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The Sustainability of the Federal Budget Deficit: Market Confidence and Economic Effects

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Summary

The budget deficit has exceeded $1 trillion since 2009. Combined with a shrinking economy, deficits increased the publicly held federal debt by over 30 percentage points of GDP between 2008 and 2012. Deficits of this size are not sustainable in the long run because the federal debt cannot indefinitely grow faster than output. Over time, a greater and greater share of national income would be devoted to servicing the debt, until eventually the government would be forced to finance the debt through money creation or default.

The current policy debate on the "fiscal cliff" occurring at the end of 2012 has raised the question of whether a deficit of the current magnitude is manageable and what risks it poses to the economy. Since deficit reduction could have a contractionary effect on the economy in the short run at a time when the economy is still fragile, restoring fiscal sustainability poses another set of risks that must be balanced against the risks of continuing an unsustainably large deficit. This report will evaluate sustainability issues.

Although the debt cannot persistently rise relative to GDP, it can rise for a time. It is hard to predict at what point bond holders would deem it to be unsustainable. A few other advanced economies have debt-to-GDP ratios higher than that of the United States. Some of those countries in Europe have recently seen their financing costs rise to the point that they are unable to finance their deficits solely through private markets. But Japan has the highest debt-to-GDP ratio of any advanced economy, and it has continued to be able to finance its debt at extremely low costs.

If investors on balance deemed the debt to be unsustainable, the yields and the cost of credit default swaps on Treasury securities would be expected to rise. Instead, both are currently low. This may seem surprising, given that the debt is currently growing more rapidly than output and is projected to continue to do so under current policy. The willingness of bond holders to finance the federal debt at low interest rates in light of these projections suggests that they believe that policy changes will eventually be made to place the federal debt on a sustainable path. This belief could change at any time; if it did, the experience of foreign countries suggests that the effects on the economy and financial markets could be severe. A failure to raise the debt limit or a ratings downgrade of U.S. debt by a credit rating agency are two events that have been seen as potential catalysts for a change in investor sentiment, although the downgrade when the debt nearly reached its statutory limit in 2011 did not result in higher yields.

According to standard macroeconomic theory, large deficits have temporarily boosted overall spending at a time when there is significant slack in the economy. Once private investment demand recovers, a large deficit would be expected to "crowd out" private investment spending. By accounting identity, domestic investment spending equals national saving plus net borrowing from abroad. The budget deficit has been equal to about half of private saving over the last three years. Even before the increase in the deficit, national saving was insufficient to finance domestic investment spending, and the United States was borrowing from abroad at unprecedented rates, peaking at about 6% of GDP. (Borrowing from abroad has since fallen by half, but remains relatively high.) To sustain large deficits, the economy will require some combination of higher private saving, lower investment, and higher borrowing from abroad. Some economists have argued that borrowing much more than 6% of GDP from abroad is unrealistic, and the already heavy U.S. reliance on borrowing from abroad makes the maintenance of a large budget deficit even less sustainable.

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Introduction

The federal budget deficit totaled $1.4 trillion in FY2009, which was the first time it ever topped $1 trillion. It remained over $1 trillion for the next three fiscal years. The government's ability to finance a budget deficit depends on the size of the economy. For this reason, and to compare the deficit to historical or foreign deficits, it is more meaningful to measure the deficit relative to gross domestic product (GDP). By this measure, the deficits since 2009 are unusual but not unprecedented. The deficit was above 10% of GDP in 2009, 9% of GDP in 2010, 8% of GDP in 2011, and 7% of GDP in 2012. Seven previous times in U.S. history the federal budget deficit has exceeded 10% of GDP, these being during or following the Civil War (1865), World War I (1918, 1919), and World War II (1942-1945). Before 2009, it had not exceeded 7% of GDP since 1946.

Federal budget deficits cause the publicly held federal debt to increase.[1] The FY2009 deficit of 10% of GDP, in a year when GDP fell, caused the debt-to-GDP ratio to rise by 12.6 percentage points. The debt has increased from 41% of GDP in 2008 to 73% of GDP in 2012. This was the highest the debt has been relative to GDP since World War II, when it peaked at 109% of GDP.

The current policy debate on the "fiscal cliff"[2] occurring at the end of 2012 has raised the question of whether a deficit of the current magnitude is manageable and what risks it poses to the economy. Since deficit reduction could have a contractionary effect on the economy in the short run at a time when the economy is still fragile,[3] restoring fiscal sustainability poses another set of risks that must be balanced against the risks of continuing an unsustainably large deficit. This report will evaluate sustainability issues. For an overview of projected deficits under current policy and options for addressing them, see CRS Report R41778, *Reducing the Budget Deficit: Policy Issues*, by Marc Labonte.

At What Point Does the Public Debt Become Unsustainable?

Some economists worry that if the public debt keeps rising, it will become unsustainable. By definition, the debt becomes unsustainable when private investors are no longer willing to hold it, at least at normal interest rates. Private investors become unwilling to hold a nation's debt when they become convinced that the government will either default on (in other words, renege on promises to repay) or monetize the debt (in other words, finance it through money creation) in a way that would result in rapidly increasing price inflation that reduces the existing debt's relative value.

Although it is not possible to establish a threshold level at which a country's debt becomes unsustainable, the trend that causes unsustainability is well known: a country cannot continually increase its debt at a rate that exceeds the growth rate of the economy. When it does, it causes debt service to absorb more and more of national income. As private investors observe that the government is unable or unwilling to make policy changes to prevent the debt burden from

[1] References in this report to the national debt refer to the publicly held federal debt unless otherwise noted because this is the debt that is financed in private capital markets and affects the economy. The gross federal debt, which was 104% of GDP in 2012, is the sum of the publicly held debt and intra-governmental debt that arises from surpluses in government trust funds. Changes in intra-governmental debt are unrelated to the budget deficit.

[2] For more information, see CRS Report R42654, *Major Fiscal Issues Before Congress in FY2013*, coordinated by Mindy R. Levit.

[3] For more information, see CRS Report R42700, *The "Fiscal Cliff": Macroeconomic Consequences of Tax Increases and Spending Cuts*, by Jane G. Gravelle.

increasing, they will decide to flee the country's debt before the point where the government is forced to default or monetize. The decision by some investors to flee the debt will make it more onerous for the government to finance the debt, because it will now have to offer higher yields to attract new buyers, and higher yields will result in a larger deficit and more borrowing. This phenomenon is sometimes referred to as a "debt spiral." Thus, unsustainability tends to be triggered rapidly, as no investor wants to be the one still holding the debt when eventual default or hyperinflation occurs. The exact point when investors choose to flee depends on psychological factors that are hard to predict and likely to vary by country.

