the equilibrium I focused on, call it the “good” equilibrium, there is another “bad” equilibrium, with the same fundamentals but a higher interest rate.

The argument is familiar: Take the case where a government debt is considered safe, the government can thus borrow at the safe rate, and, under these conditions, its debt is considered sustainable. If, however, investors start to worry about default risk—or worry that other investors worry—and start asking for a risk premium to hold the debt, the higher interest rates and the worsening of the debt dynamics may well increase the probability of default, potentially triggering the very outcome they feared.[25]

As a matter of theory, the bad equilibrium can happen without any change in fundamentals (and thus is often referred to as a “sunspot equilibrium”). In reality, it is likely to involve both, a possibly small perceived deterioration of fundamentals and thus a worsening of the “good” equilibrium, leading however also to a shift from the good to the bad equilibrium, and a large increase in rates.

Such large jumps in rates are not just a theoretical worry. The history of emerging markets is full of examples of “sudden stops,” in which investors, in response to some news about fundamentals, try to leave the market en masse, leading to a very large increase in rates, and in some cases, triggering debt default. As has been made clear during the euro crisis however, such sudden stops can also happen in advanced economies.

This has been used as an argument to decrease debt from its current levels: Lower debt implies a smaller adverse effect of a given interest rate increase on debt dynamics. If debt is sufficiently low, then, even if investors were to worry and require a higher risk premium, this may not be enough to make debt unsustainable and justify the investors' worries. Thus, there may be no bad equilibrium (at least no bad equilibrium under the assumption of rational expectations).

The question becomes: How low is low enough? Based on ongoing work (Blanchard et al. 2021), the conclusion is: Very low. The basic algebra behind the result is given in the box below, which derives the upper bound on the value of the debt ratio such that a bad equilibrium cannot exist, both in a one-period and a multiple-period framework. The intuition can however be easily given. If investors worry and expect future investors to have similar worries, the sustained increase in interest rates easily leads to an eventual debt explosion. In the example below (which is admittedly too rough to serve even as a benchmark, but shows the logic behind the result), if the debt ratio that keeps debt stable under the low interest rate equilibrium (the good equilibrium) is 100%, and if the haircut conditional on default is 30%, the bad equilibrium can arise for debt ratios as low as 7%.

Multiple equilibria and safe levels of debt

Assume that if debt next period, $b(+1)$ exceeds some level, call it b^*, the government defaults, and the haircut on debt is equal to $x, x > 0$.

Let p be the probability of default. Let R denote the stated interest rate on what may now be risky debt. The expected return on debt is therefore given by:

$$(1-p)(1+R)+p(1+R)(1-x)$$

Assume that investors are risk neutral, and that the safe rate is equal to r. Investors will then require a stated rate R, such that

$$(1+r) = (1-p)(1+R) + p(1+R)(1-x)$$

Solving for R gives:

$1 + R = \frac{1+r}{(1-px)}$ implying a spread of $(1+r)\frac{px}{(1-px)}$

Debt dynamics are given by (ignore growth for simplicity, so $g = 0$):

$$b(+1) = \frac{1+r}{(1-px)}b - s(+1) \tag{8}$$

Ignore uncertainty in s, so $s(+1)$ is equal to some constant s, and thus ignore intrinsic uncertainty in $b(+1)$ (so we focus just on the multiplicity of equilibria).

The equilibrium is characterized by two equations. Equation 8 above, giving $b(+1)$ as a function of p. And the equation giving p as a function of $b(+1)$ and b^* :

$p = 0 \quad \text{if} \quad b(+1) < b^*$

$p = 1 \quad \text{if} \quad b(+1) > b^*$

Both equations are represented in the figure below, with $b(+1)$ on the vertical axis, and p on the horizontal axis.

$b(+1)$ is an increasing convex function of p. The value of $b(+1)$ when $p = 0$ is $(1+r)b - s$. The value of $b(+1)$ when $p = 1$ is $((1+r)/(1-x))b - s$.

p is a step function of $b(+1)$, equal to zero for $b(+1) \leq b^*$, equal to 1 if $b(+1) > b^*$.

