

What Is the Long-Term Fiscal Imbalance?

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### Abstract

Official measures of federal deficit and debt fail to account for future expenditures and revenues; this obscures information for economic decision-makers, budgeting, and financial markets.

Recent literature proposes to incorporate promised outlays and inflows in order to account for the government's forward-looking, long-term fiscal imbalance (FI). This paper improves existing estimates of FI that make simplistic assumptions of growth, inflation, and interest rates. It uses the current term structure for discounting to the present value and models variables randomly to incorporate the uncertainty of future economic outcomes. We find that a single value of FI is insufficient and potentially misleading; instead, a range of fiscal imbalances indicates the full extent of potential outcomes.

## I. Introduction

Recent political discussion has highlighted the federal government's persistent budget deficit and increasing debt. Several bipartisan panels—including *the National Commission on Fiscal Responsibility and Reform*, *The Debt Reduction Task Force* and *Our Fiscal Security*, among others—addressed deficit and debt issues in late 2010. However, official figures are backward-looking measures that account only for past or present expenditures and revenues. The Office of Management and Budget (2010) estimates a \$1.27 trillion deficit in the President's 2011 Budget and \$10.5 trillion in debt held by the public. Even though efforts are made to estimate future spending and tax programs, official accounting methods do not incorporate promised outlays and projected inflows. Doing so would allow the government, deficit reduction panels, and American citizens to understand the nation's actual fiscal imbalance (FI). The literature defines FI as the current federal debt plus the present value of all future spending minus the present value of projected receipts. Using a Monte Carlo simulation, we calculate the long-term FI using varying interest rates from the current term structure and probable inflation and growth rate of gross domestic product (GDP).

## II. Literature Review

Daniel Shaviro (2004) criticizes the government's failure to accept Generally Accepted Accounting Principles (GAAP), which dictates any cost incurred must be recorded at once. He notes that traditional cash-flow measures used in government accounting fail to convey useful budgetary information, in particular as the federal government promises huge long-term commitments. Inadequate information allows for unsustainable policies, which currently provide insufficient financing relative to the benefits due. In fact, Senator Joseph Lieberman realized

this, and in 2003, he introduced the “Honest Government Accounting Act.” Lieberman claimed, “the most appropriate way to assess Government finances is to calculate its net assets under current policies: the net present value of all prospective receipts minus the net present value of all prospective outlays and minus outstanding debt held by the public” (Fullwiler, 2006). The law would have formed a Commission on Long-Term Government Liabilities and Commitments and charged it to calculate the FI on 75-year and infinite horizons, citing Jagadeesh Gokhale and Kent Smetters (2003).

Gokhale and Smetters (2003) establish a model for present value accounting in their paper, “Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities.” In this paper, Gokhale and Smetters propose an alternative figure, the FI:

$$(1) FI_t = PVE_t - PVR_t - A_t$$

where  $PVE_t$  represents the present value of projected expenditures under current policies at the end of period  $t$ ,  $PVR_t$  represents the present value of projected receipts under current policies, and  $A_t$  represents assets, or debt, at the end of  $t$ . The authors assume several values in their calculations: a real interest rate of 3.6% corresponding to the recent average yield on 30-year Treasury bonds, and a real GDP growth rate of 2%. The authors projected a \$44 trillion deficit in 2003 under their FI model. Using the same model, Gokhale and Smetters (2006) updates their original projections to include legislative changes, which increased their FI estimate to around \$63 trillion.

David Baker and David Rosnick (2003) argued that, while the \$44 trillion deficit is “attention grabbing,” the measure has little practical use. However, the figure has more significance, they argue, if expressed as a share of the present value of future GDP. Baker and Rosnick calculate this projected deficit as 6.5 percent of future GDP at \$682 trillion, based on

Gokhale and Smetters (2003). That is, FI compared to future GDP represents the spending decrease or tax increase needed to close the gap.

Fullwiler (2005) proposes two explanations of the gap and its significance. Under the orthodox view, rising debt drives interest rates higher in order to fund the debt; interest payments then comprise a higher portion of GDP. This process prevents fiscal sustainability. In Fullwiler's view, the Federal Reserve can determine interest rates, and historically the Fed targets an anchor rate. Lowering rates lessens the burden of the debt, and if successfully held below GDP growth, debt payments remain sustainable.

Historical data, Fullwiler argues, suggest that Gokhale and Smetters (2003) incorrectly assume both the real discount rate of 3.6% and the real GDP growth rate of 2%. Both assumptions lack empirical foundations. Fullwiler cites that, historically, average maturity of debt outstanding is significantly lower than thirty years (in fact, never higher than 90 months). Since long-term rates are generally higher than short-term rates, 30-year Treasury bonds provide an inappropriate measure for the real discount rate. Instead, Fullwiler proposes three-month and 10-year Treasury rates—both of which rarely exceeded 3.6%, except occasionally between 1979 and 2000, a period when monetary policy set high rates. Further, the average nominal GDP growth rate was 6.75% between 1953 and 2006, compared to a nominal growth rate of around 4% in Gokhale and Smetters. Fullwiler discusses the weaknesses of assumed interest rates and growth rates, but he does not model the variables, neglecting to fully address these issues.

