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Financing U.S. Debt:
Is There Enough Money in the World – and At What Cost?

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and

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†Revisions in this version include updated data, budget projections, and empirical estimation through 2010; adjustments to empirical specifications; and more explicit treatment for Federal Reserve balance sheet changes. The general results and conclusions from the original version are not affected.

ABSTRACT:

This paper examines the potential role for foreign official holdings of U.S. Treasury securities and the associated implications for Treasury security interest rates, international portfolio allocations, net international income flows, and the U.S. net international debt position, using a baseline outlook of current and projected U.S. budget deficits and growing debt. The analysis applies empirical results regarding the role of U.S. structural budget deficits, and foreign official and Federal Reserve holdings of U.S. Treasuries, in determining Treasury security interest rates. Although initial review of information suggests that the world portfolio could potentially accommodate financing requirements over the intermediate horizon and mitigate interest rate effects, substantial uncertainty remains about the relationships among foreign official holdings, exchange rates, and trade; the potential effects of “crowding out” in the international portfolio; and how and whether world portfolio allocations would adjust to accommodate higher shares of U.S. assets.

Financing U.S. Debt: Is There Enough Money in the World – and At What Cost?

1. INTRODUCTION

The United States and many other advanced economies have long faced fundamental budget and external imbalances that, under current policy configurations, are unsustainable in the long run. Recent sovereign debt concerns in Europe, while not fully comparable in nature to those facing the United States, have heightened the attention devoted to public finances in the U.S. In the short to medium run, the key relationships involve the nexus between the rising domestic and international financing costs of debt service, and the interactions with the current account deficit and net international debt position. The international funding sources for U.S. government debt are of particular importance, and such funding has in recent years depended heavily on the behavior of foreign official holdings. Analysis of prospects for financing the budget deficit is complicated because foreign official holdings, the foreign exchange value of the dollar, and the U.S. trade deficit and net international debt position are all intertwined. In this paper, we assess the importance of foreign financial flows – and notably foreign official holdings of U.S. Treasury securities – not only for financing the U.S. trade and current account deficits but also for funding U.S. government borrowing and affecting U.S. long-term Treasury interest rates.

This work adopts and extends the framework used by Kitchen (2007). Using consensus projections for the U.S. economy, net exports, and exchange rates, that analysis found that the outlook for the U.S. international debt position and net international income flows was generally less dire and more sustainable than had been typically assumed given the persistence of U.S. current account imbalances. With the drastic change in economic prospects in recent years, however, it is clear that a re-examination is in order. The financial crisis and the recession – and policy actions to mitigate both – have resulted in large increases in the U.S. Federal budget deficit and the publicly held debt, with an outlook for continued deficits and growing debt. The deterioration in public finances has then brought an immediacy to the previously existing concerns regarding the sustainability of the nation's public finances (Auerbach and Gale (2009)). The situation is further complicated by the large share of U.S. Treasury debt held by foreigners.

Within the setting of current and projected budget deficits and debt, this paper examines the role of foreign official holdings of U.S. Treasury securities and the implications for Treasury security interest rates and relative international portfolio allocations. The analysis presents empirical estimates of the impact of U.S. structural budget deficits and foreign official holdings of U.S. Treasuries on U.S. Treasury

security interest rates. Using that information and baseline economic and budget projections, the implications of alternative assumptions about the projected behavior of foreign official holdings are examined for: (1) the implied/required international portfolio adjustments for foreign holdings of U.S. international debt and other assets; (2) the projected U.S. international net debt position and net income flows, including the role of U.S. government payments on foreign official holdings; (3) the effects of budget deficits, Federal Reserve security purchases, and foreign official holdings on U.S. Treasury interest rates; (4) the potential feedback effects to and from interest rates to the U.S. budget deficit; and (5) a scenario with assumed higher growth in Federal Reserve holdings of Treasuries and partial monetization of the debt. The issue of crowding out of international capital flows – under the assumption of a growing international portfolio share for foreign official holdings – is also raised. Questions remain regarding the potential trade-offs the United States could face under these relationships and whether, under the current fiscal policy outlook, the high level of foreign official holdings implied by the interest rate projections of most current public and private economic forecasts could ever be considered reasonable or attainable. The results therefore provide information regarding Meltzer’s (2009) claim that “There isn’t going to be enough money in the world in the years to come to finance the U.S. budget deficits.”

The results and scenarios presented in this paper are not “forecasts” per se, but rather projections that illustrate some fundamental relationships for the U.S. fiscal outlook in an international setting, and specifically the role of international financial flows and portfolio adjustments. The analysis is intended to provide a baseline case and alternative scenarios that are descriptive of the relationships involved, and to aid in better understanding those relationships and the implications for the U.S. fiscal outlook. Further, the analysis doesn’t address issues or questions associated with varying views of short-run policy or cyclical behavior, but looks ahead to the relationships and pressures that would occur at an intermediate horizon beyond short-run transitions.

Section 2 provides a brief review of some prior research and literature, providing background for the analysis of the paper. Section 3 presents data and information on U.S. government debt and the base outlook consistent with projections by the Congressional Budget Office (CBO). Section 4 examines an empirical specification and estimation results for U.S. Treasury interest rates and the role of budget deficits and foreign official holdings of Treasuries. Section 5 presents the base case projections, including an explicit accounting for the large change in foreign official holdings of U.S. Treasury securities (and other implied foreign portfolio allocations) required to meet the base case economic assumptions for interest rates. The resulting outlook under the base case for the U.S. international debt

position, net international income flows, and U.S. government payments to foreign holders of Treasury securities is also presented. Section 6 examines two alternative scenarios to the base case: the first alternative considers how the projected outlook would change if foreign official holdings of Treasuries were fixed as a percent of U.S. GDP (a declining share of total Treasury securities outstanding); the second alternative presents the effects on the projections from assuming the Federal Reserve (Fed) implements a sustained increase in the rate of growth for its holdings of U.S. Treasury securities (including assumed pass-through to inflation, nominal interest rates, and the exchange value of the dollar from such a partial monetization of the debt). Section 7 provides closing discussion.

2. SOME BACKGROUND AND SELECTED LITERATURE

Questions about the sustainability of the U.S. current account and the outlook for U.S. international debt have received growing interest in recent years; the recent experience with and outlook for higher U.S. budget deficits and debt have raised further questions regarding the international implications. The theoretical and empirical literature examining the relationships among budget deficits, international trade, current account sustainability, and the outlook for U.S. international debt and international net income flows is large.¹ The traditional literature ascribes a fairly direct role between the budget balance and the current account balance. Increases in government spending or reductions in taxes lead to increased aggregate demand, some of which spills over into increased imports. Fiscal shocks of this nature then induce a positive correlation between budget deficits and current account deficits – with international financial flows helping to fund domestic investment, in contrast to a prior view that budget deficits would “crowd out” investment. This “twin deficits” view dominated policy analysis during the 1980s, when tax rates were sharply reduced under the Reagan Administration and the exchange value of the dollar increased; empirical evidence appeared to buttress this view (Feldstein (1986)).² The improvement in the trade balance as the budget deficit shrank also provided additional confirmation of the twin deficits view.

This approach fell out of favor during the 1990s as public finances improved throughout the decade yet the current account deteriorated. This episode highlighted the fact that alternative multiple shocks – either private demand, monetary, or supply side – can reverse the implied correlation. Various explanations were forwarded. The most prominent ones ascribe the enhanced growth prospects for the United States, as information and communication technologies raised productivity growth (e.g., Pakko

¹ The theoretical literature linking budget deficits and trade balances, and stocks of government debt include the portfolio balance models of Kouri (1976) and Branson and Henderson (1985). Recent treatments of the portfolio balance model have not explicitly modeled government, as opposed to private, assets. See for instance Blanchard, Giavazzi and Sa (2005).

² The “twin deficits” view is a straightforward application of the Mundell-Fleming model of the open economy.

(1999)). In this intertemporal approach, in the presence of an upward revision in permanent income, running larger current account deficits would help smooth consumption. Engel and Rogers (2009) have shown that the U.S. current account deficits throughout the 1990s and 2000s were consistent with expectations of future growth. During the early- to mid-2000s, however, interest in the “twin deficits” hypothesis re-emerged as both budget and current account deficits widened (Chinn (2005)).

In recent years questions concerning the “sustainability” of the U.S. current account deficit and the U.S. international debt position more generally have received much attention. Mann (1999), Roubini and Setser (2004), Cline (2005), Higgins, Klitgaard, and Tille (2005), Eichengreen (2006), and Kitchen (2007) are among those who have examined the challenging outlook for U.S. international trade and financial imbalances, and the varying views as to whether the outlook is sustainable or manageable. In this paper, we focus on particular aspects of the relationship between budget deficits and the current account. Specifically, we examine the role of changes in foreign official holdings – one part of the international financial asset portfolio – as a key international financial flow for funding U.S. budget deficits (given the outlook for the U.S. fiscal imbalance and growing debt), and against the backdrop of the outlook for continued U.S. international imbalances. A related question that arises is the potential for “crowding out” to occur within the international portfolio flows if a greater share is devoted to U.S. Treasuries. Several other researchers have conducted research on issues similar to those addressed here, notably Bergsten (2009), Cline (2009), and Mann (2009). Mann (2009) and Bertaut, Kamin, and Thomas (2009) examine the world financial asset portfolio and the question of available international funding to meet prospective U.S. international imbalances; we discuss their findings in more detail further below.³ The roles of alternative sources of funding for U.S. budget deficits – international and domestic – for the determination of U.S. interest rates are key issues in this analysis and are the focus of much of the subsequent discussion.

³ Ideally, one would want to use a portfolio balance model based on asset stocks to determine the impact of budget deficits on interest rates, exchange rates, and current account balances. Unfortunately, the empirical literature on estimating these relationships is largely unsuccessful.

3. U.S. GOVERNMENT DEBT: HISTORICAL DATA, TRENDS, AND THE BASE OUTLOOK

This section provides background information and historical data on publicly-held U.S. government debt, including Treasury debt securities in particular, but also for U.S. agency and government sponsored enterprises (GSEs). Information is also provided on who holds the debt, including distinguishing between domestic and foreign owners, as well as private and official. Assumptions used in the analysis regarding GSE debt holdings are addressed. The base case outlook for the analysis – economic and budget projections from CBO’s baseline and long-run budget projections – is presented and discussed.