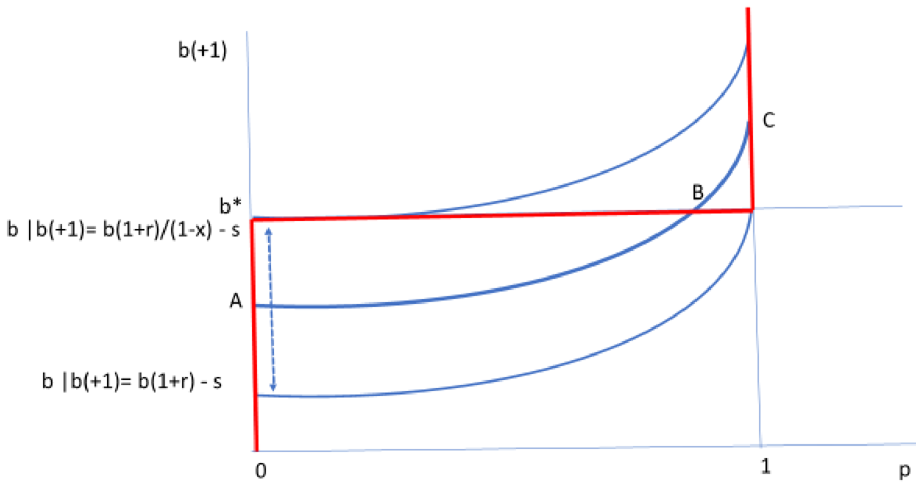

Figure 4
The scope for multiple equilibria

Depending on the value of debt today, b, there is either one or three (rational expectation) equilibria.

If $b \leq (b^* + s)(1 - x)/(1 + r)$, (as in the lower blue line) the only equilibrium is $p = 0$. Even if investors expect default for sure and ask for a large spread, debt next period is still less than b^*, so $p = 1$ is not a (rational expectation) equilibrium.

If $b > (b^* + s)/(1 + r)$, as in the upper blue line) the only equilibrium is $p = 1$. Even if investors expect no default, next period debt exceeds b^*, and thus $p = 0$ is not an equilibrium.

If b, debt today, is in between those two values, then there are three equilibria, A, B and C in Figure 4. B and its associated probability pB can be excluded on grounds of stability (If investors assume a value of p close to the value of pB, compute the new probability this implies, they will move away from B towards either A or C). This leaves two equilibria, A and C.

Suppose we take $b^* = 1$, and $r = s = 3$%, then the highest value of debt today for which there is no default is given by $b = (b^* + s)(1 - x)/(1 + r) = 1 - x$. If the haircut, x, is say 30%, then the range of values of debt for which there are multiple equilibria goes from 0.7 to 1.

This one-period example is however too optimistic. Suppose we move to a multi-period model. If investors next period assume that, if following period debt exceeds b^*, there will be default, then there will be default next period when debt exceeds $\hat{b}$. So, coming back to the current period, $\hat{b}$ becomes the new b^*, the critical value above which there is default. As we move back more and more periods, the critical value will decrease until $\hat{b}$ and b^* are equal, and the following condition holds:

$$b^* = (b^* + s)(1 - x)/(1 + r)$$

Or solving out:

$$b^* = (1 - x)s/(r + x)$$

Using the above values gives b^* = 0.7 $\ast$ 3%/(33%) = 0.07, a very low value, delivering a very large range of multiple equilibria, from 0.07 to 1.00.

A more general derivation, introducing fundamental uncertainty and allowing r to be negative, is given by Gonzalo Huertas, Michael Kister, and myself.

This result has a practical and sad implication: There is no hope to decrease debt ratios to such low levels any time soon. Thus, if it is at all costly in terms of output, this cannot be a motivation for embarking on fiscal austerity, because the realistic decrease in debt that can be achieved over, say, the next ten years, will not eliminate the risk.[26]

This raises the next question: Can central banks eliminate the "bad equilibrium"?[27]

In thinking about the answer, it is useful to start by distinguishing between two extreme cases, pure sunspots versus pure changes in fundamentals. Reality is typically a combination of the two.