We alter the oversimplified model and correct for both inaccurate assumptions to calculate FI. First, we adhere to financial principles which dictate that anticipated cash flows are discounted using a variable rate that reflects the current yield curve. Second, we create random

variables for growth rate of GDP and for inflation. Using a Monte Carlo method, we then calculate a distribution of fiscal imbalances.<sup>1</sup>

### III. Data

Our data will revise the FI calculation to include expenditure and revenue projection from fiscal year 2011. The Congressional Budget Office (CBO 2010) included budget projections as a percentage of GDP to 2084 in their “Long-Term Budget Outlook.” CBO (2010) outlines two scenarios, an extended baseline and alternative (Figure 1). The baseline scenario includes recent health care reform, the repeal of 2001 tax cuts, and the maintenance of current law. The alternative fiscal scenario assumes that, after 2020, policies designed to control health care costs will no longer be in effect. Meanwhile, other noninterest spending consumes 1 percent more of GDP than under the baseline. CBO (2010) assumes a real GDP growth rate of 2% and CPI inflation of 2.5% through 2084.

#### a. *Expenditures*

Under these assumptions, the extended baseline scenario projects total noninterest outlays to increase from around 20% to 31% of GDP, and the alternative fiscal scenario projects total noninterest outlays to increase from around 21% to 34.8% (Figure 2).

CBO (2010) projects that an aging population and increasing scheduled benefits will force social security expenditures from 4.8% to 6.2% of GDP in 2035 under both extended baseline and alternative fiscal scenarios. According to their projections the number of people aged 65 or older will increase by 90% by 2035, from 53 million to 92 million beneficiaries.

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<sup>1</sup> A Monte Carlo simulation uses repeated random samples from a assumed probability distribution to determine an outcome.

Outlays fall slightly as baby-boomers die, but increases in the life expectancy cause rates return to around 6.3%.

Mandatory healthcare programs—Medicare, Medicaid, and Children’s Health Insurance Program—increase from 5.5% to 17.9% of GDP in 2084 under the extended baseline scenario. Meanwhile, CBO (2010) projects mandatory healthcare spending to reach 20.1% of GDP under the alternative fiscal scenario. Projections beyond 2020 use their standard growth, inflation, and demographic assumptions as well as historical rates of excess cost growth, based on an average between 1985 and 2008.

b. *Revenues*

Under the extended baseline, CBO (2010) projects total receipts to grow from 17.8% to 30.3% of GDP in 2084, while the alternative fiscal scenario projects total receipts to grow from around 17% to 19.3% in 2020, and constant thereafter.

CBO (2010) assumes that increases in effective national tax rate come from rising individual income during economic recovery and growth. Even if tax rates are indexed to inflation, the total effective rate will rise as individuals with increased standards of living enter higher brackets. For example, CBO (2010) projects that, over the next 25 years, total revenues as a percentage of GDP will increase 8.4% due to economic recovery, expiring tax provisions, demographic trends, healthcare legislation, and real bracket creep (Figure 3). In the alternative scenario, CBO (2010) assumes permanent extensions of the 2001 tax cuts. After 2020, changes in tax legislation reduce the national effective tax rate such that tax revenues account for a constant percentage of GDP.

*c. Interest Rates*

In order to calculate appropriate discount rates, we use data on United States Treasury STRIPS (Zeroes).<sup>2</sup> The yield curve of STRIPS provides rates to discount future cash flows. For example, the present value of a dollar 7 years from now is discounted using the current 7-year interest rate from the term structure. The Wall Street Journal's Market Data Center provides STRIPS data through 2040. Rates past 2040 remain at the 30-year mark. This assumption and data produce an entire term structure through 2084 (Figure 4).

## IV. Model and Theory

Two random variables improve the Gokhale and Smetters model and assumptions: real growth rate of GDP and inflation. Using historical data from the Bureau of Economic Statistics, we estimate the mean and standard deviation of the real GDP growth rate over the last 60 years. Historical data approach a skewed normal distribution, as the histogram of real growth rates indicates (Figure 5).<sup>3</sup> Although not completely random, this simplifying assumption can be justified. First, historical data also suggest that a previous year's growth rate does not dictate the growth rate for the following year—for example, only once since 1950 does a negative growth rate repeat in two consecutive years. Second, data suggest that mean reversion does not always occur—that is, growth does not necessarily overcompensate for a previous year, instead it returns to the historical trend level. With a mean near 3.2% and a standard deviation of 2.3%, the

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<sup>2</sup> STRIPS stands for 'separate trading of registered interest and principle securities.' They are Treasury securities that have been stripped of their coupon payments and mature at par value.

<sup>3</sup> We use a skew normal distribution, instead of a log-normal distribution because values in the log-normal cannot be less than zero, creating an arbitrary bound. The skew normal distribution is a probability distribution based on the normal distribution that allows for different levels of skewness. SN (0.055, 0.035, -2) with mean 0.03 and standard deviation 0.024.



probability of seeing growth rates in excess of 10% or less than -4% is less than .3%. This information and the distribution assumption allow a calculation of real GDP per year, as indicated in (2):

$$(2) \text{GDP}_t = (1 + \text{growth}_t)\text{GDP}_{t-1}$$

We use the previous year's GDP ( $\text{GDP}_{t-1}$ ) and then multiply by the growth rate ( $\text{growth}_t$ ) such that the projected GDP varies as in the real economy. GDP estimates are essential to the calculation of both the FI and the present value of future GDP because government revenue is a direct, positive function of real GDP. Further, calculating the present value of future GDP allows an interpretation of the magnitude of the FI, compared to the size of the entire economy.