3.1. Treasury debt and foreign official holdings

U.S. Treasury public debt is held by domestic and foreign holders, and private and official holders:

$$(1) \quad T_{TOT} = T_D + T_F \\ = (T_{D,P} + T_{D,O}) + (T_{F,P} + T_{F,O})$$

where T_{TOT} is the total supply of Treasury debt held by the public, and for the other variables, the first subscript represents domestic (D) or foreign (F), and the second subscript is private (P) or official (O).⁴

Historical data show growing U.S. Treasury debt held by the public (T_{TOT}) and growing foreign official ($T_{F,O}$) holdings and shares for U.S. Treasury securities outstanding – and especially for the recent period associated with and following the recession and financial crisis (see Chart 1). Particularly noteworthy is the large and growing role for foreign official holdings, rising from just over \$600 billion (17 percent of total Treasury debt securities outstanding) at the end of 1999 to about \$3.2 trillion (35 percent of total outstanding) by the end of 2010. Domestic official ($T_{D,O}$) amounts in (1) above are those held by the Federal Reserve, which over the past two-and-a-half decades, generally have accounted for about 10 to 15 percent of total outstanding Treasuries (and also generally in the range of about 4 percent to 6 percent of GDP). During the financial crisis, however, the Federal Reserve share fell sharply (to as low as 7 percent of Treasuries outstanding) as the Federal Reserve used its portfolio of Treasury securities as part of its implementation of the various lending facilities, and reflecting its portfolio shift (and expansion) to other assets (including government sponsored enterprise (GSE) debt securities). More recently, the Federal Reserve’s share of Treasuries has increased back to around 10 percent of the total outstanding.

⁴ Treasury debt held by the public is the net debt and does not include the amounts owed within the U.S. government across accounts (e.g., social security and other trust fund accounts) that are included in measures of the “gross” debt.

3.2. GSEs, Fannie and Freddie, and the Fed’s large-scale asset purchase program

Following the decline in housing and mortgage markets and the ensuing financial crisis, much attention has been directed at U.S. agency and GSE debt and securities – notably for the Federal National Mortgage Association (Fannie Mae) and the Federal Mortgage Guarantee Corporation (Freddie Mac). Chart 2 shows historical data for agency, GSE, and GSE-backed securities by holder.⁵ During the financial crisis, the U.S. government undertook direct actions to provide backing for Fannie Mae and Freddie Mac, including direct purchases of GSE-backed debt. As described in OMB’s *Analytical Perspectives*, Treasury acted to acquire GSE securities under temporary authority provided by the Housing and Economic Recovery Act (HERA) of 2008:

Treasury initiated a temporary program to purchase MBS [mortgage-backed securities] issued by Fannie Mae and Freddie Mac, which carry the GSEs’ standard guarantee against default. ... Treasury purchased \$226 billion in MBS from September 2008 to December 31, 2009, when the statutory authority for this program expired. In addition, the Federal Reserve engaged in GSE MBS purchases over this period totaling \$1 trillion through the end of 2009. (OMB (2010), p. 350)

The Federal Reserve’s purchases and holdings of agency and GSE-backed securities – through its balance sheet expansion and purchase of mortgage-backed securities – has attracted much attention because of the more-than-doubling of the Fed’s balance sheet (and, hence, the monetary base) since the end of 2007, with much of that increase held in GSE-backed debt securities. In early 2009 the Federal Reserve implemented a plan to expand credit and support aggregate demand through purchases of longer-term assets – described by Kohn (2009) as the large-scale asset purchases (LSAP) program. The Fed increased purchases of GSE and agency debt, mortgage-backed securities, and longer-term U.S. Treasury securities. FOMC statements announced that the program would include purchases of up to \$200 billion of agency debt, up to \$300 billion in longer-term U.S. Treasury securities, and up to \$1.25 trillion in agency mortgage-backed securities.⁶ In November 2010, the FOMC announced plans “to purchase a further \$600 billion of longer-term Treasury securities by the end of the second quarter of 2011.”

⁵ Beyond Fannie Mae and Freddie Mac, the total amounts in Chart 2 include the Federal Home Loan Banks and other agencies.

⁶ At the end of 2010, agency and GSE-backed securities accounted for nearly 50 percent of the total assets on the Federal Reserve balance sheet, and Treasury securities accounted for about 40 percent, up from about 30 percent at the end of 2009. (See the H.4.1 release of the Federal Reserve Board of Governors.)

Chart 1

Outstanding Treasury Securities by Holder

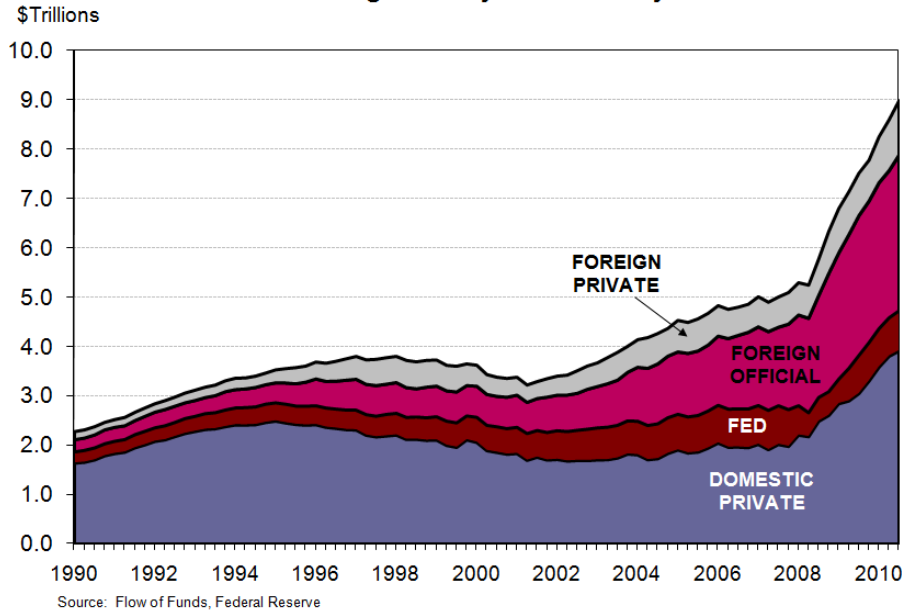
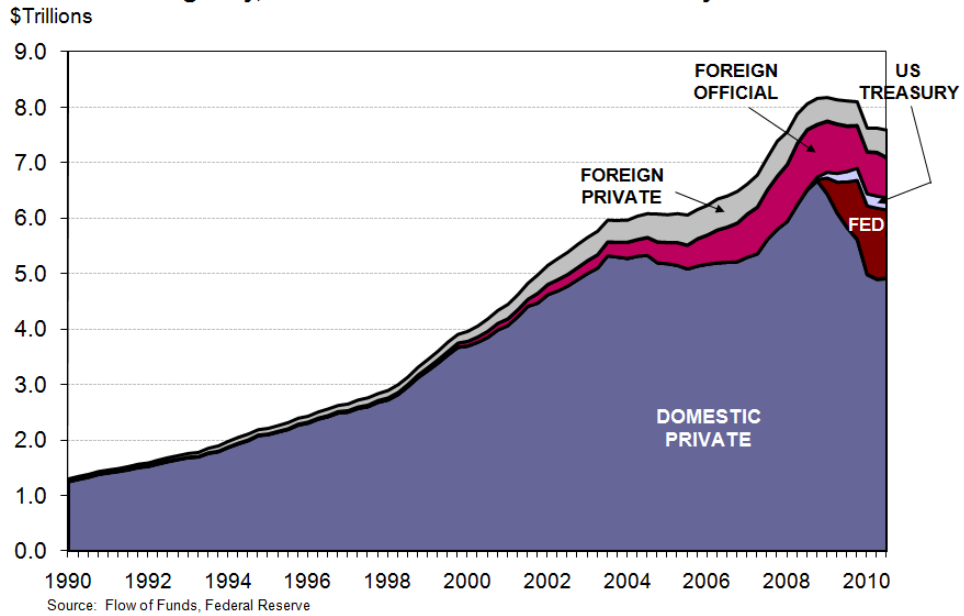


Chart 2

Agency, GSE and GSE-Backed Securities by Holder



The data show the U.S. government role – although substantial in absolute dollar amounts and as a share of the Fed’s balance sheet – has been a relatively small share of the total agency and GSE debt (Chart 2). Also, the portfolio changes have been effectively, on net, primarily domestic in nature with private domestic holdings declining with the increase in Treasury and Fed holdings. How the Federal Reserve and Treasury unwind their GSE positions will be an important policy issue going forward – especially for monetary policy interactions. Nonetheless, the large increase in borrowing for housing that fueled the prior excessive increase in the overall level of GSE debt securities is a thing of the past.

For the analysis of this paper, specific assumptions are made for the projections (described further below) regarding Federal Reserve holdings of longer-term Treasuries and GSE securities and Federal budget exposure – that the expansion will be gradually unwound in an orderly and benign fashion over a five year period. These assumptions are similar to those made by Chung et al (2011) and described by Yellen (2011). As such, the analysis for the base case presented below has an implicit assumption that Federal Reserve policy will gradually and successfully unwind its expanded portfolio holdings of GSE securities and longer-term Treasuries and return to its pre-crisis position of a balance sheet comprised primarily of Treasury securities, and at a level consistent with the sustained growth and low inflation of the economic projections. Analogously, foreign portfolio holdings of GSE and agency securities are assumed in the base projection to be consistent with that gradual unwinding and trend economic projections. Hence, the analysis reflects general funding and portfolio pressures and not specific pressures associated with speculative scenarios regarding the Fed balance sheet or GSE securities.⁷ Regarding the Federal budget exposure, the CBO’s previous treatment of Fannie Mae and Freddie Mac as government entities in its budget accounting and estimates explicitly includes the net expected Federal budget exposure by including “a subsidy equal to the shortfall between the current value of the mortgages and the liabilities used to fund them” (CBO (2010(b))). CBO estimates in 2009 included the implicit subsidy cost of the existing business as well as new business. The analysis presented here proceeds using the CBO projections, albeit a fuller accounting of the implied exposure to Fannie and Freddie could potentially suggest an expected debt effect of perhaps an additional couple hundred billion dollars.

3.3. The base case and CBO projections

The base case of this paper is based on CBO’s baseline economic assumptions (CBO (2011)). The CBO economic projections assume the U.S. economy continues to rebound from the recession and returns over

⁷ This approach is consistent with CBO baseline assumptions (CBO (2011)) and the information presented in various statements and minutes of the meetings of the Federal Open Market Committee (e.g., Federal Reserve Board of Governors (2010)).

several years to its potential growth path. Output and unemployment gaps are expected to steadily decline and interest rates and inflation rates are assumed to reflect the return to an environment of sustained real growth at potential with low inflation. The budget projections used in this analysis reflect CBO's baseline budget outlook adjusted to an alternative scenario that includes policies that would likely be adopted absent fundamental policy change. Although various alternative policy and budget outlooks are possible, the use of the CBO's projections under the alternative scenario provides a benchmark that generally incorporates policies that should be included in a true baseline policy outlook, including key tax provisions that are set to expire but that have had broad political support for extension.⁸

Regarding the international economic outlook, both the Administration and the CBO – based on language in recent outlook discussions – implicitly have an improving net export outlook in their economic assumptions. For example, for the Administration:

As the U.S. economy recovers from the current crisis, it is unlikely to return to current account deficits as large as those in the mid-2000s. ... The specific path of the current account as the economy exits the crisis will depend on whether government and private saving rise ahead of, or along with, a rebound in private investment. But in the long run, the current account deficit is likely to be smaller than it was before the crisis. ... Given that the current account deficit has already narrowed to roughly 3 percent of GDP—less than half its peak—the crucial challenge will be to avoid a reversion to a high-spending, low-saving economy. A successful shift toward a more balanced world growth model generated by increased consumption in nations with current account surpluses could improve net exports even more. This could bring the current account deficit toward its mid-1990s level of roughly 1 to 2 percent of U.S. GDP. (Council of Economic Advisers (2010), pp. 132-133)

For the CBO, in addition to the outlook for improving U.S. trade balance, the outlook for a continued long-term downward trend for the value of the dollar is also described:

⁸ In a 2010 report, CBO acknowledged some of the issues addressed in this paper: “In fact, CBO’s projections understate the severity of the long-term budget problem because they do not incorporate the significant negative effects that accumulating substantial amounts of additional federal debt would have on the economy: Large budget deficits would reduce national saving, leading to higher interest rates, more borrowing from abroad, and less domestic investment—which in turn would lower income growth in the United States.” (CBO 2010(e), p. xi) CBO (2010(f)) also provided discussion of the risk of fiscal crisis from higher Federal debt.