Because it is the upward trend in debt that leads to unsustainability, investors may accept very large deficits for a few years, as long as they are convinced that in the future the government will reduce the deficit to a sustainable level before it is too late. For example, governments are often able to finance large deficits in wartime—the largest deficits relative to GDP in U.S. history occurred as a result of the Civil War, World War I, and World War II—because investors expect a rapid decline in the deficit once peacetime leads to a rapid decline in military spending.

Investors' willingness to accept large deficits for a time will depend in part on the current level of debt relative to GDP. In that regard, the 16 percentage point reduction in debt to GDP between 1993 and 2001 left the United States in a relatively good starting position to absorb the 30 percentage point increase in debt to GDP that has occurred since 2001. Although the increase in debt in 2012 brings the federal debt as a share of GDP to its highest level since 1950, it will remain at less than three-quarters of its World War II peak.[4]

Are Financial Markets Treating the Debt as Unsustainable?

Standard financial market measures currently do not suggest widespread concern about potential U.S. default. Although investors' views on the sustainability of the deficit cannot be observed directly, they are implicit in Treasury yields. If investors believed that the government would default on its debt or erode its value through inflation, they would demand higher yields to compensate against these risks. Yet Treasury yields have gone down, instead of up, as the deficit has increased. Since the financial crisis, long-term yields have been below 3% for the first time since the 1950s. Besides Treasury yields, another indicator of market fears of default are prices for credit default swaps, which can be thought of as a type of insurance against default.[5] Although the cost of credit default swaps for U.S. Treasuries rose during the recent financial crisis to atypical levels, they still implied a very low probability of default and the rise was much less than in European countries affected by the sovereign debt crisis, discussed below.[6] (They have fallen since.) These data strongly indicate that investors do believe that future deficits will be reduced to sustainable levels.

The ease of financing this year's historically large deficit is partly attributable to unique economic conditions. The United States entered its longest post-war recession in December 2007 (which ended in June 2009), featuring the most severe disruption to financial markets since the Great Depression.[7] September 2008 saw a "flight to quality" by investors who shunned risky assets and

[4] For more information, see CRS Report RL34712, *The Federal Debt: An Analysis of Movements from World War II to the Present*, by Mindy R. Levit.

[5] For more information on credit default swaps, see CRS Report RS22932, *Credit Default Swaps: Frequently Asked Questions*, by Edward V. Murphy and Rena S. Miller.

[6] CMA, *Global Sovereign Credit Risk Report*, Q1, 2011, http://www.cmavision.com/images/uploads/docs/CMA_Global_Sovereign_Debt_Credit_Risk_Report_Q1_2011.pdf.

[7] See CRS Report R40198, *The 2007-2009 Recession: Similarities to and Differences from the Past*, by Marc Labonte.

sought to hold only the safest assets. Investors perceived Treasury securities to be the safest assets, partly because they are the most liquid (i.e., easily tradeable).

While investors have not shown widespread concern about the sustainability of government borrowing so far, this does not prove that borrowing is on a sustainable path. Investor behavior is compatible with a belief that policy steps will be taken to reduce the deficit to a level that stabilizes debt compared to GDP, but there is no guarantee that the government will take those steps. There is nothing preventing investors from re-evaluating their views at any time, however. As long as federal deficits remain at unsustainable levels, there is the risk—however small—that interest rates could rise quickly as a result of a perceived rise in default risk.[8] Waiting until investor confidence has fallen would require larger policy changes because higher interest rates would cause debt service costs to rise.

Evidence from Abroad

A frequent question is whether one can predict when the United States will reach a "tipping point" where investors become unwilling to finance it. One way to answer that question is to look at whether there is a specific level of public debt that has become problematic for other countries. Different countries have different reputations, so an acceptable debt level is likely to vary from country to country. Because more developing countries have defaulted on their debt in recent decades, advanced economies are generally seen as more able to sustain higher debt levels than developing ones. Thus, in gauging how much higher the U.S. public debt could get before it faces sustainability concerns, it is more useful to compare the United States to other advanced economies.

All of the advanced countries that have experienced fiscal and financial crises (Greece, Iceland, Ireland, Italy, Portugal, and Spain) in recent years have high government debt levels in 2012. This would appear to offer evidence that high debt levels cause fiscal and financial crises, but for some of these countries, causality ran in the opposite direction—Iceland, Ireland, and Spain all had extremely low government debt levels (much lower than the United States) and were running budget surpluses before the crisis. Those three countries have high government debt levels only as a result of the crisis, notably as a result of declining revenue bases, higher social insurance outlays, and their governments taking on liabilities to shore up the banking system. In other words, looking at high public debt levels before the crisis would not have helped predict that those three countries would experience crises. Italy and Greece had unusually high debt levels before the crisis, supporting the idea that high debt can sometimes lead to crisis.[9] On the other hand, Japan's public debt level was by far the highest among advanced countries in 2007, and its borrowing costs have remained unusually low.[10] Japan's ability to finance debt at this level at low interest rates has been attributed to Japan's high overall rate of national saving, despite its large budget deficits, and its near-zero inflation rates.

A comparison of the United States to other advanced economies reveals that the U.S. debt level was higher than average as a share of GDP in 2007, but there were six countries in the sample

[8] This argument is made, for example, in Chairman Ben Bernanke, "Fiscal Sustainability," Speech, Washington, DC, June 14, 2011, available at http://www.federalreserve.gov/newsevents/speech/bernanke20110614a.htm.

[9] While Italy had a long history of budget deficits, it is notable that its deficit was smaller than average and much smaller than the United States since 2007.

