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GUESSING THE TRIGGER POINT FOR A U.S. DEBT CRISIS

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Leading authorities in the United States, including the Congressional Budget Office, use the term “unsustainable” to describe the long-term fiscal outlook.² By the year 2080, spending on entitlements alone could exceed total federal tax revenues. In the very long run (meaning from the year 2035 through 2080), the problem is primarily one of “excess costs” in health care, meaning the tendency for health spending to grow faster than the rest of GDP. However, in the medium run, meaning from 2010 through 2035, the aging of the U.S. population is the dominant factor.³

This paper explores the possibility of the U.S. experiencing a debt crisis in the medium run, meaning somewhere between 2015 and 2035. It is impossible to state precisely the trigger point for a crisis. At best, we can make guesses about some of the key parameters.

Non-Quantifiable Aspects of Sovereign Debt Crises

The trigger point for a debt crisis is not quantifiable. This is often true even in the case of private debt, such as a credit card balance. What should be the trigger point at which your bank disallows use of your credit card? If the limit were based solely on your theoretical *ability* to pay, then the upper limit on your credit card balance would equal the present value of all of your future earnings. However, you clearly are not going to work solely for the purpose of paying the outstanding balance on your credit card. Your *willingness* to pay is much less than your ability to pay. This presents the bank with a problem in psychological guesswork. The bank has to estimate the maximum amount that you can borrow and still be *willing* to repay.

If you are a credit card borrower with a large outstanding loan balance, your decision to default depends on the costs and benefits of default. The costs might include various legal penalties as well as reduced access to credit in the future. The benefits of default would include the ability to devote more of your future earnings to consumption, rather than to repaying the debt. If your perception is that the costs of default are less than the benefits, then you will choose to default. However, another borrower in similar circumstances might evaluate the costs and benefits differently and choose to repay the debt.

The fact that different people may respond differently under similar circumstances poses an analytical challenge for the bank. In addition to assessing the borrower’s financial characteristics, the bank must guess how they are likely to behave under financial distress.

The circumstances surrounding sovereign debt are, if anything, even murkier. The holder of sovereign debt has little or no legal redress available in the event of default. For the sovereign borrower, the cost of default is pretty much limited to (temporary) loss of reputation in credit markets.

1 I would like to thank Richard Williams for helpful comments. Remaining errors are my own.

2 In June 2009, the Congressional Budget Office long-term budget outlook begins, “Under current law, the federal budget is on an unsustainable path—meaning that federal debt will continue to grow much faster than the economy over the long run.” http://www.cbo.gov/ftpdocs/102xx/doc10297/SummaryforWeb_LTBO.pdf

3 The CBO writes, concerning Social Security, Medicare, and Medicaid “Between now and 2035, aging is projected to make the larger contribution to the growth of spending for those three programs as a share of GDP. After 2035, continued increases in health care spending per beneficiary are projected to dominate the growth in spending for the three programs.” *ibid*

The benefit of default to the borrower is even more difficult to quantify in the case of sovereign debt than in the case of private debt. The equivalent of a credit card borrower's willingness to forego consumption in order to repay debt is the willingness and ability of the sovereign to alter its budget in order to repay debt. A dictatorship may be able to extract considerable sacrifice from its subjects, while a weak democratic government may be able to extract very little.⁴

A country with a significant national debt always has the option to transfer wealth from bondholders in order to avoid inflicting pain on other constituents. This can be done through formal repudiation, in whole or in part. There is a trade-off between offending bondholders on the one hand and angering pensioners, public employees, and taxpayers on the other.

If the debt is denominated in local currency, a country can print money rapidly, which transfers wealth from bondholders by causing unexpectedly high inflation. However, a temporary "inflation shock" may backfire,⁵ as investors demand higher interest rates. On the other hand, if the government tries to stay ahead of the investor backlash by creating additional inflation shocks, this could lead to hyperinflation.