... CBO expects that the dollar will continue to decline in the long run as part of an adjustment toward sustainable borrowing from foreigners. (Congressional Budget Office, 2011(a), p. 41)

Similarly, the average for the private Blue Chip forecasters' projections (Blue Chip Economic Indicators (2011)) of real net exports shows a slight downward trend over the 2012-2016 period with further small decline into the 2017-2021 period. Such a projection would indicate a steady projected improvement in the U.S. trade balance as a percentage of GDP. Hence, to reflect the general "consensus" among public and private forecasters, the base case projection includes a gradual trend improvement in U.S. net exports.

The outlooks for U.S. government debt, interest rates, net exports, and other economic variables are all intertwined and the interactions are not always fully understood and accounted for. Public and private forecasts generally do not have explicit information on assumptions about international holdings of U.S. Treasury securities, U.S. net international debt or net international income flows, or the portfolio allocations for international debt. The analysis of this paper helps to illustrate the importance of recognizing and accounting for those relationships and effects.

4. U.S. GOVERNMENT DEFICITS, FOREIGN OFFICIAL RESERVES AND INTEREST RATES

It is commonplace to attribute effects of budget deficits and international financial flows on interest rates. Interestingly, however, the recent literature regarding the nature and magnitude of the combined effects in the era of large deficits and large flows is not particularly extensive, nor definitive. This section presents an empirical specification and results for estimating the role of budget deficits and changes in foreign official holdings of Treasury securities, as well as changes in Fed holdings, in the determination of U.S. Treasury interest rates. The estimated relationships are then used to analyze what the base case projections implicitly require for foreign official holdings of U.S. Treasuries.

The estimated relationships presented here essentially describe how long-term Treasury rates adjust to induce *private* holdings of Treasuries – given the outlook for budget deficits and the behavior of *official* domestic and foreign holdings of U.S. Treasuries. The specification is also based on the assumption that the Federal Reserve implements monetary policy through open market operations on Treasury securities in order to set the short-term interest rate. In line with the extant literature, we assume the Fed sets the target rate by policy rule as a function of the output and inflation gaps, as described by Taylor (1993).

4.1. Empirical specification for U.S. Treasury rates

The approach taken here draws from various studies in a growing literature. Gale and Orszag (2002, 2005) surveyed the literature on budget deficits and interest rates, primarily in a closed economy setting, and highlighted the significant role of Federal debt and budget deficits in determining long-term interest rates. Kitchen (2003) presented a framework based on short-term interest rates being determined by a Taylor rule and with the structural Federal budget deficit determining the term spread for long-term Treasury interest rates relative to short-term rates. Canzoneri, Cumby, and Diba (2002) also observed a significant role for the Federal budget deficit for the long- to short-term spread for Treasury interest rates. The advent of the “conundrum” – that is, surprisingly low long-term interest rates relative to short rates – inspired research introducing an international dimension. Warnock and Warnock (2006) and Chinn and Frankel (2007) augmented conventional bond pricing specifications with international variables, namely foreign official purchases of U.S. Treasuries. More recently, Laubach (2009) examined the response of long-horizon forward rates to increases in the projected deficit- and debt-to-GDP ratios.

The specification employed here is based on that presented in Kitchen (2003), augmented to include the role of foreign official reserves as highlighted in Warnock and Warnock (2006) and Chinn and Frankel(2007). Kitchen (2003) derived an equation of the following quasi-reduced form for the term structure spread between the long- and short-term Treasury interest rates:

$$(2) \quad i_{t,k} - i_{t,j} = -\gamma(\pi_t - \bar{\pi}) - \phi(y_t - \bar{y}_t) + \sigma_t + \varepsilon_t$$

where $i_{t,j}$ is the nominal interest rate on a j-period Treasury security in period t, π_t is the inflation rate, y_t is a (log) measure of aggregate output, and the “bar” variables represent the target or full employment levels of the corresponding variables. The term premium σ_t is assumed to be comprised of (1) a liquidity premium and (2) a risk premium associated with uncertainty about interest rates generally, as well as uncertainty about the structural Federal budget deficit, specifically. For the purposes of this paper, the roles of foreign official holdings of Treasury securities and Federal Reserve balances of longer-term securities, are also included in affecting the term premium, affecting the relative demand-supply relationship over time, and thereby the market price and yield for Treasury securities. The working assumption underlying equation (2) is that short-term interest rates are determined by the monetary policy rule; external changes in relative supply and demand for longer-term Treasury securities would therefore show up across the term structure beyond the short-term interest rate. We focus on the yield for 10-year

Treasury securities, but observed effects occur in shorter-term regions of the term structure as well.⁹ The role of increased Fed holdings of longer-term Treasuries and mortgage backed securities as part of the large scale asset purchases (LSAP) program and the subsequent additional purchases of Treasuries (QE1 and QE2 colloquially) is also included in the estimation.¹⁰

The empirical specifications used in regression analysis are based on:

$$(3) \text{ SPREAD}_t = \beta_0 + \beta_1 \text{ UNGAP}_t + \beta_2 \text{ INFL}_t + \beta_3 \text{ STRSURP}_t + \beta_4 \text{ FOROFFICIAL}_t + \beta_5 \text{ FEDLT} + \epsilon_t$$

where SPREAD is the term spread for longer-term Treasury yields relative to short-term Treasury rates (the 10-year yield minus the 3-month Treasury bill rate); UNGAP is the deviation of the unemployment rate from the natural rate (as estimated by the CBO)¹¹; INFL is the difference between the inflation rate (the percentage change in the personal consumption expenditure price index of the NIPAs) and targeted inflation (here assumed at 1.8 percent)¹²; STRSURP is the structural, or cyclically-adjusted budget surplus/deficit as a percent of potential GDP (as estimated by the CBO); FOROFFICIAL is the change in foreign official holdings of U.S. Treasury securities as a percent of potential GDP; and FEDLT is the change in Fed holdings of long-term (more than 5 years) Treasuries, U.S. government agency, and mortgage-backed securities as a percent of potential GDP.

Chart 3 shows foreign official holdings of U.S. Treasury securities as a share of total outstanding Treasury securities; Chart 4 shows foreign official holdings of U.S. Treasury securities as a percent of U.S. potential GDP. Both charts show the rising importance of foreign official holdings. The variable used in the empirical analysis – the change in foreign official holdings of Treasuries expressed as a percent of potential GDP – is similar to that used in Warnock and Warnock (2006).¹³

⁹ The estimation used is an approach that implicitly includes the well-known relationship of the term spread as a signal of economic activity across the business cycle – including for recession probability estimation (e.g., Stock and Watson (2003), Wright (2006)) – in combination with key factors that affect the risk and relative supply and demand for longer-term Treasury securities beyond real activity and inflation. The structural budget deficit is a supply shifter for longer-term Treasuries; Fed and foreign official holdings a demand shifter. The relationships presented thus also provide information for why the term spread isn't always a clear predictor for future economic activity.

¹⁰ Gagnon, Raskin, Remache and Sack (2010) found the LSAP reduced U.S. long yields during implementation. See also, Hamilton and Wu (2010) for additional estimates.

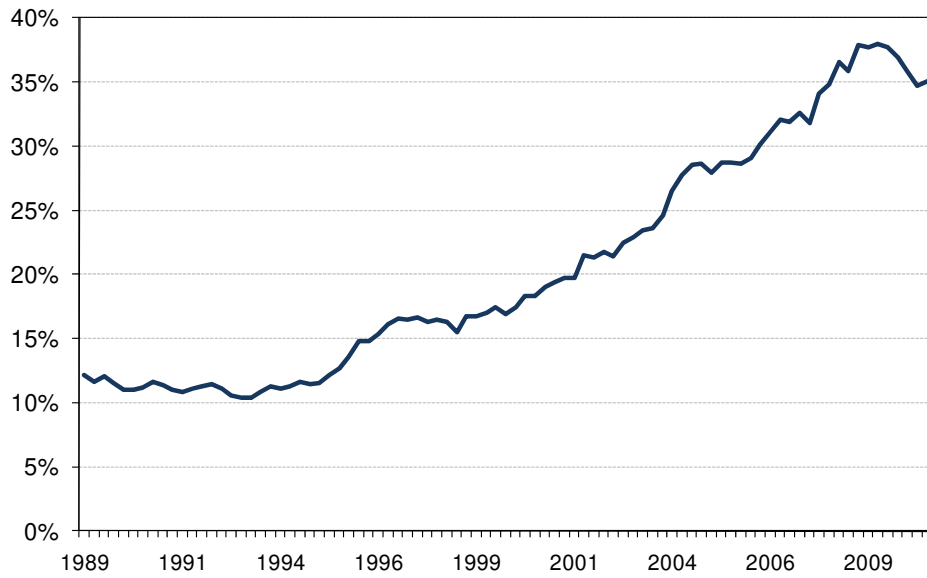
¹¹ The unemployment gap and the output gap are roughly interchangeable measures (a la Okun's law) of the relative cyclical position of the economy, the relative slack that exists in the economy.

¹² The rate of inflation measured by the PCE price index tends to be several tenths of a percentage point lower than for the CPI; the 1.8 percent target rate used here is roughly equivalent to a CPI rate of about 2 percent or just over.

¹³ This specification for the variables follows the structural budget deficit being expressed as a percent of potential GDP. Foreign official holdings of Treasuries data are from the Flow of Funds; the historical structural budget deficit is from CBO. Warnock and Warnock (2006) used a specially constructed variable for foreign official flows.