Take the case of a pure sunspot equilibrium. Suppose that fundamentals have not changed, but investors start to worry and want to sell at the low interest rate. If a large enough investor is willing to take the opposite position and buy, then the bad equilibrium cannot prevail.

This is precisely the role the central bank can play. By announcing that it stands ready to buy the bonds that investors want to sell at the price associated with the low interest rate, and credibly indicating that it has deep enough pockets to buy whatever is needed, it can eliminate the bad equilibrium.[28] Remember the famous statement by Mario Draghi in the summer of 2012, when investors were indeed worried about the debt of a number of euro members and a shift to a bad equilibrium: "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough."[29] [30]

Indeed, the announcement may well be enough to prevent the investors from selling in the first place, and thus the central bank may not have to actually intervene. A similar conclusion holds if investors sell not because they worry, but because they temporarily need the funds elsewhere, for example to close other positions, as happened at the start of the global financial crisis. The central bank can simply replace them and limit the increase in interest rates.

Now take the case of a deterioration of fundamentals, which leads investors to ask for a risk premium and therefore a higher interest rate even under the good equilibrium. In this case, it is not obvious that the central bank, were it to want to do so, will be able to decrease the risk premium. As this proposition is likely to be controversial, and because it seems to clash with the empirical evidence, let me first state the argument in its pure form: In contrast to private investors, the central bank is part of the consolidated government. When it buys government bonds, it pays for them by issuing central bank liabilities. These days, these liabilities typically take the form of central bank reserves, accounts at the central bank which pay interest and are held by banks. Thus, looking at the balance sheet of the consolidated government (central government plus central bank), what happens is a change in the composition of its liabilities, fewer bonds and more central bank reserves, but no change in its overall liabilities. Thus, if investors worried about default risk, they have no reason to worry less than they did before the intervention.[31]

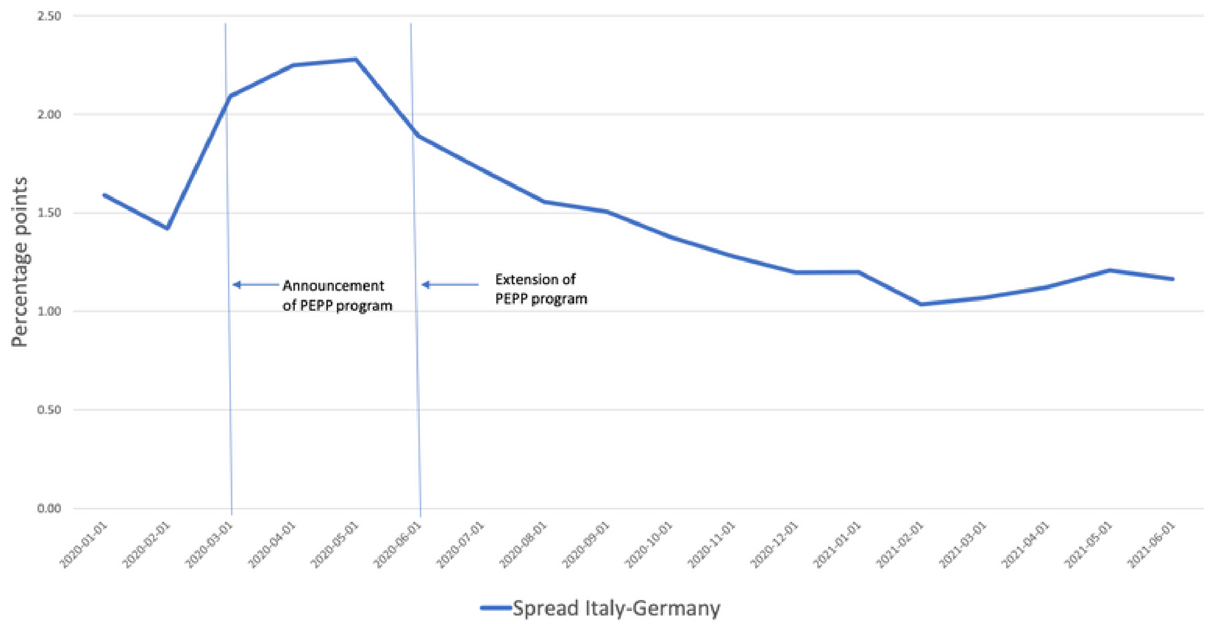

Figure 5
The evolution of the spread between Italian and German 10-year bonds since the start of 2020
*Sourc*e: Fred.stlouisfed.org