[10] Based on general government gross debt from the IMF, World Economic Outlook, October 2012. Using general government net debt (which nets out certain government assets), the same pattern is present, although by that measure Japan's debt level was lower than Greece's and Italy's in 2007.

with debt levels that were higher still. In 2012, the U.S. debt to GDP ratio was higher than most other countries, but well below the ratio in the highest debt countries. The levels of debt to GDP in the United States and many other countries are higher today than any country in 2007 except Greece and Japan.[11]

The concept of a debt spiral is well illustrated by the experience of the eurozone crisis countries. Before the crisis, none of these European countries paid significantly more than Germany to finance government debt. All except Iceland joined the euro area, and their interest rate differentials with Germany fell significantly after joining. This pattern of interest rates implies that markets perceived them as having little more sovereign risk than Germany until the financial crisis, but significantly more afterward. The experience of these countries demonstrates that a loss of confidence quickly leads to a vicious cycle—investors demand higher yields on government debt to compensate against the perceived higher risk of default, but these higher yields cause the deficit to spike suddenly, thereby undermining a government's ability to continue to service its debt. This dynamic causes a country to swing from stability to crisis relatively quickly. Restoring stability has been difficult, and since 2008 GDP has shrunk for three or more years for most of the countries. Falling GDP exacerbates the budget deficit, and vice versa.

These countries that have required assistance to finance their deficits have some commonalities with the United States—projections of unsustainably large budget deficits under current policy, a large net foreign debt (with the exception of Italy), asset price bubbles that led to large losses in the financial sector, and large subsequent government outlays to cope with financial sector turmoil. On the other hand, several factors differentiate the United States from most of these countries—a reputation of fiscal solvency based on a history of non-default, a large economy, a flexible exchange rate, and a status as the world's "reserve currency" and "safe haven." The fact that Treasury securities are considered the riskless, "safe haven" asset internationally could mean that investors continue financing unsustainable deficits longer than they would for other countries, but it could also mean that if confidence were lost, the shift out of Treasury securities would be greater than in other countries since the original rationale for holding them was no longer valid.

Will Future Budget Deficits Remain at Unsustainable Levels Under Current Policy?

If the budget deficit were to remain near 2009 to 2012 levels, it would be unsustainable because it would cause the national debt to continually rise relative to GDP. But will deficits remain at elevated levels in future years, or return to more normal levels under current policy? In other words, are policy changes needed to return the budget to sustainability?

The deficit has already fallen from 10% to 7% of GDP, and there are reasons to believe that the deficit will continue to fall somewhat without any policy changes in the next few years. The recession caused certain outlays (such as unemployment insurance) to automatically rise and revenues to automatically fall. If business cycle conditions continue to improve, deficits will continue to decline. Furthermore, because of "real bracket creep," the tax system tends to collect modestly more revenue each year without any changes to the tax code.[12]

[11] Based on general government gross debt from the IMF, World Economic Outlook, October 2012. Using general government net debt (which nets out certain government assets), the U.S. debt level in 2012 is higher than all countries in 2007 except Greece and Italy.

[12] "Real bracket creep" refers to as incomes rise over time, more income is subject to tax.

CBO's projections of current law under the baseline show deficits falling to less than 3% of GDP after 2013. The projections would seem to indicate that the budget deficit is already on a sustainable path under current law. These projections assume four important differences from current policy, however. First, CBO assumes that all tax provisions, including the tax cuts enacted in 2001 and 2003, will be allowed to expire as scheduled.[13] Second, CBO projections of the deficit are based on assumptions that the automatic spending reduction process under the Budget Control Act will proceed as scheduled beginning in January 2013.[14] Third, CBO assumes that the routinely enacted one-year "patches" to adjust the alternative minimum tax (AMT) for inflation will not be extended, and as a result millions more taxpayers will pay the AMT each year.[15] Fourth, the Medicare cuts required in law by the sustainable growth physician payment formula are assumed to be allowed to take place; Congress has enacted legislative overrides to prevent those cuts (popularly known as the "doc fix") each year since 2003.[16] If any of these assumptions were altered, deficits would be much higher, all else equal.

Under its Alternative Fiscal Scenario, CBO modifies the baseline to assume that these four current policies stay in place. This causes the projected deficits to fall no lower than 4.2% of GDP, rising as a share of GDP after 2018. Deficits of this size would cause a persistent increase in the debt as a share of GDP; therefore, policy changes are required to put the projected budget deficit on a sustainable path.[17] For illustrative purposes, CRS estimates that to stabilize debt as a share of GDP at its projected 2012 level would require annual budget deficits no larger than 3½% of GDP in 2015 and 2016, falling to 2¾% of GDP from 2019 on, based on CBO's projections of GDP growth and interest rates. Were GDP to grow more slowly or interest rates to be higher than projected, the deficit would have to be smaller to be sustainable, and vice versa. Compared with a current policy baseline where discretionary spending grows at the rate of inflation, this would require some combination of spending cuts and tax increases equivalent to roughly $800 billion in 2013, falling to $275 billion in 2015, and rising each year thereafter until it exceeds $900 billion in 2022.[18] Thus, deficits do not fall enough under current policy, as defined in CBO's Alternative Fiscal Scenario, to stabilize the debt.

Moreover, long-term projections of current policy estimate that a large increase in Social Security, Medicare, and Medicaid spending will cause the budget deficit to grow continuously following the retirement of the baby boomers. Although deficit projections show some improvement in the short run, the long-term projection estimates even larger deficits under current policy, assuming health care costs continue to rise more rapidly than output. In the long term, reducing the growth rate of health care costs below the growth rate of the economy would have the largest impact on the budget deficit; however, the effects of health care cost growth on the deficit are very gradual, and play little role in the sustainability of the deficit in the near term.[19]

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[13] For more information, see CRS Report R42485, *An Overview of Tax Provisions Expiring in 2012*, by Margot L. Crandall-Hollick.

[14] For more information, see CRS Report R41965, *The Budget Control Act of 2011*, by Bill Heniff Jr., Elizabeth Rybicki, and Shannon M. Mahan.

[15] For more information, see CRS Report RL30149, *The Alternative Minimum Tax for Individuals*, by Steven Maguire.

[16] For more information, see CRS Report R40907, *Medicare Physician Payment Updates and the Sustainable Growth Rate (SGR) System*, by Jim Hahn and Janemarie Mulvey.

[17] Budget projections are subject to high margins of error, even over relatively short periods of time. Thus, the actual deficit in future years could turn out to be larger or smaller than CBO's projection, requiring larger or smaller policy changes, respectively, to place the debt on a sustainable path.

[18] CRS estimates from CRS Report R41778, *Reducing the Budget Deficit: Policy Issues*, by Marc Labonte.

[19] See CRS Report RL32747, *The Economic Implications of the Long-Term Federal Budget Outlook*, by Marc Labonte.