Chart 3

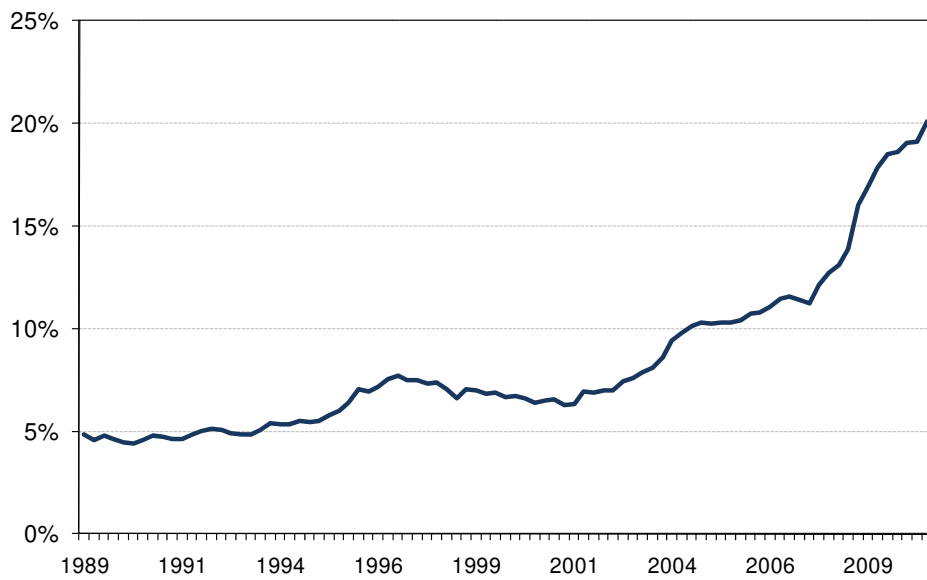
Foreign Official Treasury Holdings as Share of Total Outstanding Treasuries



Source: Federal Reserve Flow of Funds

Chart 4

Foreign Official Treasury Holdings as Percent of Potential GDP



Source: Federal Reserve Flow of Funds, Congressional Budget Office

The coefficient on the UNGAP variable, β_1 , is expected to be positive, and the coefficient on the INFLDEV variable, β_2 , is expected to be negative, reflecting their roles in the monetary policy rule and the resulting relationship to short-term rates.¹⁴ That is, consistent with the Taylor rule and with well-anchored long-run expected inflation, as output rises relative to potential, and unemployment falls relative to the NAIRU, the Federal Reserve would raise the short-term interest rate relative to the long-term interest rate (*ceteris paribus*) and the term spread would decline. Similarly, as inflation increased relative to the target level of inflation, the Federal Reserve would raise the short-term interest rate relative to the long-term rate and the term spread would decline. The coefficient on the structural surplus variable, β_3 , is hypothesized to be negative; an increase in the structural budget surplus (a fall in the deficit) would reduce the relative supply of Treasury securities and reduce risk and uncertainty for longer-term Treasury securities, leading to a lower long-term yield relative to short-term (short-run-policy-determined) rates. The coefficients on the change in foreign official holdings of U.S. Treasuries, and for Federal Reserve holdings of long-term Treasuries, MBS and U.S. agency assets, are posited to be negative; an increase in official holdings (foreign or domestic) is effectively an exogenous demand shift (at that point in time) that would lower longer-term yields.

4.2. Estimation results

Estimation of specifications from equation (3) above were conducted using annualized data, reflecting the fact that key variables for the broader analysis of the paper – budget projections and the international asset position – are only available at that frequency.¹⁵ The regression results are reported in Table 1; they confirm the hypothesized relationships included in equations (2) and (3) above. The results in Table 1 build to the full specification. Line 1 shows the results using the variables affecting short-term policy (UNGAP and INFL) and the structural budget surplus as a percent of potential GDP (STRSURP). Note that while a large proportion of the variation in the spread is explained by the specification reported in line 1, the serial correlation indicated by the Durbin-Watson statistic suggests that important factors are omitted. This buttresses the economic motivation for examining an expanded version of the basic domestic specification.

¹⁴ Note that the specification doesn't "require" and is not based on any *specific* values for policy coefficients on the gap and inflation variables, only that the policy rule in practice would adjust short-term rates in accordance with the expected direction.

¹⁵ Estimations were also performed on a quarterly basis and observed results were generally consistent with those using annual data. We use fiscal-year-consistent data.

Table 1

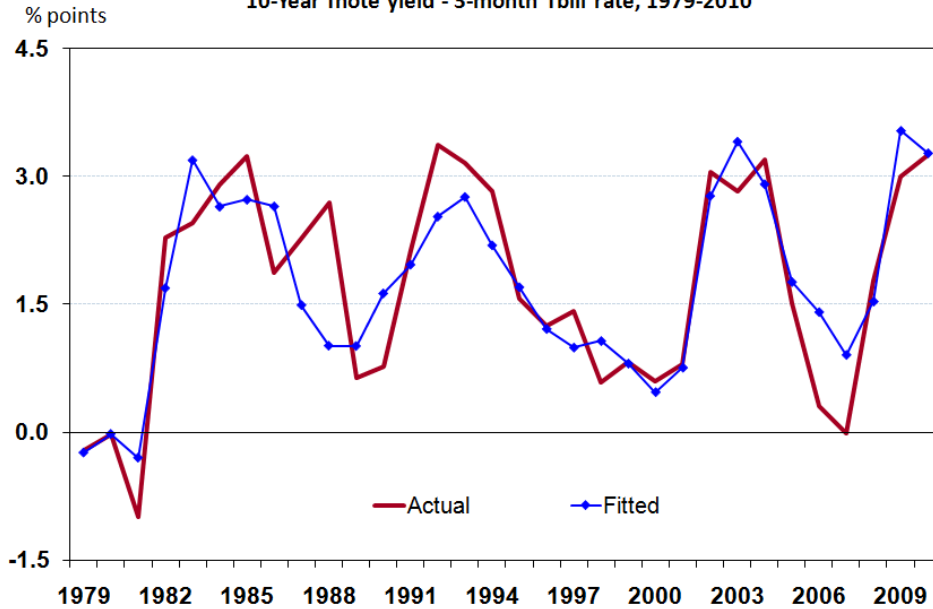
Regression Results for the Treasury Interest Rate Term Spread, 10-Year - 3 Month
 Ordinary Least Squares, Sample 1979-2010

	C	UNGAP	INFL	STRSURP	FOROFFICIAL	FEDLT	DISCMPOL	Adj. R ²	DW	SE	AIC	F
1	1.373** (0.278)	0.416** (0.143)	-0.276** (0.072)	-0.190* (0.106)				0.553	1.29	0.823	2.56	
2	1.435** (0.269)	0.481** (0.142)	-0.383** (0.090)	-0.291** (0.116)	-0.445* (0.243)			0.588	1.66	0.790	2.51	
3	1.358** (0.238)	0.648** (0.137)	-0.407** (0.080)	-0.293** (0.102)	-0.147 (0.237)	-0.561** (0.189)		0.680	1.89	0.680	2.28	
4	1.331** (0.191)	0.565** (0.091)	-0.420** (0.070)		-0.349** (0.086)			0.685	1.91	0.691	2.22	0.80
5	1.265** (0.238)	0.608** (0.135)	-0.385** (0.079)	-0.306** (0.099)	-0.254 (0.239)	-0.442** (0.198)	0.748 (0.461)	0.699	1.94	0.675	2.24	
6	1.223** (0.188)	0.557** (0.086)	-0.382** (0.069)		-0.335** (0.082)		0.847** (0.413)	0.717	1.96	0.655	2.13	0.18

Standard errors in parentheses; ** denotes significant at the 0.05 level; * denotes significant at the 0.10 level.
 DW is Durbin-Watson statistic; SE is standard error of the regression.
 AIC is the Akaike information criterion
 F is the test value for the Wald test for the null hypothesis of equality of the coefficients on STRSURP, FOROFFICIAL and FEDLT.

Chart 5

Actual and Fitted Treasury Term Spread
 10-Year Tnote yield - 3-month Tbill rate, 1979-2010



Line 2 includes the variable for the change in foreign official holdings of Treasuries as a percent of potential GDP (FOROFFICIAL), and line 3 includes changes in Federal Reserve holdings of long-term government assets (FEDLT). The results in lines 2 and 3 generally conform to the hypothesized relationships for the specification, reflecting the policy relationships underlying the determination of short-term rates and confirming the importance of the structural budget deficit and the change in foreign and domestic official holdings as determinants of the long- to short-term Treasury yield spread. The results in line 3 show a significant negative coefficient for the FEDLT variable, conforming to the view that the Fed's purchases of longer-term Treasury and agency securities as part of the LSAP program lowered long-term yields and relative to short-term rates. The coefficient on FOROFFICIAL is not statistically significant in line 3; a high degree of multicollinearity between STRSURP, FOROFFICIAL, and FEDLT variables is likely the cause, with correlations in the 0.54 to 0.75 range. Since it is reasonable to expect that exogenous relative supply and demand effects in the Treasury market have identical effects on interest rates, we chose to impose and test the restriction of equal coefficients on STRSURP, FOROFFICIAL, and FEDLT. The estimates of the resulting specification are reported in line 4 of Table 1. Our conjecture is borne out by the results; an F test for testing the restriction of equality of the coefficients shows that equality cannot be rejected.

The results in the estimated equation of line 4 generally conform to prior estimates in the literature for the effects of the budget deficit on long-term Treasury yields – and for the effect of the change in foreign official holdings, as well. The estimated effect is 35 basis points on the 10-year yield relative to the short-term yield for each one percentage point of GDP for the structural budget deficit – a result that lines up with the estimates from Gale and Orszag (2002, 2005) at 25 to 35 basis points and Laubach (2009) at 20 to 30 basis points. Also, as observed in Warnock and Warnock (2006) and in Chinn and Frankel (2007), the results confirm the importance of foreign official holdings of Treasuries as a determinant of the long-term Treasury yield (here expressed relative to the short-term yield). Warnock and Warnock, for example, showed estimated effects for the budget deficit (relative to GDP) of 19 to 31 basis points and for foreign official flows (measured relative to GDP) of 24 to 61 basis points; Chinn and Frankel (2007) observe estimates in the range of 52 to 71 basis points (for real and nominal Treasury rates, and for a sample extending to September 2004).¹⁶ For the FEDLT variable – the change in Fed holdings of Treasury, MBS and U.S. government agency securities with more than 5 years to maturity as a percent of potential GDP – the constrained coefficient estimate is also roughly consistent (albeit somewhat higher) with other estimates from the literature for the effects of the Fed's purchases of longer-term assets. The

¹⁶ Because of estimation and specification differences, the coefficient estimates are not all directly comparable, but nonetheless give references for relative magnitudes.