A government's behavior under financial distress depends on how it chooses to balance the preferences of bondholders with those of other constituents. If the government is willing to go to great lengths to avoid default, then under distress it will punish other constituents with lower spending and higher taxes. On the other hand, if the government is concerned primarily with those other constituents, then it will prefer at least partial default (which might consist of printing money rapidly).

Just as a bank must make a guess about a credit card borrower's willingness to repay under financial distress, investors in sovereign debt must make a guess about a government's willingness to repay under financial distress. This in turn requires judgments about political incentives.

Investors in a country's government bonds must assess the economic and political situation there. A sudden adverse change in those assessments is what constitutes a sovereign debt crisis. Thus, predicting when a sovereign debt crisis will take place requires a multi-layered qualitative assessment. We are trying to estimate the psychological stress point of bond investors, which in turn depends on *their* assessment of the political/economic stress point of governments. This paper will offer one approach to grappling with this impossibly complex problem.

Using Experience as a Guide

As we have seen, sovereign debt default is not a matter of hard numbers. We cannot say *a priori* that any particular level of debt will trigger default. However, the large record of past defaults provides some clues and ballpark estimates.

Reinhart and Rogoff begin by tabulating the ratio of external debt to GNP for middle-income countries

4 There is a substantial economic literature on the topic of sovereign debt defaults. An outstanding treatise on the history of financial crises and sovereign debt crises is Carmen M. Reinhart and Kenneth S. Rogoff, *This Time is Different*, Princeton University Press, 2009. Discussing the issues dealt with in this paper, they write (p. 52-53), "These are not simple questions, and they are the subject of huge debate among economists. We do not come close to providing complete answers; the social, political, and economic problems underpinning default are simply too complex."

5 We will see that this happened in the United States, when in the 1980s and 1990s investors punished the government with high interest rates in reaction to the inflation shock of the 1970's.

that defaulted between 1970 and 2008.⁶ For the 33 instances in which this ratio can be calculated, it ranges from a low of 12.5 percent for the Russian Federation when it defaulted in 1991 to a high of 214.3 percent in Guyana when it defaulted in 1982. Averaging across all 33 episodes, this ratio was 69.3 percent at the time of default. On the whole, it seems that for non-OECD countries, the combination of internal politics and external investor confidence rarely permits the ratio of external debt to GDP to exceed 100 percent.

For OECD countries, the ratio of debt to GDP can exceed 100 percent. Japan currently has a ratio of debt to GDP that is close to 200 percent.

Next, Rogoff and Reinhart compare developing countries that defaulted between 1970 and 2008 with those that did not default.⁷ Most non-defaulting countries had ratios of external public debt to GDP of less than 50 percent, and nearly half of the non-defaulters had ratios below 30 percent. Conversely, most defaulting countries had ratios of external public debt to GDP of 40 percent or more.

Overall, it would appear that historical experience suggests that debt defaults become somewhat likely as the ratio of debt to GDP rises above 40 percent. Furthermore, ratios above 150 percent of GDP among non-defaulters are rare.

A Debt Crisis as a Regime Shift

As Rogoff and Reinhart point out, the issue of sovereign default is one that involves multiple equilibria. I prefer to avoid the term equilibrium, and I also wish to avoid the term “model.” My stylized description of the sovereign debt market has two states of confidence, which might be labeled a high-confidence regime and a low-confidence regime. Investors constantly evaluate a country in light of its indebtedness, history, and political condition. In a high-confidence regime, most investors conclude that repayment of debt is highly likely, so interest rates are low. In a low-confidence regime, investors concluded that repayment of debt is somewhat doubtful, so interest rates are high unless the government takes clear, drastic steps to reduce its deficit.