Because interest rates are currently so low, interest payments have been relatively low in recent years despite large deficits. For example, CBO recorded debt service payments of $187 billion for FY2009, the lowest level in dollar terms since 2005, even though the debt rose by more than $1.7 trillion that year. As discussed below, financing the deficit may become more costly once economic conditions normalize. Even if interest rates return only to average levels in recent years, the cost of debt service will rise significantly. CBO's projections assume a relatively low interest rate paid on government debt over the next 10 years, largely because the starting point for its projections is today's historically low rates. Some commentators have questioned whether this assumption is reasonable given the size of current and projected budget deficits. If investors respond to large deficits by demanding above-average interest rates, the cost of debt service would become large. CBO estimates that if interest rates rose to their average level from 1991 to 2000, the budget deficit would be an average of $100 billion higher per year over the next 10 years. If interest rates rose to their average level from 1981 to 1990, the budget deficit would be an average of $500 billion higher per year over the next 10 years.[20]

Sustainability and Foreign Holders of the Debt

Some economists believe the government's reliance on foreign investors to finance the federal debt makes the United States more vulnerable to sudden shifts in investors' willingness to hold federal debt.[21] Foreigners currently hold $5.3 trillion (more than half) of the total privately held federal debt.[22] Foreigners are perceived as less willing to passively buy and hold federal debt, in part because they bear exchange-rate risk when holding federal debt. If so, their demand for federal debt could be more sensitive to perceptions of sustainability, since default or monetization typically leads to currency devaluation that would reduce the debt's value in foreign currencies. If foreigners were to become less willing to hold federal debt, presumably, significantly higher interest rates would be required for Americans to absorb such large sums. For example, J.P. Morgan estimates that a 20% decline in foreign demand for Treasury securities would raise Treasury yields by 0.5 percentage points.[23] Furthermore, if debt service costs were to rise suddenly, higher debt payments to foreigners would result in a fall in U.S. income, while higher debt payments to Americans would transfer income with no net effect on overall U.S. income.

Is foreign unwillingness to hold U.S. debt in the future a serious concern? Perhaps the strongest argument against it is the behavior of investors during the recent financial crisis. Although the crisis first emerged in U.S. subprime mortgage markets, foreigners increased their net purchases of Treasury securities from $155 billion in 2007 to $710 billion in 2008—a trend that continued even after financial conditions deteriorated in September 2008. These circumstances seem like a

[20] Congressional Budget Office, *Letter to Honorable Paul Ryan*, Feb 24, 2011, Table 2.

[21] As an example, J.P. Morgan notes that foreign holdings of GSE debt fell by 40% after they were taken into federal conservatorship following financial problems although the federal government ensured that their debt continued to be paid in full. See " J.P. Morgan, "The Domino Effect of a U.S. Treasury Technical Default," *U.S. Fixed Income Strategy*, April 19, 2011. See also, Kenneth Rogoff, "Foreign Holdings of U.S. Debt: Is Our Economy Vulnerable?", Testimony before the Committee on the Budget, U.S. House of Representatives, June 26, 2007; Brad Setser, *U.S. External Debt and Power*, Brookings Institute, working paper, 2008.

[22] Federal Reserve, *Flow of Funds*, Table L.209. Privately held debt omits debt held by government trust funds and the Federal Reserve. It includes debt held by state and local governments.

[23] J.P. Morgan, "The Domino Effect of a U.S. Treasury Technical Default," *U.S. Fixed Income Strategy*, April 19, 2011, http://www.jpmorgan.com/cm/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1158634891053&ssbinary=true.

good test of whether foreigners would be willing to maintain their Treasury holdings in adverse circumstances, and they were.

Nevertheless, in the long run, the sustainability of foreign borrowing falls under the same mathematical rules as the sustainability of government borrowing—the net debt owed to foreigners cannot indefinitely rise faster than GDP, or else an ever-increasing share of national income will be needed to service it. The current account deficit has fallen significantly relative to GDP since 2007, but it remains to be seen whether this change is cyclical or longer lasting. Thus, independent of concerns about the size of the federal debt, the upward trend in the net debt owed to foreigners raises concerns about the long-term sustainability of large-scale borrowing from abroad.[24]

The continued willingness of foreign investors to hold U.S. Treasury securities is further complicated by the role of foreign governments. From the end of 2001 to the second quarter of 2012, foreign official holdings of Treasury securities increased from $0.6 trillion to $3.9 trillion.[25] While it can be reasonably assumed that private investors are purchasing Treasury securities because they are seen as good investments (and would sell them if they no longer were), foreign governments may have other motivations. Countries may have been accumulating official reserves in recent years (1) to prevent their currencies from appreciating against the dollar or against a major trading partner's (or competitor's) currency; (2) because the price of a major export, such as oil, had suddenly risen and the country decided to invest some of its windfall in foreign assets; (3) to guard their currency against a sudden withdrawal of investment from their country during a future downturn; or (4) to rebuild their reserves after a prior defense of their currency drained them away. None of these explanations would imply a permanent desire to continuously accumulate official dollar-denominated assets. Regardless of the motivation for initially purchasing Treasury securities, now that some foreign governments hold large portfolios of federal debt, they have an incentive to maximize their return. Collectively, this would call for governments to cooperate to avoid taking actions, such as large sales of holdings, that destabilize Treasury prices. But individually, any particular government has the incentive to sell its holdings before everyone else if it believes that the debt has become unsustainable; this incentive could hamper collective action.

Economic Effects of a "Debt Spiral"

Policymakers are currently faced with a dilemma. Reducing the deficit too quickly could have a contractionary effect on the economy at a time when the economy is still far below full employment. But leaving the deficit at an unsustainable size retains the risk that the budget could at some point enter a debt spiral, in which Treasury yields rose sharply and suddenly. Whether this risk is worth taking depends on two factors—how great the risk is of entering a debt spiral (a risk considered by most to be very small), and how serious the economic effects would be.

Assuming the government were to enter a debt spiral, the economic effects would be expected to be negative and potentially severe. How severe would likely depend on how much spillover there would be to other financial markets. Most economists believe that the 2007-2009 recession was the deepest and longest since the Great Depression because it was accompanied by a financial

[24] For more information, see CRS Report RL33186, *Is the U.S. Current Account Deficit Sustainable?*, by Marc Labonte.