What happens to interest rates on bonds will depend on how investors perceive the seniority of different types of liabilities in case of default. If for example, they believe that central bank reserves will be more protected from default than bonds and are in effect safer, then the intervention, which leads to an increase in bank reserves, will make the bonds remaining in the hands of private investors more risky, and will increase rather than decrease their yields. . . Or, if instead investors expect central bank reserves to stop paying interest in the future and thus lead to an increase in the non-interest paying money supply then, investors might expect more inflation in the future, and thus ask for higher nominal rates on bonds today. . . Or, if they hold bonds of a certain maturity for maturity matching or other reasons (the so called preferred habitat theory of bond holdings), and the central bank intervenes in that particular market, interest rates on those bonds may indeed come down, but interest rates on bonds of different maturities will go up. In short, it is not obvious that, in this case, central bank intervention will decrease rates (or prevent them from increasing).

Yet, going from the theoretical argument to reality, the evidence suggests that central bank interventions have in general, decreased spreads. Take ECB interventions during the Covid crisis. Figure 5 shows for example the evolution of the spread on 10-year Italian bonds relative to German bonds since the beginning of 2020. As the Covid crisis developed, old worries about Italian debt resurfaced, leading to an increase in the spread of Italian over German bonds from February to June of about 80 basis points. In March 2020, the ECB announced a bond purchase program (the Pandemic Emergency Purchase Program, or PEPP) of up to 750 billion euros, extended to 1.3 trillion euros in June, and started buying Italian (and other) government bonds to stabilize and reduce the rates. By early May, despite the intensity of the Covid crisis, the spreads indeed decreased, returning to their pre-Covid level by late summer 2020.

In light of the theoretical discussion above, why was the ECB successful? Probably for three reasons, the third one being specific to the ECB as opposed to national central banks:

- First, because there was a large sunspot component to the increase in rates, and investors' worries exceeded what was warranted by fundamentals; to be fair, the passage of the EU recovery plan in July 2020 improved Italian fundamentals; but the spread had decreased before that.
- Second, because investors may have perceived the commitment by the ECB to intervene as a quid pro quo with member governments, in which they committed to take measures to ensure debt sustainability.
- Third, because the ECB is more than a national central bank. To the extent that it bought more Italian bonds relative to the capital key—the relative contribution of each euro member to the ECB—which it did, it transferred some of the risk on Italian debt to other euro members.[32]

Overall, I see the discussion serving as a warning about the ability of the central banks to maintain low rates if changes in fundamentals were to put debt sustainability in doubt.

4.6 Central banks, bailouts and write-offs

This section takes up two additional issues about the interactions between central banks, fiscal policy, and debt sustainability, where I have found the discussion to be often both hot and confused: The first is whether central banks, through Quantitative Easing, are monetizing the debt and bailing out governments. The second is whether central banks should write off the government bonds they hold to increase fiscal space. The answers to both are: no and no.

Debt monetization and bailouts.

Are central banks, at this juncture, monetizing the debt and bailing out governments, and is this a portend of major inflation to come?

In a sense, central banks have always monetized some of the debt: This is what open market operations aimed at decreasing interest rates have always done. The worry however is that central banks are doing this on a completely different scale from the past, in effect financing a substantial part of the large fiscal deficits. For example, since the beginning of 2020, the US Federal government has run a cumulated deficit of 5.4 trillion dollars,[33] and the Fed has purchased 3.7 trillion dollars of government securities, an amount equivalent to 68% of the deficit.[34]

The reference to "monetization" in the current context is a misnomer however. What central banks have typically done is to replace interest paying bonds by interest paying central bank reserves, which is quite different from the past when money did not pay interest. The large purchases have no obvious implication for inflation in the future.