FEDLT variable in our estimation had a value of about 2.8 percentage points of GDP for 2009, so the coefficient value of -0.35 indicates an estimated impact on the term premium of just under 100 basis points for that year. This estimate is somewhat larger than that obtained by Gagnon, et al. (2009), who estimated that the effect of the first-round LSAP was in the range of 38 to 82 basis points (although standard errors of the coefficient estimates indicate a degree of imprecision that allows for overlapping confidence intervals at typical levels).¹⁷

The summary regression statistics for the line 4 equation are also generally good, with an adjusted R-squared of 0.685, a Durbin-Watson of 1.91, and a standard error of the regression of just under 0.7 percentage point. Throughout the Table 1 results, the declining Akaike information criterion (AIC) values verify the use of the additional variables in each line and the restriction imposed in line 4. Testing for heteroskedasticity produced test statistics that did not reject the null hypothesis of homoskedasticity for the line 4 equation. To examine an additional issue and relationship of recent years, lines 5 and 6 of Table 1 add a variable to examine Taylor's (2009) observation that the Fed's policy for interest rates during early years of the 2000s resulted in interest rates well below the levels indicated by the Taylor rule. Given that the specification employed is derived using the assumption of short-term rates being determined by a Taylor rule, the DISCMPOL variable (for "discretionary monetary policy" and taking on a value of 1 for 2002-2004 and zero otherwise) was used to capture the effects in the estimation that result from the deviation from Fed policy from the Taylor rule over that time. The results in lines 5 and 6 show a significant positive coefficient for the DISCMPOL variable, conforming to the view that discretionary monetary policy kept short-term yields abnormally low for the given relative gap and inflation relationships of that period. The estimated coefficient shows the term spread was higher by nearly 1 percentage point, suggesting an equivalent negative effect on the short-term rate, a result that matches up with Taylor's (2009) observation about the Federal Reserve's use of discretionary policy during that time period. The other coefficient estimates of the equation are robust and change little and the AIC statistics for equations 5 and 6 are lower than for equations 3 and 4, indicating significant added explanatory information from including the discretionary monetary policy term. Chart 5 shows the actual 10-year to 3-month Treasury spread compared to fitted values from the full specification of line 6.

The results presented here confirm an analytical approach in which short-term rates are generally determined according to a Taylor rule, with budget deficits, foreign official holdings of Treasury securities, and Federal Reserve purchases of longer-term assets affecting long-term yields relative to short-term rates. The evidence also provides information for the debate of Taylor (2009) and Greenspan

¹⁷ See, also, Hamilton and Wu (2010) for more discussion and comparisons of estimated effects of the LSAP.

(2009, 2010) regarding the roles of domestic policy and international financial flows in contributing to the economic environment associated with and leading to the financial crisis. The results are consistent with specific aspects of the views of both Taylor – that U.S. short-term rates were kept abnormally low for several years – and Greenspan – that international flows from abroad (especially foreign official) kept long-term rates low. The results therefore also point to an interpretation that policy errors – both domestic and international – contributed to the financial imbalances of recent years. Notably, foreign official flows from abroad kept long-term rates lower than otherwise, contributing to an environment in which financial flows and interest rates exacerbated the housing and financial boom and bust.¹⁸

5. IS THERE ENOUGH MONEY IN THE WORLD? BASE PROJECTIONS AND IMPLIED INTERNATIONAL PORTFOLIO ADJUSTMENTS

In this section, we examine the outlook for international debt and net income flows using historical rates of return and assumptions regarding portfolio allocations, in a manner consistent with relationships regarding the trajectory of rates of return and debt as modeled in Kitchen (2007).¹⁹ The exercise does *not* produce a forecast per se, but rather a projection (with specific details) consistent with economic and budget projections. Our base case uses economic, deficit and debt projections over the next 10 years based on CBO projections. We project foreign holdings and the U.S. international investment position through 2020, starting from historical investment position data through 2009 (BEA (2010)).²⁰

5.1. Interest rates and other assumptions in the base case outlook

In constructing the base case (and to illustrate the implied role for foreign official holdings), the various components and assumptions were derived in a manner to be consistent with the CBO projections. CBO's economic assumptions have the output-unemployment gaps closing to zero over several years and inflation settles at a targeted level (around 2 percent depending on the inflation measure used). Budget projections consistent with an "alternative" budget outlook have the structural budget deficit initially falling from recent highs but then gradually rising relative to GDP through the end of the 10-year projection; by 2020 the structural budget deficit of the CBO alternative is over 6 percent of GDP. Those

¹⁸ These observations are similar to those of Greenspan (2009) regarding foreign financial flows and of Bernanke (2005) regarding a global saving glut, with the observed relationship here pointing to the (foreign) policy-determined flows via foreign official holdings. Warnock and Warnock (2006) also discuss this observation. Bergsten (2009) stated: "... the crisis occurred at least partly because the rest of the world was *too* willing to finance US current account deficits rather than becoming unwilling to do so."

¹⁹ Kitchen (2007) provides a description of the model used; the model has been maintained and updated to incorporate new data and minor methodological changes.

²⁰ Cline (2005, 2009) also addresses the implications of the U.S. fiscal outlook for the U.S. international debt position and international income flows, but without a full explicit accounting for the specific international and domestic sources for financing U.S. Treasury debt and the implications thereof.

budget assumptions yield the outlook in the CBO projections for the debt held by the public, which under the alternative scenario including likely policies, rises to over 90 percent of GDP by 2020. In the base case of this analysis, foreign official holdings of U.S. Treasury securities are determined – based on the empirical estimates above – so as to roughly reproduce the long-term interest rate assumptions of the base economic assumptions. CBO’s projections of long-term Treasury yield projections are similar to those of the Administration and the Blue Chip consensus forecast, so the results are not being driven by special characteristics of the CBO outlook.²¹

Table 2 shows the results for the projections for interest rates for the years 2013-2020. Generally, similar results are observed for the Taylor rule-generated short-term rates compared to the public and private projections, with the estimates in the 3.9 to 4.3 percent range for 2017-2020, for example.²² Using the estimated relationships from the equation of line 3 in Table 1 and the base case budget assumptions for the structural budget deficit, the estimated term spread in the final line of Table 2 is produced by

Table 2
Projections for Key Treasury Security Interest Rates
Percent, annual

	2013	2014	2015	2016	2017	2018	2019	2020
<u>CBO, Jan 2011</u>								
3-Month Treasury Bill	2.5	3.5	4.0	4.3	4.4	4.4	4.4	4.4
10-Year Treasury Yield	<u>4.2</u>	<u>4.6</u>	<u>5.0</u>	<u>5.3</u>	<u>5.4</u>	<u>5.4</u>	<u>5.4</u>	<u>5.4</u>
Spread	1.7	1.1	1.0	1.0	1.0	1.0	1.0	1.0
<u>Administration, Feb 2011</u>								
3-Month Treasury Bill	2.6	3.7	4.0	4.1	4.1	4.1	4.1	4.1
10-Year Treasury Yield	<u>4.2</u>	<u>4.6</u>	<u>5.0</u>	<u>5.2</u>	<u>5.3</u>	<u>5.3</u>	<u>5.3</u>	<u>5.3</u>
Spread	1.6	0.9	1.0	1.1	1.2	1.2	1.2	1.2
<u>Blue Chip, September 2010</u>						<u>2017-2021</u>		
3-Month Treasury Bill	3.2	3.6	3.7	3.8		3.9		
10-Year Treasury Yield	<u>4.7</u>	<u>4.9</u>	<u>5.0</u>	<u>5.1</u>		<u>5.2</u>		
Spread	1.5	1.3	1.3	1.3		1.3		
<u>Base Case Estimate/Fitted</u>								
3-Month Treasury Bill (Taylor)	1.2	2.3	3.2	4.1	4.2	4.3	4.3	4.3
10-Year Treasury Yield	<u>4.2</u>	<u>4.6</u>	<u>5.0</u>	<u>5.3</u>	<u>5.4</u>	<u>5.4</u>	<u>5.4</u>	<u>5.4</u>
Spread	2.9	2.3	1.8	1.2	1.2	1.1	1.1	1.1

²¹ Note Cline (2009) observes that “the CBO long-term projection itself does not appear to increase the interest rate in response to the higher deficit.” CBO(2010(e)) accounts for that effect in separate discussion. Here, the derivation allows foreign official flows to provide the financing that keeps rates at the levels of the CBO assumptions.

²² The Taylor rule specification employed is based on the form identified in Taylor (1993), with a coefficient on the unemployment gap of 1.0 (two times the 0.5 for the output gap via Okun’s law) and a coefficient on the inflation gap of 0.5; we use an equilibrium short-term real rate of 2.1 percent and a target CPI inflation rate of 2 percent.

assuming the needed increase in foreign official holdings (*and also for the given assumed unwinding of the Fed's portfolio*) to approximately replicate the 10-year yield levels of the CBO and other projections. The increase in foreign official holdings required to produce the base case interest rates (given the rising structural budget deficit and Fed unwinding) is addressed further in the following discussion.

5.2. Portfolio allocations – historical data and base projections

Table 3 shows the international portfolio allocations for U.S.-owned assets abroad and foreign-owned assets in the United States for selected years for a historical period and our assumptions for the base projection. The portfolio shares used in the projections should be viewed as being representative of the changes that would have to occur in order to conform to the changes in foreign official holdings assumed or required to occur by case. A fully-specified portfolio allocation model for international assets could potentially be a useful enrichment of the analysis provided here, but is beyond the scope of the present analysis and is an area for further research.²³ In particular, a better understanding of the potential relative asset effects for "crowding out" in the international portfolio could be gained.²⁴

Of particular importance in the projections is the path of foreign holdings of U.S. Treasuries relative to U.S. GDP that is required to be consistent with the interest rate projections of the base case economics – and the resulting portfolio shares of U.S. treasuries for foreign holdings of U.S. assets. The derived large increase in the portfolio share for foreign official holdings of Treasuries (last line of Table 3) – rising from 24 percent to nearly 49 percent – reveals the extent to which the projections for long-term Treasury interest rates remaining below 5½ percent (as in private and public projections), in the face of a rising Federal structural budget deficit, depend on a continued large increase in foreign holdings of Treasuries.²⁵

The portfolio shares of the base projection also show the potential “crowding out” that would occur in the portfolio allocations for international financial assets. Historically, the concept of crowding out

²³ See, for example, Black and Litterman (1992) and He and Litterman (1999).

²⁴ Mann (2009, p. 48) discusses the challenges regarding understanding the determination of the portfolio allocations for foreign held assets: “All told, from the standpoint of sustainability research relevant for projections, this body of analysis points out the challenges of projecting both the level and any change in the desire of foreigners to continue to buy US assets and the type of assets.”