The second random variable we create is inflation, in order to convert our discount rate to real terms. Changing yields to reflect inflation aligns the discount rate with the model's other variables, which are reported in real terms. As inflation remains unknown, a random variable model appropriately models its future behavior. However, inflation does not fit a normal distribution. Instead, historical data reveal a heavily skewed distribution with a large positive trail of inflation rates above three standard deviations from the mean and very few negative numbers (Figure 6). Historical CPI-U data between 1954 and 2010 from the Bureau of Labor Statistics indicate a mean of 3.69% and a standard deviation of 2.91%. With a normal distribution assumption, almost 10% of the inflation values would be negative. However, in the data there are only 3 times when there was deflation and each of those values was less than 1%. This requires a model other than the normal distribution—a skewed normal.<sup>4</sup>

Using the inflation variable, we derive the real discount rate from the nominal rates in the term structure:

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<sup>4</sup> SN (0.008, 0.04, 3) with mean 0.038 and standard deviation 0.026.

$$(3) 1 + k_t = (1 + r_t)(1 + \pi_t)$$

where  $k_t$  is the nominal discount rate,  $r_t$  is the real rate, and  $\pi_t$  is inflation. Rearranging (3) produces:

$$(4) 1 + r_t = \frac{1 + k_t}{1 + \pi_t}$$

We use this to calculate the rate at which the model discounts government expenditure, tax revenue, and real GDP. As both  $k_t$  and  $\pi_t$  vary each year, real discount rate  $r_t$  will also vary.<sup>5</sup> And since our inflation rate can be negative, the resulting discount rate can actually be greater than the yield on the Treasury STRIPS in a given year. Similarly, if our inflation rate is actually greater than the yield on the Treasury STRIPS then our “discounted” value of the cash flow will be larger than the actual value. For example, a negative real interest rate in the future could result in a huge value after compounding.

With this random variable framework, we calculate the FI using CBO (2010) data. To determine the appropriate fiscal imbalance  $FI_t$  as designated in (1), we recalculate  $PVE_t$  and  $PVR_t$  under our assumptions. Adding the present value of cash flows together produces the present value of future expenditures:

$$(5) PVE_t = \sum_{t=0}^{75} \frac{E_t}{(1 + r_t)}$$

where  $E_t$  is government expenditure in each year and  $r_t$  is the real discount rate from (4).

Similarly, the present value of future revenues is represented:

$$(6) PVR_t = \sum_{t=0}^{75} \frac{T_tGDP_t}{(1 + r_t)}$$

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<sup>5</sup> We use this method instead of Treasury-Inflation Protected Securities (TIPS) because TIPS are subject to a shadow tax and an additional liquidity premium.

where  $T_t$  is the total effective tax rate on GDP. This reflects the fact that tax revenue varies with GDP as a function of the tax rate. In addition, changes in the GDP variable will affect the total effective tax rate. For example, higher GDP should correspond with higher effective tax rate as individuals experience real bracket creep. In order to estimate the tax function, we use data from CBO (2010) estimates of tax revenues as a percentage of GDP through 2084. Regressing tax percentage as a function of the log of GDP produces:

$$(7) \text{Tax} = -0.552 + 0.0772 \log(\text{GDP}) \quad R^2 = .9917$$

[.0008]            [.0088]            StDev.

This estimates the projected tax rate as a function of GDP, which allows our model to control tax rates for each year according to GDP in that year. Multiplying those effective tax rates by the GDP produces the total tax revenues in each year. Accounting for these calculations, (8) represents the present value of revenues stated generally in (6):

$$(8) \text{PVR}_t = \sum_{t=0}^{75} \frac{[-0.552 + 0.077 \log(\text{GDP}_t)] \text{GDP}_t}{(1 + r_t)}$$

Adjusting the Gokhale and Smetters model (1) to account for our changes as shown in (5) and (6), the final model for the long-term FI indicates the changes in assumed real growth rate, inflation, and real discount rates:

$$(9) \text{FI}_t = \sum_{t=0}^{75} \frac{E_t}{(1 + r_t)} - \sum_{t=0}^{75} \frac{T_t \text{GDP}_t}{(1 + r_t)} - A$$

In order to get an impression of the FI, we calculate the present value of future GDP:

$$(10) \text{PVGDP}_t = \sum_{t=0}^{75} \frac{\text{GDP}_t}{(1 + r_t)}$$

where  $\text{GDP}_t$  reflects the variable growth rate as indicated in (2). This allows an interpretation of the magnitude and significance of the FI. The ratio of FI to the present value of GDP is similar

to the debt-to-GDP ratio, however it takes the present value of both values, not the present value of the ratio itself:

$$(11) \text{ FiscalGap} = \frac{FI_i}{PVGDP_i}$$

where the values  $FI_i$  and  $PVGDP_i$  are those from (9) and (10) respectively.