[25] For more information, see CRS Report RS21951, *Financing the U.S. Trade Deficit: Role of Foreign Governments*, by Marc Labonte.

crisis. Moreover, financial crises seem to leave long-lasting effects after the initial crash—economists Reinhart and Reinhart find that in the decade following a financial crisis the median decline in annual GDP growth is one percentage point and unemployment often does not return to its pre-crisis level.[26]

The direct effect of higher interest rates stemming from greater credit risk would be to reduce the market value of existing federal debt, as investors would be willing to pay a lower price (i.e., demand a higher yield) for Treasury securities to compensate for the greater credit risk. This would cause a negative "wealth effect" for debt holders, and debt holders would be expected to reduce their spending in response, although initially by a much smaller factor than the loss of wealth. Since the publicly held debt is projected to reach $10 trillion by the end of FY2011, the wealth effect could potentially be large. The fact that roughly half of this debt is held by foreigners or the Federal Reserve mitigates the wealth effect on domestic spending. The most potentially damaging wealth effects for the broader economy could come from financial institutions that hold Treasury securities. At the end of third quarter of 2012, commercial banks held over $300 billion of Treasury securities, while insurance companies, GSEs, and broker/dealers held over $400 billion. As demonstrated during the 2008 financial crisis, leveraged financial firms can potentially respond to losses that reduce their capital base by contracting credit by a multiple of the amount of losses, a process known as deleveraging.[27] These "leveraged losses" can lead to a credit crunch that affects the economy as a whole.

The potential severity of the effects on the economy would come from indirect effects that are of a more uncertain nature. For example, money market mutual funds held about $450 billion of Treasury securities at the end of the third quarter of 2012. These funds are typically set up to mimic a bank account, in that account balances are quoted with a stable principal that never rises or falls. In the current low interest rate environment, capital losses on Treasury holdings, particularly for funds that are concentrated in Treasury securities, would not have to be that large to cause a fund to "break the buck," meaning that principal would be reduced.[28] When a money market fund broke the buck in September 2008, it set off a $250 billion run on money market funds that was viewed as a significant factor in the worsening of the financial crisis, and was only brought to an end by a temporary government guarantee of money market funds.[29]

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[26] Carmen Reinhart and Vincent Reinhart, "After the Fall," National Bureau of Economic Research, Working Paper 16334, September 2010. See also International Monetary Fund, *World Economic Outlook*, Oct. 2009, Ch. 4.

[27] Financial firms can respond to losses that deplete their capital by raising new capital to replenish it or reducing the size of their overall balance sheet to return to previous leverage ratios. In the 2008 financial crisis, the difficulty that firms had in raising new capital led many to deleverage in response to losses.

[28] The effect of interest rate changes on the value of Treasury securities held by money market funds is reduced by the fact that these funds are limited to securities with short-term maturities. Nevertheless, J.P. Morgan estimates that a sudden increase in yields of 1.5 to 1.75 percentage point or larger would cause some money market mutual funds to "break the buck." J.P. Morgan, "The Domino Effect of a U.S. Treasury Technical Default," *U.S. Fixed Income Strategy*, April 19, 2011, http://www.jpmorgan.com/cm/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1158634891053&ssbinary=true.

Unless Treasury defaulted, any capital losses would be unrealized ("mark-to-market" losses). However, although money market funds are allowed to value their holdings at historical cost, they must take prompt action if the mark-to-market cost deviates from the historical cost by more than 0.005%. See BlackRock, "The New Regulatory Regime for Money Market Funds," *Viewpoint*, Jan. 2011, https://www2.blackrock.com/webcore/litService/search/getDocument.seam?contentId=1111128717&Source=SEARCH&Venue=PUB_INS.

[29] Figure cited in Fed Chairman Ben Bernanke, "Financial Reform to Address Systemic Risk," speech at the Council on Foreign Relations, March 10, 2009, http://www.federalreserve.gov/newsevents/speech/bernanke20090310a.htm. For more information, see CRS Report R41073, *Government Interventions in Response to Financial Turmoil*, by Baird

Treasury securities are also widely used as collateral for short-term borrowing in the repurchase agreement ("repo") market. The Treasury Borrowing Advisory Committee estimated that Treasury securities are used as collateral for $4 trillion of borrowing, and that this market is an important source of liquidity for leveraged financial firms, such as investment banks.[30] Were the creditworthiness of Treasury securities to be placed in doubt by a debt spiral, lenders could become less willing to accept them as collateral or reduce the amount they were willing to lend against them. Either way, credit would contract and firms' access to liquidity would be harmed if that borrowing could not be replaced in other markets.

A key issue in determining the effects on the broader economy is whether a spike in Treasury yields spilled over into a spike in private yields on corporate bonds, bank lending rates, and consumer credit. Treasury yields are often considered a benchmark lending rate that other private rates are based on (albeit not on a one-to-one basis), although that does not guarantee that they would continue to be if perceptions of sovereign credit risk changed. If financial markets perceived that higher credit risk for the U.S. government did not alter the credit risk of U.S. corporations or households, then private yields would not necessarily rise with Treasury yields. On the other hand, investors may believe that government credit risk implies significant risk for private corporations, in terms of potential financial instability, exchange rate risk, and an inability of the federal government to provide obligated funds or indirect support (such as the resources necessary to maintain financial stability in the event of systemic risk). If so, private yields would rise with Treasury yields.

A debt spiral could also result in the federal government undertaking a contractionary fiscal policy in the form of higher taxes or lower spending. In the mainstream economic model, the direct effects of such a policy would be to further reduce overall spending in the economy in the short run, although in a debt spiral some believe that it might improve confidence in financial markets that partly or wholly offsets the contractionary effects. This is the rationale for countries such as Greece to undertake austerity measures to restore stability.

An obvious limitation to estimating how serious the economic effects of a debt spiral would be is that the United States has not experienced one in modern times. There are examples of foreign countries that have recently become caught in debt spirals, however, and in those countries the contraction in output and employment has typically been deep. In Iceland, GDP fell 11% peak to trough, and in Greece, GDP has already fallen 18% from its peak and is projected to continue falling. By contrast, GDP fell by 2.6% in the United States in the recent recession, which was the deepest since the Great Depression.[31] It is noteworthy that these economic effects have occurred before default occurred, and in cases where financing from neighbors or international institutions such as the International Monetary Fund has allowed the countries to avoid default altogether. Looking more broadly, an IMF study analyzed 148 sovereign defaults between 1824 and 2004, and found that GDP growth declines on average by 2.6 percentage points in the first year after a default.[32] It also worth noting that, typically, countries have eventually bounced back

Webel and Marc Labonte.