Going step by step:

Let me first dispose of an incorrect argument against the monetization view. Central banks do not buy newly issued bonds, they buy bonds on the secondary market. Thus, in some formal way, they do not directly finance the government. This is however a distinction without a difference. The primary and secondary markets are closely related, and the investors who sell existing bonds to the central bank can use the proceeds to buy the newly issued bonds and keep their portfolios roughly unchanged. It is (nearly) as if they had bought the newly issued bonds directly.[35]

Another argument against the monetization view which I also do not find convincing, is lack of intent. During the financial crisis, or during the Covid crisis, central banks have not thought of themselves as directly financing their respective governments. They have thought of themselves as trying to keep interest rates low across all maturities to reflect what the yield curve would have looked, had they been able to achieve the very low neutral rate.

Presumably, they would do the same if there were no government deficit but private demand was very weak. This is true, but if in the end, the result has been that they have bought large quantities of government bonds; intent does not matter per se. It matters however for guessing what may happen in the future; more on this below.

The relevant argument is based on the nature of the liabilities issued by central banks to pay for the purchases of bonds. If these liabilities had been non-interest paying money, be it non-interest paying reserves or currency, then this would have led to a large increase in the non-interest paying monetary stock, with the potential, if this increase was not undone later, to create high inflation down the road. (This is indeed how hyperinflations have always started).[36] What central banks have issued however is interest-paying central bank reserves. To the extent that these pay roughly the same interest rate as the bonds they replace, the effect on overall interest payments of the consolidated government is very small. Governments have not been bailed out by their central banks: As I discussed earlier, central bank intervention does not reduce the overall liabilities of the consolidated government, just their composition. And it does not automatically lead to more inflation: It increases the size of the balance sheet of the central bank, but it does not increase the size of the non-interest paying money stock. Put another way: We can think of modern central banks as being divided in two activities. The first and traditional one is the issuance of zero-interest money against government bonds or private assets. The second is an intermediary activity, buying public and private assets, and issuing interest-paying central bank reserves. This second activity resembles that of other financial intermediaries, and has no direct implication for what happens to inflation.

Given that interest rates are currently very close to zero on both bonds and reserves, the argument that central bank reserves pay interest may seem rather irrelevant at this point: what is the difference between non-interest paying money and interest paying money? Indeed, what is important is what will happen if and when the neutral rate increases and the mandate of the central banks is thus to increase the actual rate.

One possibility is that, given the high levels of debt, governments will put pressure on the central bank not to increase rates and debt service even when the neutral rate increases (and the mandate of the central bank would imply that they increase the actual rate in tandem with the neutral rate), an outcome known as *fiscal dominance*. This is indeed a potential worry, but the pressure will depend on the level of debt of the consolidated government (which is what determines interest payments to outside investors, and which, as we have seen, is unaffected by central bank purchases), rather than on the size of the balance sheet of the central bank.

Another possibility is that the central bank itself will be reluctant to increase rates. While an increase in rates will increase both outlays (interest paid to banks on central bank reserves) and revenues (interest received on government bonds), the increase in rates implies capital losses on long maturity bonds, and might lead to a negative balance sheet for the central bank.

From an economic viewpoint, a negative balance sheet is not an issue for the central bank.[37] This is even more the case here, as the capital losses of the central bank on its holdings of government bonds are reflected one-for-one in corresponding capital gains for the government on those very same bonds, leaving the consolidated balance sheet unaffected. But it may be a political issue, and lead to a decrease in the central bank's independence. This is certainly something central banks worry about.[38]

To summarize: Central banks are not bailing out governments. The risk that high debt leads to fiscal dominance, or that large balance sheets with long maturity bonds leads central banks to keep rates too low is there. But I believe the risk is small. Advanced economies' central banks have shown their independence. The evidence from the increase in rates by the Fed and the Bank of England in 2016-2018 is reassuring. In the case of the ECB, the fact that there is not one fiscal authority, but rather 19 countries, with different attitudes vis-à-vis fiscal policy and debt, makes fiscal dominance of the central bank extremely unlikely.

Should central banks write off their holdings of government bonds?