²⁵ Note that the required increase in foreign holdings of Treasuries is directly dependent on the magnitude of the coefficient on foreign holdings as estimated and reported in Table 1. If we were to use a larger estimated effect (such as observed by Chinn and Frankel (2007) or at the upper end of the Warnock and Warnock (2006), the required increase in foreign holdings for the base case would be accordingly smaller, and on a roughly proportional basis. For example, an estimated coefficient at around -0.55 instead of the constrained -0.34 we used would require an increase in foreign holdings only about three-fifths as large as we have in the base case; yet the general result would still hold.

associated with budget deficits typically referred to the prospect of domestic investment being crowded out because of higher interest rates. However, beginning with the large budget deficits of the mid-1980s, net exports were more likely to be crowded out. Hence, the United States was able to continue to maintain private domestic investment and even continued positive net international investment income flows, even as the U.S. net international debt increased. In the base case presented here, however, the implied portfolio shares reveal the pressures that will occur with the persistent need to fund U.S. budget deficits – increasing shares of assets held in U.S. Treasury securities, and decreasing shares held in direct foreign investment, corporate stocks and bonds, and in other assets. Reduced foreign flows and holdings in private assets reveal the potential manifestation of crowding out in the foreign asset portfolio.

Table 3
International Investment Asset Shares, Percent of Total

	<i>Projections/Assumptions</i>						
	<u>2001</u>	<u>2005</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2016</u>	<u>2020</u>
US Owned Assets Abroad:							
Direct Investment	26.8	24.6	27.2	26.2	25.2	23.7	23.1
Foreign Securities	34.4	40.2	36.8	38.2	38.9	40.1	40.1
Bonds	8.8	9.4	10.0	10.4	10.2	10.3	10.3
Corporate Stocks	25.6	30.8	26.8	27.9	28.8	29.8	29.8
US claims, Nonbanks	13.3	9.5	5.3	5.6	5.8	6.5	6.7
US claims, Banks	22.0	23.3	27.3	27.2	27.1	26.9	26.9
Official	2.1	1.7	2.7	2.2	2.5	2.5	2.9
Other US Govt	1.4	0.7	0.6	0.5	0.4	0.4	0.4
Foreign Owned Assets in the US:							
Direct Investment	18.6	14.9	15.1	14.9	14.7	13.5	12.9
US Treasury Securities	4.6	5.0	4.7	4.8	5.0	5.2	5.2
US Securities other than Treas	34.5	34.1	29.8	30.1	26.4	18.3	15.5
Corporate and other bonds	16.4	17.6	16.0	16.1	14.3	10.3	8.8
Corporate stocks	18.1	16.5	13.8	13.9	12.1	8.0	6.6
US currency	2.8	2.2	1.8	1.8	1.7	1.6	1.4
US liabilities, nonbanks	9.8	5.2	3.8	3.8	3.7	3.5	3.3
US liabilities, banks	16.2	20.4	20.3	20.4	18.6	14.5	13.1
Official	13.6	18.1	24.7	24.3	30.0	43.4	48.6

Source: Historical data, Bureau of Economic Analysis; authors' projections

5.3. The international debt and income outlook under the base case – and other issues

The overall U.S. net international debt position and the associated net international income flows derived under the base case are shown in Charts 6 and 7. Under the base case, U.S. net international debt as a share of GDP roughly doubles over the 10-year projection period, increasing from about 20 percent of GDP to 44 percent. Net international income flows turn negative and steadily decline, from roughly +1 percent of GDP in recent years to about -2½ percent of GDP by the end of the ten-year projection. That negative net international income flow represents a growing wedge between GDP and national income. Note that, even with the assumption in the base case of a gradually improving U.S. net trade position over the projection, the current account deficit would gradually widen, reflecting the increasingly negative net international income flows.

The increased foreign holdings of Treasury securities under the base case result in a substantial increase in interest payments to foreigners on Treasury debt as part of the net international income flow (see Charts 8 and 9). Chart 9 shows that interest payments for Treasuries relative to GDP account for the bulk of the change in net international flows over the ten-year projection (shown in Chart 7), accounting for an increase of over 3 percent of GDP. Charts 8 and 9 also highlight the interesting result that, initially, the payments to foreign holders of Treasuries are relatively low for several years – despite rising foreign holdings – as interest rates on Treasuries are projected to be abnormally low during the recession and early recovery period. However, as interest rates rise to higher levels, interest payments to foreign holders of Treasuries rise sharply, in absolute terms, and relative to GDP.²⁶ Chart 8 also shows that the increase in foreign holdings of Treasuries under the base case over the 2010-2020 projection – that is, the increase required to keep Treasury bond yields from rising higher than shown in the base economic assumptions (given the structural budget deficit projection) – amounts to the bulk of the \$13 trillion increase in the base-case projection for publicly-held Treasury debt.

²⁶ These increases essentially show the combined effect from having the growing share of Treasuries in the foreign-held asset portfolio (the share rising from 24 percent to nearly 49 percent) and the increasing effective rate of return on those assets from just over 2 percent to around 5 percent.

Chart 6
U.S. Net International Investment Position
As Percent of GDP

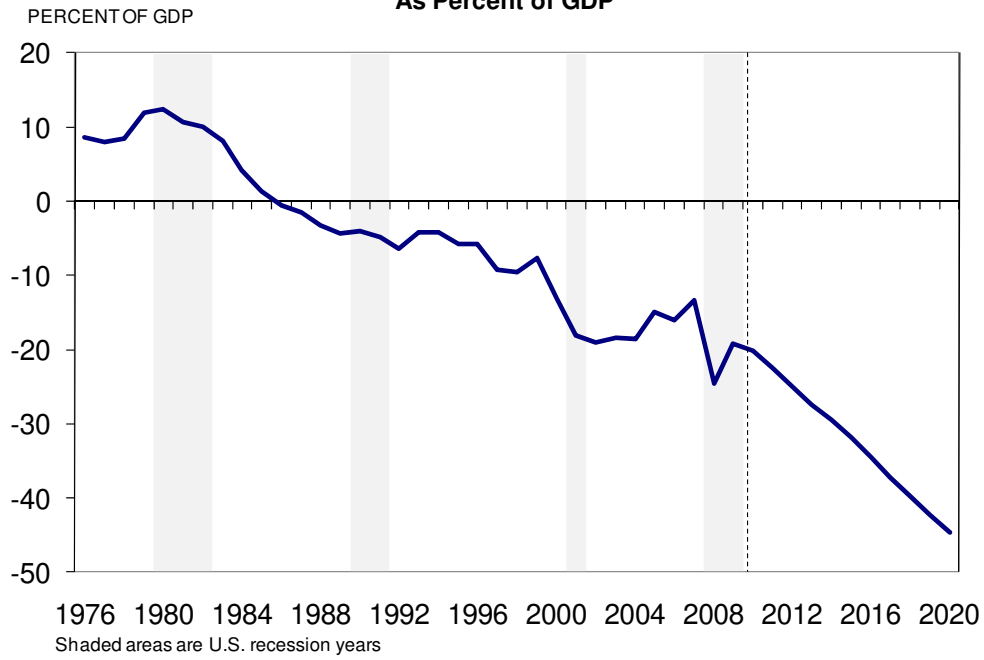


Chart 7
U.S. Net Factor Income (NIPAs)
As Percent of GDP

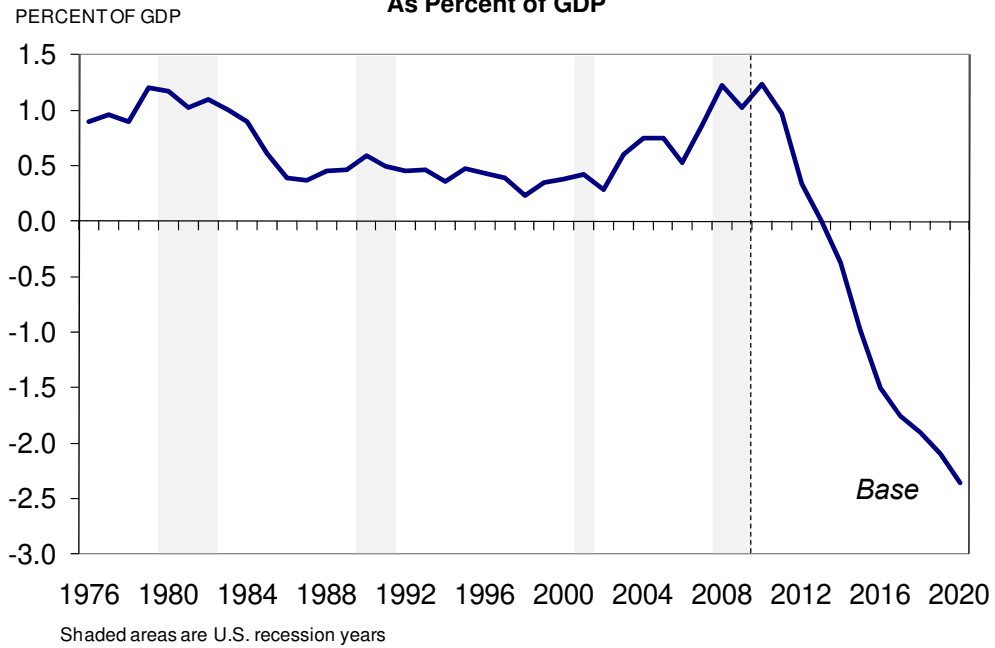


Chart 8
Foreign Holdings of US Treasuries and U.S. Payments to Foreigners on Treasuries