[30] Matthew Zames, Treasury Borrowing Advisory Committee, *Letter to the Honorable Timothy Geithner*, April 25, 2011, http://www.sifma.org/issues/item.aspx?id=25013.

[31] CRS calculations using annual data from International Monetary Fund. These calculations may underestimate the peak to trough decline in GDP because they use annual data.

[32] Eduardo Borensztein and Ugo Panizza, "The Costs of Sovereign Default," International Monetary Fund, Working Paper 08/238, October 2008. Because default could cause recession or recession could cause default, the authors use statistical tests to verify that the negative effects on GDP growth are caused by the default, although they find a smaller effect on GDP when using these tests.

economically—the negative effects have not been permanent. The IMF study found no statistically significant effects on GDP growth after the first year.

To gauge the likelihood of whether a sudden spike in Treasury yields would spill over to the broader economy, a useful analogy might be the recent financial crisis. While the crisis was complex and multi-faceted, the crisis was set off by the unexpected rise in mortgage default rates that caused a broad and widely held class of securities, AAA-rated mortgage-backed securities, to suddenly plummet in value and lose liquidity. The loss in value and liquidity was caused by a reassessment by investors that a security, previously believed to be very safe, in fact faced significant credit risk. The loss in value of these securities was significant enough that it caused financial markets to doubt the solvency of the firms holding the assets. This caused widespread illiquidity for financial firms, and ultimately, some failed. Before the crisis, most economists and policymakers assumed that monetary policy could be employed to contain any systemic risk event, but that proved not to be the case.

Would a Failure to Raise the Debt Limit Cause a Debt Spiral?

The U.S. Treasury has announced that the statutory debt limit would be reached by the end of 2012 under normal operations. If extraordinary measures are taken, the debt limit would not be reached until early 2013.[33] After that point, there would not be enough revenue available to Treasury to finance the spending obligations that have been authorized by Congress under current policy. This has raised the question of whether a failure to raise the debt limit would lead to a default on federal debt. The debt has come close to the statutory limit before, most recently in 2011, but the limit has always been raised before it has been reached. Some commentators have argued that more than enough revenue will be collected to meet interest payments on the debt, so default can be avoided indefinitely. Treasury has argued that it does not have the authority to prioritize between different types of payments, but must meet obligations on a "first in/first out" basis. If so, a failure to meet interest payments could not be avoided since revenue would be insufficient to prevent a backlog of unpaid obligations.[34] A 1985 Government Accountability Office opinion argued that statute does not prevent Treasury from prioritizing and paying interest first.[35]

Assuming Treasury were able to prioritize, although revenues would be sufficient to meet interest payments at current interest rates, a debt spiral might still be unavoidable. As discussed above, investors will continue financing unsustainably large budget deficits as long as they believe that the government will eventually implement policy measures to reduce them to sustainable levels. Some investors might perceive a failure to raise the debt limit as a signal that the "full faith and credit" of the federal government no longer stood behind its obligations, even if the government continued to meet interest payments. This could occur for two reasons. First, if unable to borrow, it would be unlikely that the government would be able to meet all other legal obligations, such as contractual payments to private vendors. Debt holders might decide that if the federal government is unwilling to meet other legal obligations, they may eventually be treated similarly, and flee the

[33] U.S. Treasury, *Quarterly Refunding Statement*, November 2012, http://www.treasury.gov/press-center/press-releases/Pages/tg1753.aspx.

[34] FitchRatings, a major rating agency, announced that even short delays (so-called "technical default") in payment to bondholders could trigger a ratings downgrade, and "though such an event (such as a short-lived Treasury bill default) might not permanently impair the capacity of the U.S. government to service its obligations, it is unlikely that its 'AAA' status would be retained in the short to medium term." FitchRatings, "Thinking the Unthinkable – What if the Debt Ceiling Was Not Increased and the U.S. Defaulted?," *Comment*, June 8, 2011.

[35] These issues are analyzed in greater detail in CRS Report R41633, *Reaching the Debt Limit: Background and Potential Effects on Government Operations*, coordinated by Mindy R. Levit.

debt to avoid that fate. Second, debt holders might decide that a scenario where popular federal programs went unfunded so that interest payments were met would be politically unsustainable, even if it were technically sustainable. Debt holders might conclude that political pressure would eventually cause policymakers to redirect revenues from interest payments toward popular programs, even if they did not. Debt holders might conclude that an unwillingness to raise the debt limit was a sign that policymakers had reached an impasse on fiscal issues that would prevent deficit reduction. (Debt holders might also reach the opposite conclusion—that a failure to raise the debt limit signaled that deficit reduction was more likely in the future.) If debt holders came to doubt the government's future willingness to make interest payments, interest rates would rise. If they rose high enough, revenues (which fluctuate significantly from month to month) would no longer be sufficient to continually meet interest payments even under prioritization.[36]

As discussed above, a debt spiral would be expected to begin before a default, at the point when investors deemed the status quo untenable. If a failure to raise the debt limit led to a debt spiral, the economic effects would be expected to be as described above (see "Economic Effects of a "Debt Spiral").

Would a Ratings Downgrade Cause a Debt Spiral?

On August 5, 2011, Standard & Poor's, a major ratings agency, downgraded U.S. federal debt from AAA to AA+ to

> reflect our opinion that the fiscal consolidation plan that Congress and the Administration recently agreed to falls short of what, in our view, would be necessary to stabilize the government's medium-term debt dynamics. More broadly, the downgrade reflects our view that the effectiveness, stability, and predictability of American policymaking and political institutions have weakened at a time of ongoing fiscal and economic challenges to a degree more than we envisioned when we assigned a negative outlook to the rating on April 18, 2011.[37]

To date, other rating agencies have not downgraded U.S. debt, although Moody's and Fitch changed their ratings outlook to negative in 2011.[38]

If the federal government debt were downgraded again, would that set in motion a debt spiral that could result in significantly higher interest rates and a potential default? Based on market reaction to the 2011 downgrade, the answer would appear to be no. Counterintuitively, Treasury yields fell in the week after the downgrade, and have remained lower since. It appears that Treasury yields fell following the 2011 downgrade because they are desirable to many investors because they are considered to be a "safe haven" asset, and play a central role in world financial markets because of their perceived riskless status, although one might have predicted a downgrade would undermine the "safe haven" status of Treasury securities.