## V. Results

Initial calculations indicate the long-term FI is in fact negative—that is, a surplus. This result contradicts previous research about the possible value of FI in the literature. Values produced in the model indicate that government tax revenues exceed the expenditures in the early 2020s and onwards. Our real growth rate assumptions, compared to those of the OMB and the CBO, drove tax revenues higher than the expenditure projections. Our historical data from the last 60 years produced a real growth rate of 3.2% per year, whereas the CBO and OMB assume a 2% real growth rate. Therefore, a large discrepancy in FI estimates appears based on assumed growth rates, and the resulting expenditure and revenue projections.

Two changes to our model can correct for this discrepancy: either to incorporate their estimated real growth rates into our variable, or to change their estimated expenditures to match our growth rates. To remain consistent with expenditure projections, we simply alter our growth rate to match CBO (2010) assumptions. Changing the mean and standard deviation of our random variable resulted in a real growth rate of 2.17%. For simplicity, standard deviation was assumed to be 1%. Rerunning our model produced a distribution of fiscal imbalances closer to the single FI values in the literature.

The following data came from 10,000 trials of the model. The maximum value of our distribution was \$129 trillion, while the minimum value was -\$138 trillion. This means that,

given our assumptions, there can be anywhere from a deficit of \$129 trillion to a surplus of \$138 trillion. The distribution looks approximately normal (Figure 7) and has a mean of \$27 trillion and a standard deviation of \$32 trillion. A median of \$30 trillion indicates that the distribution is skewed slightly to the right. If we assume that the distribution is normal then approximately 10.03% of our observations would be negative—that is, a surplus—while 90% of our observations would reflect a deficit. Our estimates produce a different portrayal of the fiscal gap than those shown in Gokhale and Smetters (2003).

In order to put this FI into perspective, the literature compares it to the present value of GDP. This represents the gap that must be closed in order to completely pay for the FI. Our projections show that this gap ranges from approximately -2.8% to 6.5% of the present value of GDP (Figure 8). The mean was 1.73% and the median was essentially the same at 1.74%. This means that, according to our calculations, the government would have to increase the total tax receipts of the government by approximately 2% in order to close the fiscal gap.

Using the assumptions from the alternative scenario presented in the CBO (2010) projections produces a larger deficit imbalance. Our simulations over 10,000 trials indicate a mean value of \$153 trillion. The minimum value is \$97 trillion and the maximum is over \$214 trillion. Compared to the present value of GDP until 2084, the FI is between 6% and 15% with the mean value being 11%. This indicates that the government would have to raise tax revenues 11% in order to close the fiscal gap. In perspective the total tax rate as a percentage of GDP in 2010 was only 14.9%, which means an increase of 70% of our current tax income would be required to close the gap.

## VI. Sensitivity Analysis

Results vary greatly depending on the assumptions made or data used, and existing literature fails to account for this. Besides showing the distribution of potential fiscal imbalances above, we alter both our assumptions and data to show that results are highly sensitive to changes even under our improved model. Below, we make changes to growth rates, inflation rates, and data inputs that produce a range of different FI outcomes.

### *a. Changes to growth and inflation rates (assumptions)*

In our original estimate, we use a mean real GDP growth rate of 2.17% with a standard deviation of 1%. Altering these assumptions indicate that small changes in future growth rates can drastically alter the FI. In particular, we make three changes: increasing the mean growth rate, decreasing the mean growth rate, and increasing the standard deviation. First, a mean of approximately 2.5% produces \$65 trillion surplus on average. This indicates that increasing the mean growth rate by only 0.33% results around a \$90 trillion shift toward surplus. Second, a mean of approximately 2% raises the mean to a \$67 trillion deficit with a 1% chance of surplus. In short, at 2.5% growth rate, deficits occur 6% of the time; meanwhile, at 2%—a change of only 0.5%—surpluses occur only 1% of the time. Third, increasing standard deviation from 0.01 to 0.02 more than doubles both minimum and maximum values of FI. This means that doubling our standard deviation increases the spread of potential deficits or surpluses over fivefold.

We use a mean inflation rate of 3.69% with a standard deviation of 1% in our original estimate. Increasing inflation to 6% increases the spread of the data: the mean increases to \$43 trillion with a minimum of -\$440 trillion and a maximum of \$427 trillion. Whereas, reducing inflation to 1.5% decreases the mean to \$20 trillion with a minimum of -\$21 trillion and a maximum of \$63 trillion. Increasing the standard deviation to 2% does not change the mean FI,

but it expands the spread to a minimum of -\$363 trillion and a maximum of \$679 trillion.

*b. Changes to expenditures and revenues (data)*

We use CBO (2010) extended baseline and alternative scenarios above, but OMB (2010) includes a different baseline projection and many other alternative scenarios. The baseline scenario projects total noninterest outlays to grow from around 20% of GDP to 43% in 2085, and total receipts to grow from 16.8% to a peak of 20% in 2050, returning to 18.7% in 2084.<sup>6</sup> Projections can change drastically under different assumptions; in turn, this affects the data used to calculate FI.