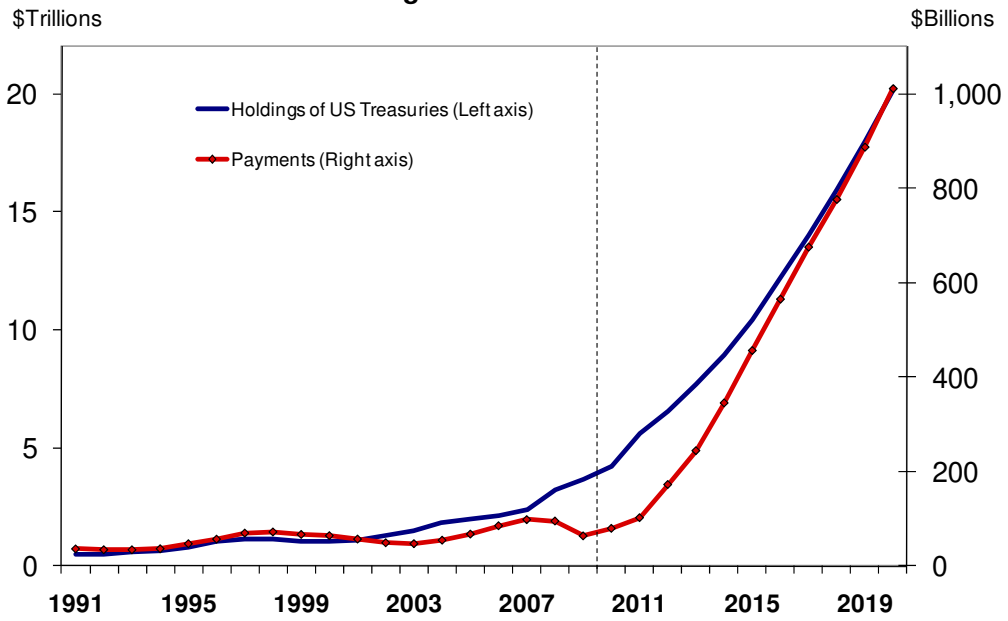
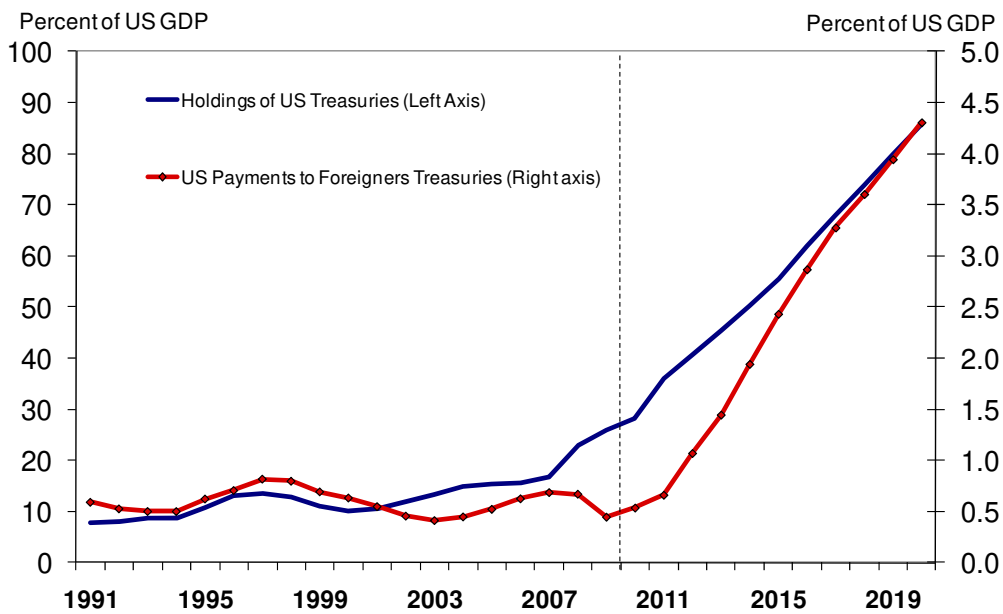


Chart 9
Foreign Holdings of US Treasury Debt and US Government Payments to Foreigners for Treasuries (% of US GDP)



5.4. Further and fundamental challenges of the base case

The base case economic projection above is generally consistent with private and public economic forecasts, and in particular regarding U.S. nominal GDP growth, interest rates and net export outlook. As such, the projection includes: GDP rebounding out of the recession and gradually returning to potential; an improving trade balance (with associated gradual decline in the dollar over time); and relatively benign longer-term interest rate levels.²⁷ Those results are assumed to occur with and despite rising structural budget deficits.²⁸ In the following, we consider potential challenges from some alternative relationships.

5.4.1. Foreign official holdings and currency values? One challenge concerns the relationships involved with foreign official holdings, currency values, and the net export outlook. From the perspective of the balance of payments, and the recognition of the role of increasing foreign official assets in keeping exchange values of currencies low, a fundamental question emerges regarding whether such a large increase in foreign official assets – required to keep U.S. long-term interest rates relatively low – could also be associated with the improving net export deficit assumed by public and private forecasters and used in the base case. The projections of the base case were derived implicitly and explicitly accounting for the effects on international flows and stocks accompanying the assumptions. Hence, the required matching of trade and financial flows occurs. But the combined set of assumptions is fundamentally different from what has occurred historically, with foreign official holdings accommodating currency valuations – and in a manner that mirrored the U.S. net export deficit (Chart 10). The question then exists whether the joint set of assumptions properly accounts for the trade-offs for foreign official holdings, managed currency valuations, and trade. High foreign official holdings of Treasuries could keep Treasury yields low, but also would tend to be associated with relatively higher demand for the dollar and keeping the exchange value of foreign currencies low relative to the dollar. That, in turn, would tend to promote continued U.S. trade imbalances – a result contrary to the underlying assumptions of the base case.

5.4.2. Negative impacts on GDP from international portfolio crowding out? A second challenge regards whether the real GDP growth assumptions fully account for the adverse impacts on investment associated with the distorted financial flows and portfolio allocations of the base case. With the extent of crowding out of private flows to private allocations in the international accounts in order to accommodate holdings of Treasury securities (see Table 3) – potential crowding out of investments in corporate equity

²⁷ That is, benign from a historical comparison basis for the economy in a sustained expansion with relatively low inflation.

²⁸ Note that CBO (2010(c)) – in its description of the potential economic effects from the President’s budget – considered some aspects of the open vs. closed economy relationships and the role of international flows. Much of that focus was on the behavior of private flows – a different perspective than the role of foreign official holdings.

and bonds, banking assets, and even foreign direct investment – does the real GDP growth and underlying investment assumed in the base case fully account for that?²⁹ One way to avoid such crowding out would be for an overall higher flow of international financing – for trade and current account deficits to widen (as in the first challenge above) – but such an outcome is inconsistent with the assumptions of the base case, and would further perpetuate international imbalances that most observers view as unsustainable.

5.4.3. Is there enough money in the world ... in the “global portfolio?” A third challenge is whether the increase in foreign holdings of such magnitude as in the base case is plausible or even possible. That is, reflecting the Meltzer quote earlier in the paper: "Is there enough money in the world?" Chart 11 shows the implied effect from the base case on foreign official holdings of U.S. Treasury securities as a percent of world GDP (in U.S. dollars). The large increase in foreign official holdings implied by the base case would require those holdings to rise to over 20 percent of rest-of-world (ROW) GDP, up from less than 5 percent for most years of history. Bertaut, Kamin and Thomas (2009) and Mann (2009) examine the issue of the U.S. asset share of the total world asset portfolio and the extent to which foreign investment in U.S. assets can increase under continued U.S. current account deficits and growth in the U.S. net international debt. Mann observed a “financial leverage” for the “global investor portfolio” of 1.6 times (160 percent) ROW GDP. The implied increase in foreign official holdings to 20 percent of ROW GDP by 2020 could at first glance therefore seem to represent a potentially manageable shift compared to the total (non-U.S.) world portfolio. Mann showed that the share of U.S. assets held by foreigners in the world portfolio was about 14 percent in 2006, and that even with a doubling or tripling of that share (associated with projected U.S. current account imbalances), “these percentages would appear to imply US assets in the global investor’s portfolio about equal to the market cap weights.” Although questions would remain about the implementation and allocations associated with increased foreign official holdings – including issues associated with private versus official portfolio allocations and competition for funds amongst various international borrowers in a time of higher debt – the relationships suggest at face value that “there would be enough money in the world” to meet the financing requirements for U.S. Treasuries over the intermediate horizon (through 2020) and under the assumptions considered in this analysis. Uncertainty remains, however, under such a projection whether world portfolio allocations would, in fact, adjust sufficiently to accommodate higher shares of U.S. assets. Further, such an expansion has limits that ultimately could not be sustained indefinitely over the long run and beyond the intermediate horizon considered here.³⁰

²⁹ CBO (2010(e)) discuss concerns about negative effects on GDP growth and lower potential output.

³⁰ Similarly, Mann concluded that, in contrast to the implications from the average portfolio percentages, it “looks unreasonable” for the required marginal contributions per dollar of new investment that would have to occur for holdings of U.S. assets under those increased world portfolio shares.

Chart 10
US Net Export Deficit and Change in Foreign Official Holdings

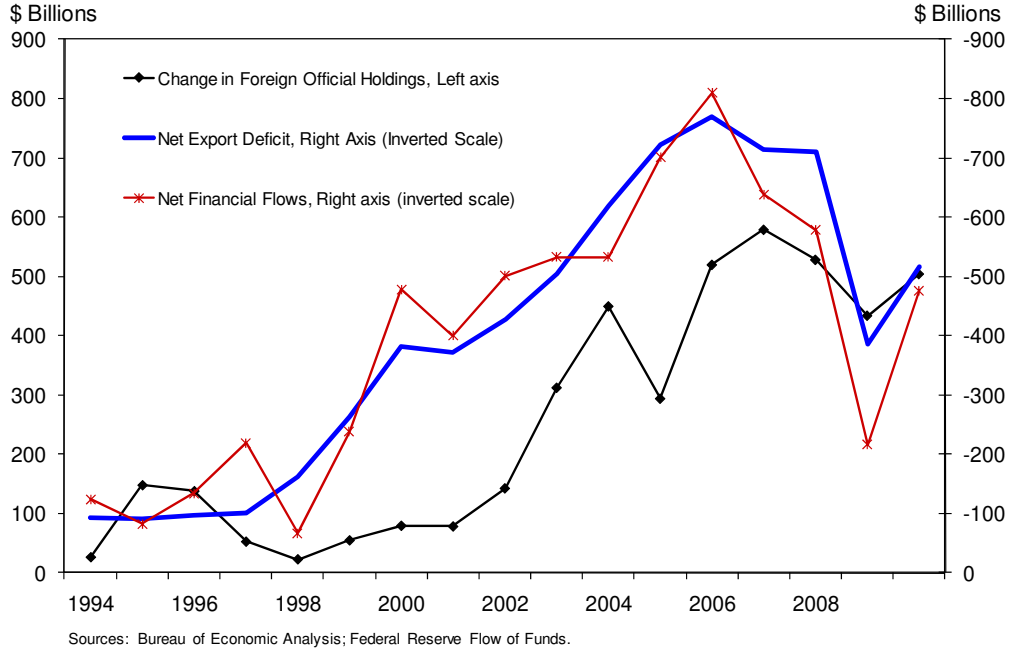
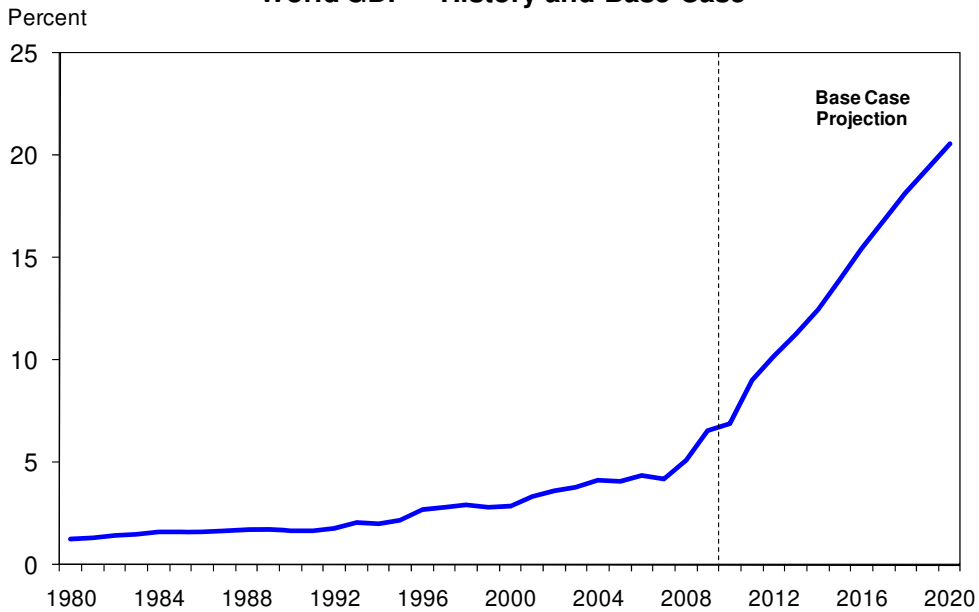


Chart 11
Foreign Official Holdings of Treasuries as Percent of Rest of World GDP -- History and Base Case



6. ALTERNATIVE CASES

Although many different alternatives to the base case could be examined, two additional scenarios are presented to illustrate how the projections would be affected by alternative outlooks for (1) foreign official holdings and (2) sustained higher Federal Reserve holdings (i.e., the domestic monetary base). Table 4 presents information on key assumptions and relationships in the scenarios.³¹

6.1. Alternative 1: Foreign official holdings kept at maintained percent of U.S. GDP – higher U.S. interest rates ...

If foreign official holdings were not to increase relative to the size of the U.S. economy over the projection period, and were only to grow with the growth in the U.S. economy, long-term Treasury security interest rates would be higher than under the base case. Under such a scenario, foreign official holdings, while fixed as a percent of U.S. GDP, would have a substantially lower portfolio share of total foreign assets – about 17 percent by 2020 compared to the base case of about 49 percent.