Since the last downgrade had the opposite effect on interest rates that many economists would have predicted, it is difficult to say whether the same pattern would occur in the event of a future downgrade. The answer would depend, in part, on how much the debt was ultimately

[36] See Chairman Ben Bernanke, "Fiscal Sustainability," Speech, Washington, DC, June 14, 2011.

[37] Standard & Poor's, *United States of America Long-Term Rating Lowered to 'AA+' on Political Risks and Rising Debt Burden*, August 5, 2011.

[38] Moody's Investors Service, *Moody's Confirms U.S. Aaa Rating, Assigns Negative Outlook*, Aug. 2, 2011. Drew Fitzgerald, "Fitch Lowers Outlook on U.S. Sovereign-Debt Rating to Negative," *Dow Jones Newswires*, November 28, 2011.

downgraded. A one-step downgrade would leave U.S. debt several steps above "junk" status, and above many of its peers. A one-step downgrade in a U.S. private or municipal security is not typically a crisis-triggering event; issuers of such securities merely pay a "risk premium" in terms of higher yields than higher-rated peers or relative to what the issuer would have paid had a downgrade not occurred.[39] Many foreign governments are able to issue debt at manageable interest rates, albeit generally higher than the United States, despite a lower credit rating. Japanese government debt, for example, has a lower credit rating than the United States, yet its yields have been consistently lower than U.S. government debt.[40]

On the other hand, as discussed above, as long as the federal budget is on an unsustainable path, investor sentiment could deteriorate at any time. Future downgrades could alter the safe haven role of Treasury securities, although the last downgrade did not. It is hypothetically possible that a ratings downgrade could trigger a sudden deterioration in investor sentiment, similar to how the ratings downgrade of AAA mortgage-backed securities coincided with a fall in their value in 2007-2008. If a downgrade resulted in a debt spiral, the economic effects would be expected to be similar to those described above (see "Economic Effects of a "Debt Spiral").

The impact on the broader economy will depend in part on how the downgrade affects broader financial markets. It does not necessarily follow that a lower credit rating for the federal government would automatically lead to broad rating downgrades for U.S. companies, but in 2011 Standard & Poor's downgraded the debt of several government sponsored enterprises and U.S. insurers from AAA to AA+ as a result of the federal debt downgrade.[41]

Another factor to consider is that, historically, rating downgrades sometimes lag rather than lead market events.[42] This section has implicitly assumed that a downgrade would occur in a scenario of normal financial conditions, similar to the present. Instead, a ratings downgrade could be triggered by some financial market disturbance. In other words, federal debt might not be downgraded until after Treasury yields or other measures of credit risk were already rising. Arguably, this pattern has occurred for the euro debt crisis countries.

Is a Large But Manageable Deficit Harmful to the Economy?

Assuming that the government is able to continue to finance the deficit smoothly, do large deficits have any effect on the economy? When the economy is at full employment (meaning practically all labor and capital resources are in use), government budget deficits "crowd out," or compete with, private investment spending in the standard macroeconomic model. Setting aside foreign capital flows for the moment, borrowing can only be financed through saving, and government

[39] J.P. Morgan estimates a one notch downgrade in the federal government's credit rating would increase Treasury yields by one percentage point. J.P. Morgan, "The Domino Effect of a U.S. Treasury Technical Default," *U.S. Fixed Income Strategy*, April 19, 2011, http://www.jpmorgan.com/cm/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1158634891053&ssbinary=true.

[40] Stanley White and Rie Ishiguro, "Fitch Cuts Japan Credit Rating Outlook to Negative," *Reuters*, May 27, 2011.

[41] Standard & Poor's, "Ratings on Select GREs And FDIC- and NCUA-Guaranteed Debt Lowered After Sovereign Downgrade," August 8, 2011; Standard & Poor's, "Rating Actions Taken On 10 U.S.-Based Insurance Groups Following Sovereign Downgrade," August 8, 2011.

[42] See Gordon Delianedis and Robert Geske, "Credit Risk and Risk Neutral Default Probabilities," The Anderson School at UCLA working paper, February 2003; Carmen Reinhart, "Credit Ratings, Default, and Financial Crises," *World Bank Economic Review*, vol. 16, no. 2, 2002, pp. 151-170.

borrowing competes with business borrowing for the same pool of national saving. By increasing the demands on that pool of national saving, government borrowing pushes up the cost of all borrowing through higher interest rates, causing businesses to finance less capital spending than they otherwise would.[43] Business borrowing finances capital spending on plant and equipment, and lower capital spending results in lower potential gross domestic product, and hence lower future national income, than would otherwise occur.

In the current context, the economy is not at or near full employment. In this context, government deficits are unlikely to significantly crowd out private business borrowing. On the contrary, business investment was contracting until the fourth quarter of 2009 and has remained low as a share of GDP since, either because investment demand declined or businesses are credit constrained. This greatly reduced the potential for large government deficits to crowd out private investment spending. As discussed above, low interest rates support the view that the deficit is currently causing little crowding out to occur. (Of course, this could change if investor concern about sustainability pushed up interest rates.) In this case, the decline in aggregate spending caused by falling investment spending can be offset, at least in part, by the rise in (deficit-financed) government spending, which directly increases GDP, and (deficit-financed) tax cuts, which directly increase after-tax income. Most economic forecasters projected that the rise in the budget deficit, on balance, increased GDP over the last few years, despite a possible crowding out effect. Indeed, it is the increase in the deficit that is the primary reason that the stimulus act (P.L. 111-5) was projected to stimulate the economy in standard macroeconomic models.[44]

With international capital mobility, borrowing can also be financed by foreign saving. In the standard macroeconomic model with perfect capital mobility, the boost in aggregate spending from the stimulus would cause the trade deficit to rise as foreign capital is attracted to higher domestic interest rates. The availability of foreign credit would avoid the crowding out of domestic capital investment. But the boost to aggregate spending from the budget deficit would be negated (or "crowded out") by the higher trade deficit. The United States relies heavily on foreign borrowing, and this is another reason that large budget deficits could be less effective at stimulating the economy. The lack of perfect capital mobility, and the large output gap at present, in the United States means that a larger trade deficit is unlikely to completely negate the stimulus as theory would suggest, but it is likely to make it less effective at boosting aggregate spending. Since the recession began, the trade deficit has fallen substantially, so a problem of crowding out from the trade deficit is not apparent at this time. It should also be noted that if capital spending is financed by foreigners, the income generated by that capital will accrue to foreigners instead of to Americans.