In our original estimate, CBO (2010) baseline produces a mean FI of \$27 trillion with minimum of -\$138 trillion and a maximum of \$129 trillion. We run our model under two different datasets from OMB (2010): the baseline and a low-cost healthcare projection.<sup>7</sup> First, baseline projections, mean FI increases to \$200 trillion with a minimum of \$133 trillion and a maximum of \$299 trillion. This shows a huge shift toward deficit. Second, the low-cost healthcare projection uses a mean cost growth of 9.8% (at a maximum of 10.9% in 2085) instead of 13.6% (at a maximum of 28.8% in 2085) in the baseline. The lower-cost scenario results in a mean FI of \$82 trillion with a minimum of \$25 trillion and a maximum of \$154 trillion. This reflects the importance of healthcare cost projection: lower cost growth can reduce potential deficits, but alone, cannot eliminate them.

*c. Mean Reversion Model*

Our final sensitivity analysis uses mean reversion to estimate GDP growth. This alters the entire

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<sup>6</sup> OMB (2010) projects a slight decline in tax revenues' share of GDP, arguing that higher marginal tax rates from increased real incomes will apply to a smaller share of total income due to fringe benefits.

<sup>7</sup> We can no longer use equation (7) due to the OMB's tax revenue projections; instead, we use the simplified equation (6).

model for calculating FI as GDP appears in several of the model's components. Using the original inputs with this model, FI results remain the same, which suggests the model is valid.

We use historical growth rates from 1950 to 2007 to generate a potential GDP variable for each year ( $pGDP_t$ ).<sup>8</sup> We estimate potential GDP as follows:

$$(12) \quad pGDP_t = pGDP_0(1 + g)^t$$

where  $pGDP_0$  is \$2.4 trillion, the estimated potential GDP in base year 1950 using 2010 dollars.

Based on the actual and potential GDP in each year, we estimate the following mean reversion equation:

$$(13) \quad GDP_t - pGDP_t = \beta(GDP_{t-1} - pGDP_{t-1}) + \varepsilon$$

with  $\beta$  equals 0.831 and  $\varepsilon$  distributed normally with mean zero and standard deviation 108.

Rearranging terms, equation (13) produces estimated GDP each year in the mean reversion model.

We run this model using three alternative scenarios. First, we assume a  $pGDP$  of \$16.9 trillion in 2010 based on calculations in (12). We use a growth rate,  $g$ , of 3.27% from historical data in (12). Running the model 10,000 times, we find the maximum FI is -\$244 trillion—the worst FI in this case is a \$244 trillion surplus. This result is inconsistent with our previous results and the literature. Second, we then reduce growth rate to 2.17% in accordance with our main model section. The maximum FI falls to -\$42 trillion, which indicates that only surpluses occur. Third, we reduce  $pGDP$  in 2010 to \$15.5, which signifies a potential GDP of only 6% larger than actual instead of 15% larger. Using a 2.17% growth rate, this results in a maximum FI of \$0.3 trillion and a mean of -\$7 trillion. These estimates indicate that a mean reversion

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<sup>8</sup> We exclude the recent financial crisis because it includes low or negative growth rates without a chance to revert to the mean afterwards and deviations from the mean in there years were huge outliers.



model of GDP shifts FI estimates largely from deficits to surpluses.

## VII. Discussion

Our results indicate that a single value for FI is insufficient. It fails to account for the uncertainty inherent in projecting future outlays and inflows. Incorporating random variables into the model provides more information on possible outcomes. In fact, our distribution shows that—when accounting for random variables instead of assuming constant rates—it is possible for the fiscal imbalance to result in a surplus. Although this is unlikely, the important point is that future outcomes are unknown and models must incorporate this uncertainty.

Sensitivity analysis shows that only a slight change in assumed growth rates, inflation, or projected data alters FI drastically. This increases the uncertainty inherent in a single value. For example, changes of only 0.5% to mean growth rates can almost completely switch the likelihood of a surplus or deficit. Factoring in uncertainty through increasing the standard deviation widens the range of possible outcomes greatly. We find that the mean growth rate assumed is the most important factor in determining the level of fiscal imbalance. Looking at historical data, we found a mean growth rate of 3.27% over the last 60 years. FI would have been almost exclusively a surplus if we had used this figure. Instead, we lowered the mean rate to the assumed CBO (2010) rate. Still, our results range from a large deficit to a surplus. And our mean deficit remains lower than the single, projected value in the literature.

The range of potential FI indicates that future economic outcomes are highly dependent and uncertain. Gokhale and Smetters (2007) asked, “Do Markets Care about the \$2.4 Trillion U.S. Deficit?” Based on their method of calculating FI in Gokhale and Smetters (2003), they argued that markets should—but do not—care about the “federal government’s mammoth, and

growing, forward-looking budget imbalance.” Gokhale and Smetters dismiss a hypothesis that *the future is too uncertain to be predictable*, in part because their “projections are, if anything, actually optimistic.” However, we argue that this is not the point: Whether their value was optimistic or not, our results—a range of possible fiscal imbalances—indicate that uncertainty comes from a large range of potential outcomes, which are highly sensitive to assumptions and future economic conditions.