A debt crisis can be thought of as a sudden transition from the high-confidence regime to the low-confidence regime. In the former, investors have high confidence in the sovereign’s willingness and ability to repay its debt. In the latter, investors lack such confidence. The loss of confidence leads to higher interest rates, which in turn exacerbates the sovereign’s difficulties with repaying debt, and that in turn reduces confidence still further. Hence, the shift is discontinuous, not a gradual smooth shift. There is no “in-between” regime in which investors have medium confidence in the sovereign’s debt, because the strong self-reinforcing feedback loop that characterizes investor confidence, interest rates, and fiscal viability drives those variables in either one direction or the other.

The shift to a low-confidence regime means that creditors place a lower ceiling on the country’s tolerable ratio of debt to GDP. Suppose that investors focus on the projected ratio of debt to GDP in five years. In the high-confidence regime, a country might be projecting a ratio of 125 percent, and borrowers may believe that this can be managed without difficulty. However, in a low-confidence regime, investors might only tolerate 90 percent. Thus, if the regime shifts, the country will have to reduce its projected ratio of debt to GDP in five years from 125 percent to 90 percent.

⁶ Reinhart and Rogoff, *This Time is Different*, Table 2.1, p. 23.

⁷ *Ibid*, Figure 2.1, p. 25

In the low-confidence regime, the target debt/GDP ratio might be set by the International Monetary Fund as part of a lending program. For example, in May, the IMF gave Greece a target of 150 percent of GDP. This target appeared to be both too high and too low. It may have been too high to satisfy an investor hoping to see a lower debt ratio in order to put the government of Greece on more solid financial footing. It may have been too low to satisfy many Greek political constituents, who saw the austerity requirements as too harsh.

In trying to guess the trigger point for a shift from the high-confidence regime to the low-confidence regime, I suggest trying to work backward from the low-confidence target. Of course, the low-confidence target is not known, either. However, by making assumptions about the low-confidence target and the country's capacity for fiscal austerity, we can estimate the point of crisis.

The Low-Confidence Target and a Pain Threshold

Early in 2010, the government of Greece faced a crisis in the bond market. Interest rates soared, and the country had to obtain assistance in order to roll over its debt. The challenges with resolving such a crisis help to define some of the parameters that will be used in this paper.

One parameter is what I call the Low-Confidence Target. This is the target that a government must credibly attempt to achieve for the ratio of government debt to GDP in order for lending to resume to the country at reasonable interest rates. When the International Monetary Fund intervenes in a sovereign debt crisis, the usual practice is to negotiate an agreement whereby the IMF agrees to provide temporary financing and the government agrees to tighten its fiscal policy in order to reduce the ratio of its debt to the country's GDP. This is known as IMF conditionality in lending. The ratio of debt to GDP that is being aimed for in order to meet the IMF's conditions is one measure of the Low-Confidence Target. In principle, if a government can credibly aim to hit its Low-Confidence Target, then the interest rate on its bonds will fall, as the risk premium becomes negligible. The decline of the risk premium ends the crisis.

However, the negotiation of an agreement with the IMF is not necessarily the end of the story. The government may or may not be able to carry out the agreement. For example, the agreement reached with Greece in early May was greeted with strikes and demonstrations by opponents within Greece, and those actions in turned raised doubts with investors about the ability of Greece to reduce spending and raise taxes in line with the agreement.

The problem of living up to a stabilization agreement is a reflection of the parameter that I call the Pain Threshold. The Pain Threshold is the maximum amount of budget adjustment that a government will be able to carry out.

The Pain Threshold depends on political conditions and the nature of the budget deficit. For example, at the end of the second World War, the United States had a high Pain Threshold. There was no entrenched opposition to large cutbacks in defense spending. Today, the situation is likely to be different, because most of the projected rise in spending is in the form of entitlements, for which cutbacks pose much greater political hazards.

The ability of a country to carry out an IMF plan depends on how its projected ratio of debt to GDP relates to the Low-Confidence Target and to the Pain Threshold. For example, suppose that the ratio of debt to GDP in five years is currently projected to be 120 percent and that the Low-Confidence Target is 90 percent. Assuming that the nominal interest rate is the same as the nominal GDP growth rate, this

requires a primary surplus of 30 percent over the five-year period.⁸ Starting from a balanced primary budget (i.e., not including interest payments), that would mean running a surplus of approximate 6 percent of GDP per year.