As the economy returns to full employment, large budget deficits will no longer stimulate aggregate spending.[45] At that point, crowding out will become a more serious concern if the budget deficit is not reduced. By accounting identity, domestic investment must equal national saving plus net borrowing from abroad.[46] In the years before the crisis (2000 to 2007), domestic

[43] In the case of current budget deficits, some government borrowing is being used to purchase assets from the financial sector, notably preferred stock. Borrowing to buy assets would not be expected to have the same crowding out effect as borrowing to buy goods and services. Asset purchases are not the primary cause of the current budget deficit, however.

[44] See, for example, Congressional Budget Office, *Estimated Impact of the American Reinvestment and Recovery Act on Employment and Economic Output*, May 2011.

[45] An economy near full employment does not have much slack that can be spurred into use by stimulus. Further, in the standard model, it is the increase in the deficit that stimulates spending—were the level of the deficit to be held steady, the economy would receive no further stimulus in future years.

[46] National saving is comprised of business saving, household saving, and government saving. Most national saving in the 2000s came from business saving; household saving averaged close to zero. When the government budget is in

investment averaged about 20% of GDP, as seen in **Table 1**. Because national saving averaged about 15% of GDP, three-quarters of this investment was financed by national saving and one-quarter was financed by borrowing from abroad. The federal budget deficit modestly reduced national saving during most of that period.[47] In 2008, national saving fell to 12.6% of GDP, in part because the budget deficit rose to 3.2% of GDP. Despite the fall in national saving that year, net borrowing from abroad remained relatively steady because investment spending fell to 17.5% of GDP.

Table 1. Saving, Investment, and the Federal Budget Deficit, 2000-2011

(percentage of GDP)

	2000-2007	2008	2009-2011
Gross Domestic Investment	20.3	18.0	15.2
Gross National Saving	15.4	12.4	11.8
Net Borrowing from Abroad	4.9	4.6	3.0
Federal Budget Deficit[a]	-1.3	-3.2	-9.3

Source: CRS calculations; Congressional Budget Office.

Notes: Gross domestic investment is the sum of private and government investment. Gross national saving is the sum of business, household, and government saving.

a. Fiscal Year, as measured by federal budget conventions.

The budget deficit averaged 9.3% of GDP from FY2009 to FY2011, more than half the size of total private saving, which is the sum of household and business saving. Although investment was low in 2009-2011 because of the recession and subsequent sluggish recovery, it can be expected to rebound when the economy recovers. At that point, even if the deficit were to fall by half as a share of GDP, either private saving would need to rise significantly above its average over the past 10 years or net borrowing from abroad would have to be significantly higher than the 2000 to 2007 average, which was already at a historical high. Private saving has risen from a range of 14% to 16% of GDP from 2000 to 2007 to an average of 18.9% of GDP in 2009 to 2011, some of which may prove lasting, but many economists question whether it would continue to rise enough to offset the rise in the budget deficit. In other words, even before the rise in the budget deficit, the combination of low rates of national saving and high rates of borrowing from abroad to finance domestic investment spending was unsustainable in the long run. If the budget deficit remains at elevated rates, national saving will be even lower, requiring either lower rates of domestic investment (that would reduce GDP from what it otherwise would have been) or higher rates of borrowing from abroad.

The willingness of private foreign investors to buy U.S. assets in the future will depend not only on the desirability of U.S. investment opportunities, but also on investment opportunities abroad. Here too, future trends may point to a shift away from U.S. assets. Even if foreign investors were unconcerned about the sustainability of U.S. debt, foreign countries may find more internal demand for their saving as the world economy recovers. U.S. public debt will also be competing to attract funds with a large increase in borrowing by foreign governments. The IMF projects that public debt in the advanced economies will rise from 80% of GDP in 2008 to 110% of GDP in

deficit, government saving is negative.

[47] In 2000 and 2001, the federal government ran a budget surplus that increased national saving. From 2002 to 2007, the government ran a deficit that reduced national saving. The deficit was more than 2% of GDP from 2003 to 2005, and less than 2% of GDP in the other years.

2012.[48] As noted above, many U.S. assets have been bought by foreign governments in the past decade, which may have accumulated U.S. assets for political reasons that cease in the future.

Will Large Deficits Lead to High Inflation?

Another concern that has been raised is that large deficits will lead to high inflation. Inflation is related to changes in the money supply; the Federal Reserve controls the money supply independently of the Treasury and its financing needs. Large deficits would lead to higher inflation if the Fed finances unfunded government operations by increasing the money supply. Under current law, this is prevented by Section 14 of the Federal Reserve Act, which forbids the Federal Reserve from purchasing debt directly from the Treasury, and Section 2A, which mandates that the Fed keep inflation low, among other goals.[49] In a well-known article, economists Thomas Sargent and Neil Wallace pointed out some "unpleasant arithmetic," however.[50] They observed that in order to avoid the economic effects of government default, a central bank might ultimately be forced to monetize the debt if private investors became unwilling to finance it and the government refuses to raise taxes or cut spending. Investors may perceive this future outcome and raise their inflationary expectations today. If investors anticipate that the debt will be monetized, they will require higher interest rates to finance it in the meantime, so inflation will ultimately be higher than if the deficit had been monetized from the outset. In that example, future inflation is a function of fiscal decisions as well as monetary decisions taken today. To date, there is no evidence that inflation expectations have risen significantly.

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[48] International Monetary Fund, World Economic Outlook database, October 2012.

[49] While the law forbids the Fed to directly finance the deficit, it can indirectly reduce the government's financing costs by purchasing Treasury securities on the secondary market. While the Treasury must pay the Fed interest on the Treasury securities it holds, the Fed remits its profits to the Treasury. The Fed has purchased Treasury securities on the secondary market since 2009 in order to stimulate the economy, but to date inflation has remained low.

[50] Thomas Sargent and Neil Wallace, "Some Unpleasant Monetarist Arithmetic," Federal Reserve Bank of Minneapolis, *Quarterly Review*, Fall 1981.

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