As debt levels have increased, some have argued that central banks should simply write off their holdings of government bonds to give governments more fiscal space.[39] I have argued earlier that there was a lot of remaining fiscal space, so there was no need for any kind of write-off at this point; but leaving this argument aside, this particular type of write-off would not achieve what its proponents believe.

The proposition is that the cancellation of the bonds held by the central bank would decrease the amount of interest payments, and thus the debt service of governments; and indeed, it would. But it would have another effect, namely, to decrease the revenues of the central bank, and thus the profits that the central bank turns in to the government. This second effect would be exactly of the same size as the first, and the net effect on the government budget constraint would be equal to zero.

Another way of stating the same conclusion is to look at the operation from the viewpoint of private investors. From their viewpoint, this is just an exchange of claims between the government and the central bank. The central bank gives up claims on the government; the government gives up claims on central bank profits. This has no implication for private investors. (Some proponents have argued that the decrease in the reported official debt of the central government—which indeed would happen—would lead investors and rating agencies to see this as an improvement, and thus increase fiscal space. This is assuming too much stupidity on the part of investors.) While the write-off has no direct effects, it is likely to have adverse political effects. As a signal, it may lead investors to question the central bank's independence. And given the size of most central bank balance sheets, the cancellation of claims on the government is likely to lead to a negative balance sheet for the central bank. As I discussed earlier, while this is of no economic relevance, it may make it more difficult for the central bank to keep its independence vis-à-vis the government, leading to a higher probability of fiscal dominance. It is to be avoided.

A final remark about the ECB (as this is the context in which the French discussion has taken place). Because the ECB is not a national bank, cancellation of government bonds of one member country would indeed improve the fiscal situation of that country. The reason is that, given that ECB profits are distributed among all member countries (in proportion to their capital key), the decrease in profits for the country whose debt is written off will be much smaller than the decrease in its debt. In effect, the cancellation will lead to a transfer from all member countries to the country in question.

This shows however the limits of the argument: It is very unlikely that other members will agree to it. And if the debt is cancelled in the same proportion for all members, then the same irrelevance result obtains: the decrease in claims held by the ECB on governments will be offset by a decrease in ECB profits going back to the member countries.

4.7 Conclusions

I argued in Chapter 3 that (r-g) was likely, although not certain, to remain negative for a long time. The theme of this chapter is that it makes the dynamics of debt much more benign. This does not make however the issue of debt sustainability disappear, both because of endogeneity and the effect of fiscal policy back on the neutral interest rate, and because of uncertainty, in particular with respect to r.

I have argued in this chapter that the best way to assess debt sustainability is through the use of a stochastic debt sustainability analysis, or SDSA, an approach which allows to take into account the specificities of each country and each year. I have argued that, given the complexity of the assessment, I am skeptical that one can rely on quantitative rules. If however, such rules are used, I suggest that they should be based on requiring the primary surplus to adjust to debt service, defined as ((r-g)/(1+g))b(-1), rather to debt itself. It cannot avoid including exceptions however, such as the need to allow for larger primary deficits when the central bank is constrained by the ELB.

I have discussed sudden stops, and the ability of central banks to limit spreads on government bonds. I have argued that whether they can or not depends very much on the nature of the spreads, whether they reflect fundamental or non fundamental factors. I have argued that the probability of a bad equilibrium is only marginally influenced by the level of debt, but can be much reduced by a contingent rule making the primary balance react to an increase in debt service.