However, the country might not be starting from a balanced primary budget. Suppose that instead it was projected to run a cumulative five-year primary deficit of 10 percent of GDP along the current trajectory. Then the total budget shift relative to the current trajectory would be 40 percent of GDP over five years. If the five-year Pain Threshold for the country is only 25 percent of GDP, then the government cannot keep its agreement. Should many investors come to believe that the agreement will not be met, the interest rate on its debt will remain high and the country probably will be forced to default.

Thus, we have a crude recipe that determines whether an agreement with the IMF (or some other commitment mechanism for a troubled sovereign borrower) can work. We take the debt/GDP ratio currently contemplated for five years from now. We subtract the Low-Confidence Target to get the five-year primary surplus needed.

$$\text{primary surplus needed} = \text{projected debt/GDP ratio} - \text{Low-Confidence Target}$$

To the primary surplus needed over the next five years we add the primary deficit projected over the next five years (or subtract the projected primary surplus) to get the fiscal adjustment necessary.

$$\text{fiscal adjustment} = \text{primary surplus needed} - \text{primary surplus projected}$$

Finally, we can compute the margin of feasibility

$$\text{margin of feasibility} = \text{Pain Threshold} - \text{fiscal adjustment}$$

If the margin of feasibility is negative, then there is no way to prevent default. The rescue plan has come too late. In our example, the primary surplus needed is 120 minus 90, or 30 percent of GDP. The fiscal adjustment needed is 30 minus -10, or 40 percent of GDP. If the Pain Threshold is only 25 percent of GDP, then there is no way to prevent default.

In our example, with a Pain Threshold of 25 percent, it is only feasible for the IMF to set a higher target for the debt to GDP ratio, say 110 percent rather than 90 percent. If investors are satisfied with a Low-Confidence target of 110 percent, then this can work. However, with such a less-aggressive target, investors may decide that the default risk remains high. In that case, the risk premium will not disappear from the sovereign's bonds, and the plan may fail. Thus, even with an attempted rescue, the situation may have passed a point of no return, so that one way or the other default is inevitable.

The Effect of a High Pain Threshold

If a country is perceived as having a high Pain Threshold, it can make a large fiscal adjustment in a low-confidence regime. This in turn affects the investors' willingness to tolerate a higher ratio of debt to GDP in the high-confidence regime. On the other hand, if a country has a low Pain Threshold, then it cannot make a large fiscal adjustment. Therefore, investors will start to worry at a relatively low ratio of debt to GDP.

⁸ See appendix: the algebra of the evolution of government debt

This effect of a high Pain Threshold may explain the case of Japan, where the ratio of debt to GDP is close to 200 percent. Investors are behaving as if Japan could make a large fiscal adjustment, if necessary. If instead they doubted Japan's ability to make a large fiscal adjustment, they would have already cut back their investment in Japanese government debt.

Japan's high debt ratio may also be explained by captive lenders. To the extent that Japanese savers are confined to using savings institutions that invest in government debt, the Japanese government may, up to a point, be insulated from a shift in confidence.

Economic Shocks

Another factor that can trigger a sovereign debt crisis is an economic shock. For the United States, the Congressional Budget Office projection from 2015 through 2035 assumes no economic shocks. This is not realistic. Although no one knows when a shock will occur, history shows that the economy does not stay on a smooth path. There are recessions and there are interest rate cycles.

Thus, although the projection might show that as of a particular date the United States will have a ratio of debt to GDP that will be below that which is presumed to trigger a sovereign debt crisis, an adverse economic shock could push the debt to GDP ratio above the trigger point. In fact, one can argue that the reason that the Greek debt crisis materialized early in 2010 was that the Greek economy had suffered, like other economies, from the recession that began in 2008.