VIII. References

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Figure 1

### Revenues and Primary Spending, by Category, Under CBO's Long-Term Budget Scenarios Through 2080

(Percentage of gross domestic product)

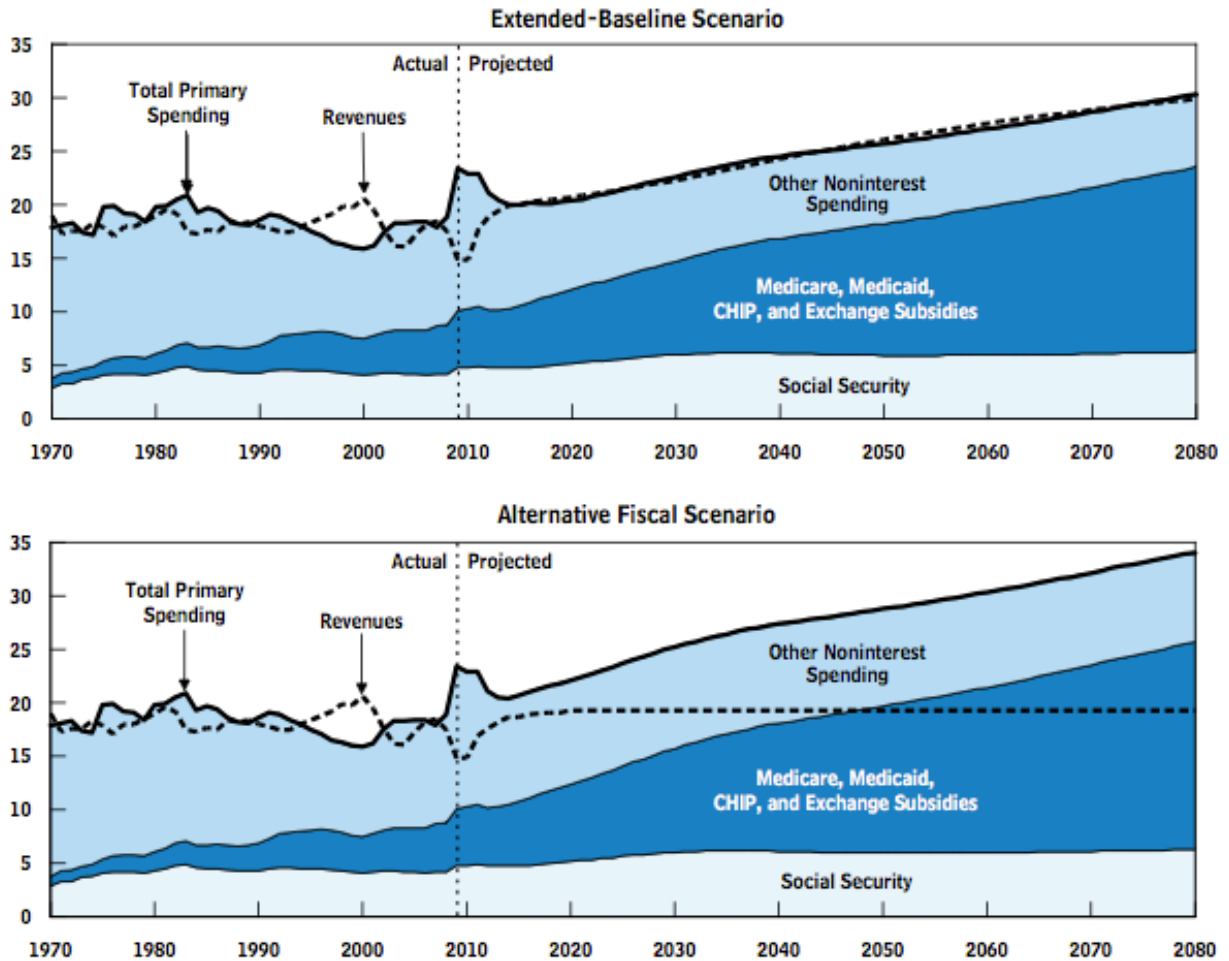


Figure 2