Footnotes

1. The overall deficit is given by (rB(−1) − S). In official reports and in the press, the deficit is typically reported however as (iB(−1) − S, and is thus an incorrect measure of the increase in the real value of debt. It needs to be corrected for the difference between the nominal and the real interest rate (in this case the realized, ex-post real interest rate, i − π rather than the ex ante rate, i − πe), a difference which is, by definition, equal to inflation. This correction matters—and used to matter much more when inflation was high. With debt equal to, say, 100% of GDP, and inflation at 2%, the correct measure of the deficit is 2% lower (better) than the official measure. When, in the 1970s, inflation was close to 10% and the debt ratio was 50%, the difference was equal to 5% of GDP, a very substantial difference. ↩
2. An anecdote: In 1981, Ronald Reagan announced that deficits were getting out of hand (at the time, an official deficit of $59.5 billion for fiscal year 1980; those were the days...), and that this justified major cuts in spending. Jeffrey Sachs and I then wrote an Oped for the New York Times, arguing that while nominal rates were a high 12%, inflation also ran at 10% (so real rates were only 2%, and high nominal rates reflected high inflation), and that once the correction for inflation was made, the correctly measured deficit was only $14 billion, less than 0.5% of GNP. Our Oped triggered a response by a famous Harvard alumnus, who accused us of being inflation lovers, and recommended to Harvard not to give us tenure. (Source. NYT March 6, 1981, and March 13, 1981) ↩
3. One may question the use of GDP in the denominator. For thinking about debt sustainability, a better ratio might be the ratio of debt to fiscal revenues. (The ratio

of fiscal revenues to GDP for advanced economies has remained fairly stable since 2000, around 35%, so looking at the evolution of the ratio of debt to revenues rather than the ratio of debt to GDP would yield roughly the same implications.) For other purposes, for example, for thinking about the effect on debt on the investment rate (the ratio of investment to GDP), then the ratio of debt to GDP is more appropriate. ↩

4. Had I written the debt dynamics in continuous time, the term would not be there. ↩

5. Because the outcome depends on the state issuing new debt every period, the outcome has been called a Ponzi game, or Ponzi finance, by some researchers. I think this is misleading. Ponzi schemes indeed depend on the ability of the Ponzi issuer to attract new investors every period in order to pay the interest due to existing investors; but typically the rate at which the number of potential investors must increase to sustain the scheme largely exceeds the rate of increase of the available investors' pool; eventually the scheme is no longer viable and collapses. In the case of the government, if r < g remains true forever (a big if, as I discuss below), there are potentially sufficiently new investors to sustain the scheme forever. ↩

6. The basic algebra: Call b^* the initial level of debt and $s^* = (r-g)/(1+g)b^*$ the associated initial primary balance. Then, if, after the one-time decrease in taxes s goes back to its initial value s∗ , one can rewrite Equation 1 as $(b-b^*)-(b(-1)-b^*) = ((r-g)/(1+g))(b(-1)-b^*)$. The limit, as we look further and further out is $b = b^*$. ↩

7. IMF Fiscal Monitor, April 2021, Table A8. ↩

8. There is some ambiguity about how to treat changes which are likely but have not yet been fully voted on. By law, the US Congressional Budget Office (CBO) must construct its baseline forecasts under "current law". In some cases, it is clear that aspects of the current law will be changed, programs which are supposed to expire will be extended, and this sometimes leads to CBO baseline forecasts which are not truly forecasts. ↩

9. CBO does not have the power to make such a requirement. It can however "score" the announced plan, and let Congress decide. ↩

10. This is based on Blanchard 2019, which itself discusses Romer and Romer 2019. ↩

11. See for example Afonso, Gomes, and Rother 2011, which is fairly representative. ↩
12.
Thanks to Silvia Ardagna for providing the data
 ↩
13. It is now working on a full SDSA approach. See IMF 2021. ↩
14. I am conscious of the difficulty of having credible contingent plans. But the conceptual point is clear. ↩
15. A real world SDSA exercise for Ireland, carried out by the Irish Fiscal Council, is given in their May 2021 Fiscal Assessment Report, Box H.[35] (although I find the assumed distribution of (r − g) in the exercise to be too wide.) Another relevant exercise is the public debt stochastic simulator constructed by the OFCE, which can be used to construct your own simulation. [89] ↩
16. This distinction is not always made clear in the discussion of EU rules. ↩
17. See for example Benassy-Queré et al. 2018 and the references in Blanchard et al. 2021. ↩
18. This is a natural extension of the so called Bohn rule (from a seminal paper by Bohn 1998), that showed that a rule which made the primary balance an increasing function of the level of debt would make debt stationarity. Bohn also showed that, for the United States, that rule appeared to be satisfied: higher debt led on average to a higher primary balance. ↩
19. Furman and Summers 2020 also focus on debt service (defined however as $rb(-1)$, rather than $((r - g)/(1 + g))b(-1)$ as I do here) and offer a related proposal: So long as debt service remains under 2% of GDP, fiscal policy is free of constraints. If debt service exceeds 2%, then the debt ratio should slowly decrease over time. ↩
20. Suppose for example that the primary balance is set equal to debt service, plus un-avoidable white noise: $s = ((r - g)/(1 + g))b(-1) + \epsilon$. Then $b - b(-1) = \epsilon$. ↩
21. This raises the issue of what happens if private demand remains structurally weak, the central bank remains at the ELB, and primary deficits have to be so large as to lead to a steady increase in debt. At some point, debt sustainability can become an issue. I return to the issue after having discussed optimal fiscal policy in the next chapter, and again in Chapter 6 when I discuss fiscal policy in Japan. ↩