There are two types of shocks that are particularly important for the evolution of the ratio of debt to GDP. One is a recession. The other is an increase in the realized real interest rate. The realized real interest rate is the nominal interest rate minus the subsequent rate of inflation. High inflation that surprises investors can cause the realized real interest rate to be low, and conversely investor concerns about inflation that prove to be unfounded can cause the realized real interest rate to be high.

A recession affects both the numerator and the denominator of the debt/GDP ratio. It affects the denominator by lowering GDP relative to its trend path. This effect, however, is temporary and generally small. Also, a recession affects the numerator, because "automatic stabilizers," primarily the drop in tax collections that accompanies a fall in income, tend to push the budget toward deficit and raise the debt/GDP ratio. This effect, too, is small—as calculated by the Congressional Budget Office, the difference between the high-employment budget and the actual budget is not enough to account for major changes in the ratio of debt to GDP. The recent recession has caused a large increase in the deficit and in total debt outstanding. However, that is because in addition to the automatic stabilizers, discretionary policies were undertaken that further added to the deficit and to the debt.

In any event, my reading of history is that an interest rate shock represents a greater threat than a recession shock. From 1990 to 1994, the interest rate exceeded the growth rate in nominal GDP by a total of more than 15 percent (that is, by about 3 percent per year). This followed a similar period from 1985–1989, and that in turn followed a period from 1979–1984 in which the nominal interest rate exceeded the growth rate of nominal GDP by almost 10 percent. I call those fifteen years the Bond Market Vigilantes period of American economic history.⁹

9 See my essay "Why Our Current Budget Situation is a Crisis" in *American.com*, May 4, 2010. <http://www.american.com/archive/2010/may/why-our-current-budget-situation-is-a-crisis>

If an interest rate shock causes the nominal interest rate to rise above the growth rate of nominal GDP by a cumulative total of 15 percent, then this will raise the ratio of debt to GDP by about 15 percent relative to what it otherwise might be. Thus, if the debt to GDP ratio were projected to be 50 percent, and it turned out to be 15 percent higher due to an interest rate shock, then the debt to GDP ratio would be 57.5 percent.

The United States in 2020, 2025, 2030, and 2035

The Congressional Budget Office published a long-term budget outlook in June of 2010. It included a “baseline scenario,” based on a strict interpretation of current law, and also an “alternative scenario” based on a more realistic outlook for policy. I will focus on the alternative scenario.¹⁰ According to this forecast, the ratio of debt to GDP is projected as follows:

| Year | Debt Held by the Public as a Percent of GDP | Primary Surplus, Following Five Years, as a Percent of GDP |
|------|---|--|
| 2015 | 71 | -12.4 |
| 2020 | 87 | -18.6 |
| 2025 | 112 | -26.6 |
| 2030 | 146 | -33.3 |
| 2035 | 185 | -38.7 |

Source: Congressional Budget Office Alternative Fiscal Scenario, June 2010, supplementary data, and author’s calculations. Note that debt held by the public rises by more than the primary deficit, because CBO assumes that the interest rate is about .8 higher than the growth rate of nominal GDP.

Suppose that the Pain Threshold for the United States is 8 percent of GDP per year for five years, or 40 percent of GDP. (Since taxes at the federal level are about 20 percent of GDP, 8 percent of GDP represents 40 percent of tax revenues. So this Pain Threshold amounts to a 40 percent tax increase, if the adjustment took place entirely with taxes.) That means that if the United States were forced to undertake a fiscal reform in 2015, the maximum primary surplus it could run between 2015 and 2020 would be $40 - 12.4$, or 27.6 percent of GDP. If it did so, then the 2020 ratio of debt to GDP would be $87 - 27.6$, or 59.4 percent. Thus, if the Low-Confidence target for the ratio of debt to GDP is 60 percent, then the the United States could barely meet this target by undertaking a fiscal reform in 2015.