Actual expenditures under growth assumptions

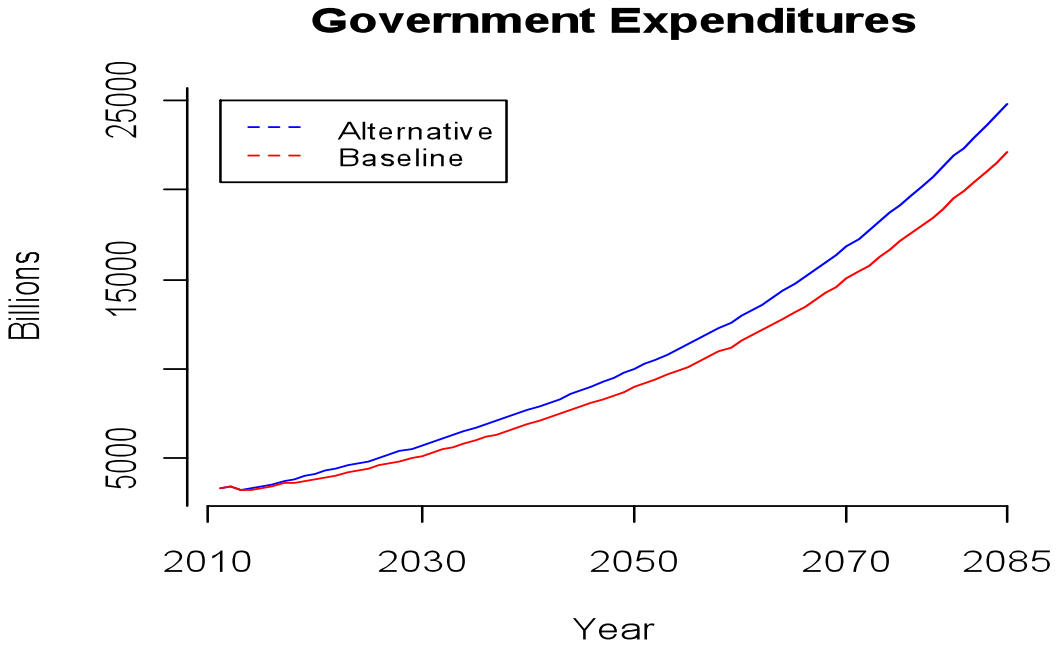
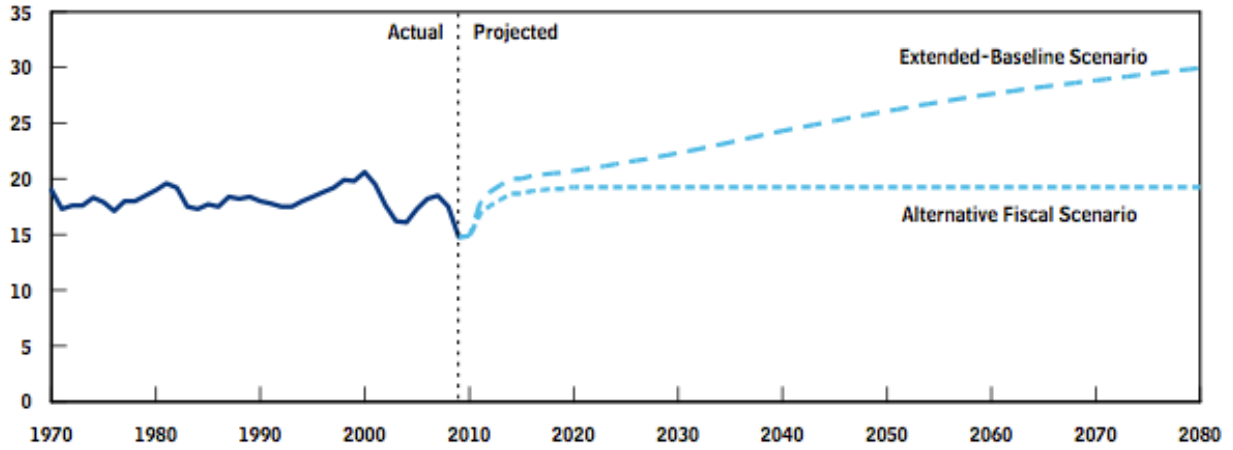


Figure 3

### Total Revenues Under CBO's Long-Term Budget Scenarios Through 2080

(Percentage of gross domestic product)



Source: Congressional Budget Office.