Using the estimated relationships from Section 4.1, point estimates show the 10-year Treasury yield would rise relative to the 5½ percent of the base case for 2015-2020 to about 7.1 percent in 2015 and to 7.9 percent by 2020.³² These estimates reflect the role of the rising structural budget deficit of the base case (without the offsetting effect on interest rates from foreign official flows in the base) – as well as the endogenous feedback to the structural deficit from higher debt service costs. Estimates of the resulting effect of the higher longer-term Treasury yields on the debt service costs for the budget indicate an increase by about \$100 billion in 2015 and about \$220 billion by 2020, with a cumulative effect on the debt of over \$1.1 trillion – an additional 5 percent of GDP – by 2020.³³

³¹ The alternative cases considered here are not derived in fully-specified general equilibrium models that would account for all of the interactions and changes to the associated underlying economic variables. As such, the scenarios do not represent the complete spectrum of effects or the behavioral and second-order relationships that would occur. The scenarios are intended to be illustrative of the changes and pressures that would occur and not full model outcomes or forecasts.

³² As the original analysis for this paper was being completed, the IMF (2010) released a report examining special issues for the United States, with a section that addressed “The Financing of U.S. Federal Budget Deficits.” That analysis used rules of thumb reflecting the results of Laubach (2009) – and similar to those estimated here – to examine the potential effect from higher U.S. debt on borrowing costs, with results suggesting an increase of 50 to 150 basis points. That range is lower than the estimated effects presented in this paper. The analysis of this paper explicitly estimates and addresses the relationships and roles for alternative sources of financing – in particular foreign official vs. private – and how those relative allocations would affect long-term Treasury rates.

³³ These estimates were made in a small model for debt service budget effects from higher interest rates (a notable assumption used was that new debt issuance was assumed to keep the relative maturity structure stable). The model was tested to successfully replicate the CBO’s estimates presented in CBO (2011). Note that the estimates presented in the text are not for an equivalent shift of interest rates across the term structure (as in the CBO tabular estimates), but rather for an increase in intermediate- and longer-term rates relative to the short-term rate.

Table 4

Key Assumptions and Relationships for the Base and Alternative Cases

	Economics		Budget		Foreign Official Holdings of Treasuries		Federal Reserve Holdings of Treasuries	
	General Assumption	10-Year Treasury Yield, 2020	General Assumption	Federal Public Debt, 2020, % of GDP	General Assumption	Foreign Official Portfolio %, 2020 (2009: 25%)	General Assumption	Average annual rate of growth, 2008-2020
Base Case	CBO economics	5.4%	CBO Alternative with Extended Policies	94%	As required by long-term Treasury yield of economic assumptions	49%	Unwind high balance sheet and return to pre crisis relationship relative to GDP over 5 years	4%
Alternative 1	Base with higher LT Treasury yield	7.9%	Base plus higher interest/debt service costs	99%	Held fixed as percent of U.S. GDP	17%	Same as Base	4%
Alternative 2	Base with higher inflation, higher ST and LT nominal interest rates, declining exchange value of the \$	6.4%	Base plus higher interest costs and budget and nominal GDP effects of higher inflation	88%	As required to maintain term spread for Treasury yield	43%	Grow 1 percent per year faster than in Base	5%

6.2. Alternative 2: Faster sustained growth of Federal Reserve holdings of U.S. Treasuries – higher inflation, interest rates, and lower exchange value of the dollar ...

The final scenario presented here considers the general effects from sustained higher growth of Federal Reserve holdings of Treasuries – an illustration of a partial “monetization of the debt.”³⁴ The scenario is based on examining the general pressures that would arise from *sustained* higher growth of Federal holdings of U.S. Treasury securities over time, and the implications for inflation, interest rates, and the international position and flows as examined in the other scenarios of this analysis. It uses standard “monetarist” relationships that illustrate the long-run pressures that would be exerted on key variables. Under those assumptions, a sustained increase in the rate of growth of the Federal Reserve balance sheet (increase in monetary base growth) by one percent per year relative to the base case passes through one-for-one to the money supply, and one-for-one to inflation being higher by one percent per year. In turn, the higher inflation rate passes through to nominal interest rates being higher by one percentage point, and the exchange value of the dollar declines by an additional one percent per year relative to the base case, maintaining relative parity relationships. For purposes of the monetary policy rule, the target inflation rate also increases by one percent. We assume no change to the projection for real GDP growth, and no change in real net exports as the changes in prices and the exchange value of the dollar lead to no change in real prices for exports and imports. Reflecting the higher rate of inflation, *nominal* GDP growth is one percentage point higher per year. Although short-run dynamics and transitions could be very different from these assumptions, the restrictive assumptions meet the intent of the projections being to examine the general implications and pressures from indefinitely sustained higher growth of Fed Treasury holdings. Foreign official holdings of Treasuries are assumed to grow at the rate necessary to maintain the same Treasury yield term spread of the base case (and offsetting effects from the inflation-induced changes to the structural budget deficit as a percent of GDP); nominal interest rates change by the one percentage point increase associated with the increase in the inflation rate.

CBO (2011) published the estimated effects on the budget from changes in economic assumptions; here the budget effects of a one percentage point increase in the inflation rate are used, a cumulative effect through 2020 of \$780 billion.³⁵ The budget effects from higher inflation are small relative to the increase in nominal GDP; the debt-to-GDP ratio is lower in 2020, at 88 percent of GDP under the alternative scenario, compared to 94 percent in the base case. The debt-to-GDP ratio is often viewed as the metric by

³⁴ Some analysts and researchers view monetization of the debt as an option for reducing the “burden” from high government debt levels. See, for example, Aizenman and Marion (2009); and Mankiw (2009), who stated: “A little more inflation might be preferable to rising unemployment or a series of fiscal measures that pile on debt bequeathed to future generations.”

³⁵ Higher inflation results in higher spending – for discretionary programs, indexed mandatory spending, and higher interest costs – with the spending increases only partly offset by rising nominal receipts.

which the debt burden is measured (see, for example, Aizenman and Marion (2009)), focusing on the value of the stock of debt relative to the production flow in the United States. With the large share of foreign holdings of U.S. Treasury debt, and with ongoing U.S. deficits and debt turnover to be financed, it is important to also recognize the role of payments to foreign holders of U.S. Treasuries and the impact on domestic national income relative to production. In the alternative scenario being addressed here of higher inflation and interest rates, the continued high foreign holdings of U.S. Treasury debt combined with higher nominal interest rates result in higher payments to foreign holders of U.S. Treasury debt than under the base case – and higher relative to GDP (4.5 percent of GDP in the alternative compared to 4.3 percent in the base case). Overall net international income flows are more negative – at -2.8 percent of GDP in the alternative scenario compared to the -2.4 percent of the base case – so the notion of “improvement” in the debt burden is slightly mitigated when accounting for the income flows. Note also, that because of the higher U.S. nominal GDP and the greater decline in the value of the dollar in this alternative scenario, the U.S. net international debt position relative to GDP is lower at about 41 percent of GDP in 2020 compared to the 44 percent of the base case. The results show that higher inflation would reduce the relative stocks of government debt and net international debt measured relative to GDP, but with the potential for higher net international income payments abroad and the resulting lower national income relative to GDP.

7. CLOSING DISCUSSION

The analysis and results presented in this paper confirm the fundamental challenges associated with funding U.S. deficits and debt, with a specific recognition of the role of – and interactions with – international financial assets and flows. We reiterate that the results and scenarios presented in this paper are not “forecasts” per se, but rather projections that illustrate some fundamental relationships for the U.S. fiscal outlook in an international setting, and specifically the role of international financial flows and portfolio adjustments. The base case and alternative scenarios are descriptive of the relationships involved regarding alternative assumptions about foreign official holdings of U.S. Treasury securities for financing U.S. debt. New empirical evidence was presented that explicitly accounted for the roles of U.S. structural budget deficits, expanded holdings of long-term securities by the Federal Reserve, and foreign official holdings of U.S. Treasuries in determining Treasury security interest rates; the empirical results are used to examine, in particular, the implications of changing relative magnitudes of foreign official holdings for Treasury interest rates. Two alternative scenarios considered (1) how the projected outlook would be affected if foreign official holdings of Treasuries did not increase substantially as assumed in the base case, and (2) the effects on the projections from assuming the Federal Reserve (Fed) would

increase the rate of growth for its holdings of U.S. Treasury securities over time, i.e., a partial monetization of the debt.

The results from the cases examined highlight several specific challenges and potential tradeoffs. The results indicate that current private and public economic forecasts (and as used in our base case) implicitly require that foreign official holdings continually increase – and by large amounts – to fund continued deficits and to keep longer-term interest rates as low as assumed in those forecasts. Yet, historically, large increases in foreign official holdings have tended to be associated with management of currency values and ongoing U.S. trade deficits. Those relationships pose a potential problem for assuming both relatively low interest rates and ongoing improvement in the U.S. trade deficit with, at the same time, continued budget deficits and growing debt. Further, if the share of foreign financial flows devoted to U.S. Treasuries increases, then the potential exists for “crowding out” of foreign flows that have historically been a key source for funding domestic investment. The question arises, then, as to how domestic investment and potential output growth would be affected. Finally, although the general interpretation presented here and by other researchers is that the world portfolio could potentially accommodate the “required” increase in foreign funding of U.S. Treasury securities, it remains an open question whether such an increase would be forthcoming. Ultimately, measures that reduce the deficit by changing the trajectory of tax revenues and spending, particularly in the latter years of the horizon we consider and beyond, would mitigate the concerns about the financing of the U.S. budget and current account deficits.

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