22. This is a simplification; to the extent that the public investment project does not generate market returns for the state and thus will have to be financed in part by a combination of debt and taxes, the decision should also take into account the marginal cost of taxation. To the extent that the investment also has adverse distributional implications, those should also be taken into account. ↩
23. I therefore disagree with the version of the so-called “golden rule” of public finance which allows capital account spending can be automatically and fully financed by debt. ↩
24. Assessing these indirect effects is known as “dynamic scoring” and has sometimes been taken into account by the CBO in its debt projections since 1997. See https://sgp.fas.org/crs/misc/R46233.pdf ↩
25. A formalization of such debt crises, their dependence on the level of debt and its maturity, is given by Lorenzoni and Werning 2019. ↩
26. One can play devil’s advocate. A commitment by the government to decrease debt may lead investors to be less subject to sunspot worries, thus decreasing the probability of a bad equilibrium. But this is far from a mechanical effect, and a dangerous one to count on. ↩
27. What follows is more tentative than the rest of the book. I have not heard counter-arguments, but I am not absolutely sure that I am right. To use the usual expression, given the importance of the answer, this is a “fruitful area for further research”. ↩
28. Formally, the central bank does not have deep pockets, but rather the ability to finance large purchases through the issuance of bank reserves. ↩
29. https://www.ecb.europa.eu/press/key/date/2012/html/sp120726.en.html ↩
30. The “whatever it takes” is important. Announcing that it commits a given amount may not be enough. Investors may still want to test it and sell more than it has announced it is willing to buy. ↩
31. The argument does not extend to the purchase of private securities. When a less risk-averse investor is willing to buy those securities, the interest rate on these securities will decrease. The central bank is playing the role of a risk averse investor in this case. Its intervention will decrease the rate, although the transfer of risk may lead to more risk on the balance sheet of the consolidated government. ↩

32. Actually, the scope for such risk transfer is very limited if non existent. Under the rules of the PEPP program, the government bonds are bought and held by the national central banks, not by the ECB itself, and in case of default, there is no risk sharing across central banks. Thus, only if investors expect that the rules will not be enforced, is there redistribution of risk across countries. ↩

33. The exact number as of the end of August 2021 was 5.4 trillion dollars. Source: https://fred.stlouisfed.org/series/MTSDS133FMS ↩

34. The exact number, as of the end August 2021, was 3.7 trillion dollars. Source: https://fred.stlouisfed.org/series/TREAST ↩

35. The conclusion would be different if the central bank bought the newly issued bonds at below market rates. But this is not the case. ↩

36. US M1 has been multiplied by 4 since the beginning of 2020. Under the old quantity theory (which assumed money did not pay interest), and ignoring real output growth, this increase would eventually lead to the price level being multiplied by 4 as well. If the adjustment happened over 10 years, this would imply an annual inflation rate of 15%, reason enough to worry... ↩

37. A bank which just did helicopter money would have liabilities and no assets, and this would not be an issue. ↩

38. The Fed avoids, at least formally, this issue altogether by holding bonds to maturity, and not marking them to market. ↩

39. This proposition has been particularly salient in France. For example, see the statement by 100 economists. https://economix.fr/uploads/source/media/LeMondeAnnulationtribune.pdf. ↩

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