Using a similar calculation for the year 2030, the maximum primary surplus that the United States would be able to accumulate, given a Pain Threshold of 40 percent of GDP would be just 6.7 percent of GDP ($40 - 33.3$), which would only reduce its debt to GDP ratio in 2035 to 178.3 percent, rather than 185 percent. Thus, if the Low-Confidence Target for the ratio of debt to GDP in the United States is 175 percent of GDP, then the United States would not be able to meet such a target in 2035. Given these assumptions, along the CBO projected path, a reasonable guess would be that the U.S. would experience a sovereign debt crisis somewhere by 2030.

I am guessing that we will experience a sovereign debt crisis if the margin of feasibility becomes negative, meaning that the necessary fiscal adjustment exceeds the Pain Threshold, looking ahead five years. The key parameter is the sum of the Pain Threshold and the Low-Confidence Target. For

10 The June 2010 long-term outlook can be found at <http://cbo.gov/doc.cfm?index=11579>.

example, if the Low-Confidence Target ratio of debt to GDP is only 70 percent and the market's estimate of our Pain Threshold is a reduction in our primary deficit of only 30 percent of GDP, then the sum of the two is 100. On the other hand, if the Low-Confidence Target is 180 percent of GDP and the estimate of our Pain Threshold is 60 percent of GDP, then the sum of the two is 240.

Below is a table showing the margin of feasibility in various years for different assumptions about the Pain Threshold plus the Low-Confidence Target as a percent of GDP, assuming no interest rate shock.

| Target Plus Pain Threshold | 2015 | 2020 | 2025 | 2030 |
|----------------------------|------|------|------|------|
| 100 percent of GDP | -1 | -31 | -73 | -118 |
| 120 | 21 | -11 | -53 | -98 |
| 140 | 41 | 9 | -33 | -78 |
| 160 | 61 | 29 | -13 | -58 |
| 180 | 81 | 49 | 7 | -38 |
| 200 | 101 | 69 | 27 | -18 |
| 220 | 121 | 89 | 47 | 2 |
| 240 | 141 | 109 | 67 | 22 |

Below is a similar table, but assuming that the forecast for the ratio of debt to GDP five years ahead rises by 15 percent, which we might attribute to an increase in the nominal interest rate relative to the growth rate of nominal GDP.

| Target Plus Pain Threshold | 2015 | 2020 | 2025 | 2030 |
|----------------------------|------|------|------|------|
| 100 percent of GDP | -12 | -47 | -94 | -146 |
| 120 | 8 | -27 | -74 | -126 |
| 140 | 28 | -7 | -54 | -106 |
| 160 | 48 | 13 | -34 | -86 |
| 180 | 68 | 33 | -14 | -66 |
| 200 | 88 | 53 | 5 | -46 |
| 220 | 105 | 73 | 26 | -26 |
| 240 | 128 | 93 | 45 | -6 |

If the margin of feasibility is negative, then we might guess that this would trigger a debt crisis. Thus, if the market believes that the United States can tolerate only a small amount of fiscal pain and that the Low-Confidence debt threshold will have to be low, so that the combination of the two is 100 percent of GDP, then along the CBO path we will have a debt crisis in 2015. If the combination is 180 percent of GDP, then we will have a debt crisis along the CBO path by 2030, or by 2025 if there is a 15 percent adverse shock. If the combination of the two is 220 percent of GDP or higher and there is no interest rate shock, then we can avoid a debt crisis even in 2030.

Conclusion

Scanning the tables in the previous section, it would appear to be quite likely that the United States will experience a debt crisis within the next two decades, unless the path for fiscal policy changes from what is projected by the Congressional Budget Office. However, international capital markets continue to treat U.S. Treasury debt as a fairly safe asset. One way to interpret this phenomenon is that investors expect the United States to take steps to get its fiscal house in order.

The assumption that the United States will have the political will to stabilize its fiscal position is based more on hope than on recent experience. If the political process continues to enlarge the government's commitments to spend in the future, investor expectations will change at some point. That change in market perception is likely to be swift and severe.