Figure 4

Nominal discount rate term structure on U.S. Treasury STRIPS, 2010 -2084

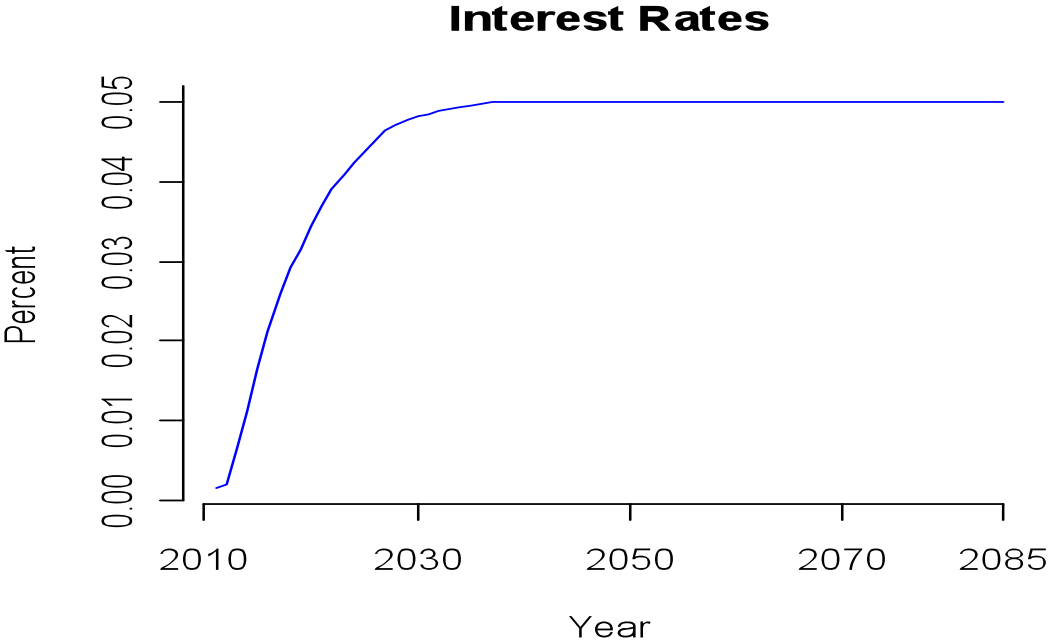


Figure 5

Historical real growth rates of GDP, 1950-2010

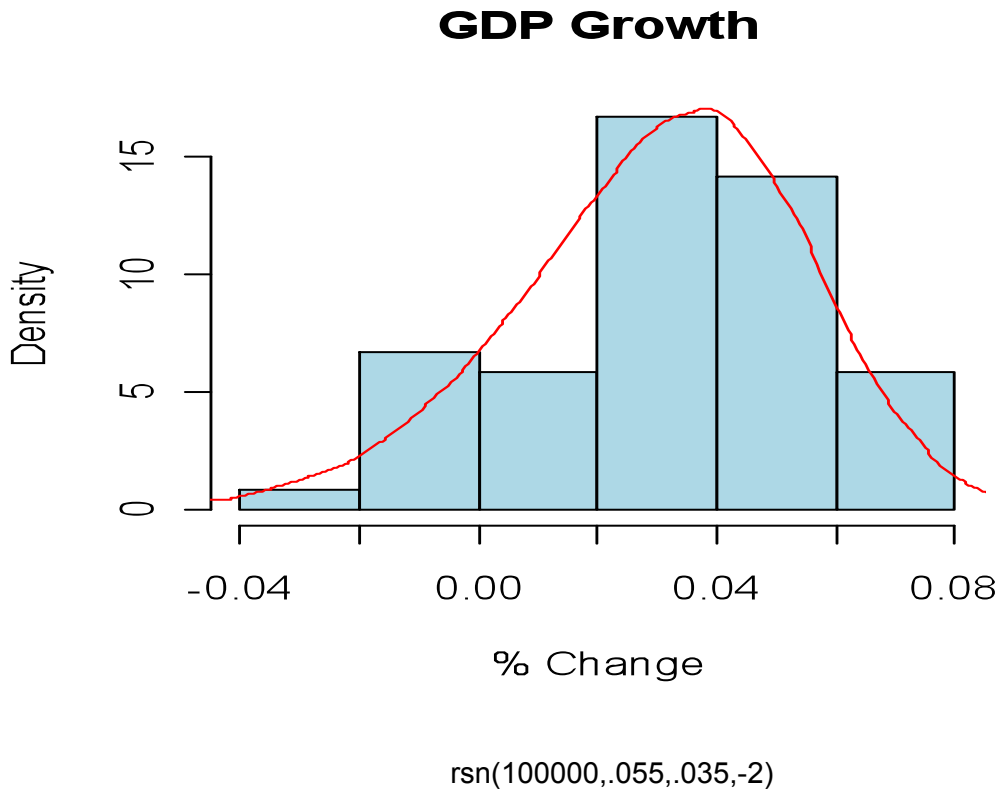
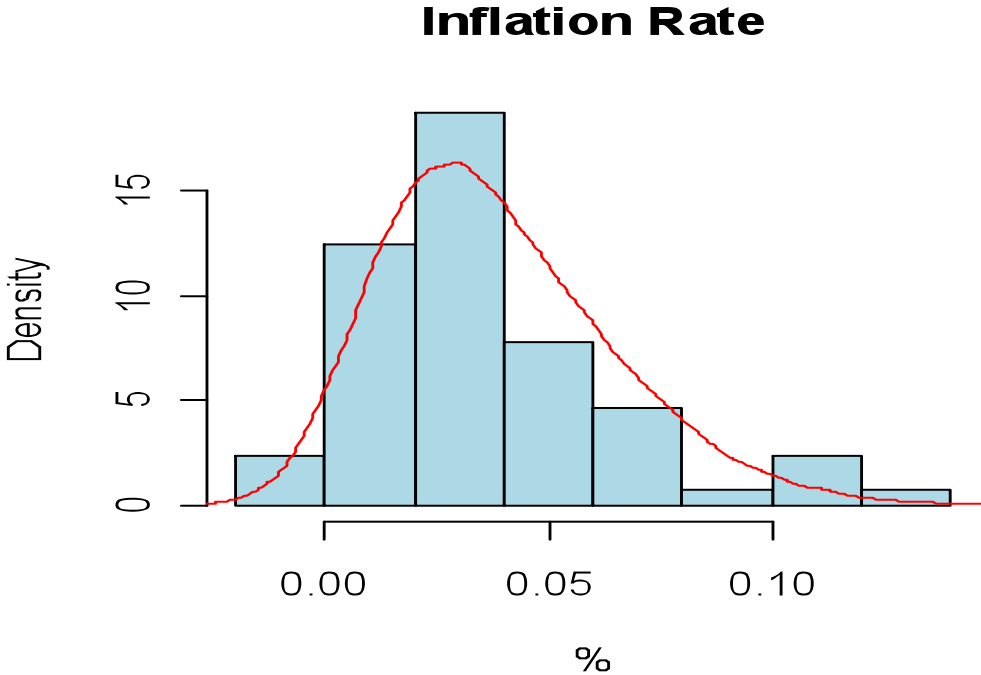




Figure 6

Historical CPI-U annual change, 1948-2010



rsn(100000,0.008,.04,3)

Figure 7

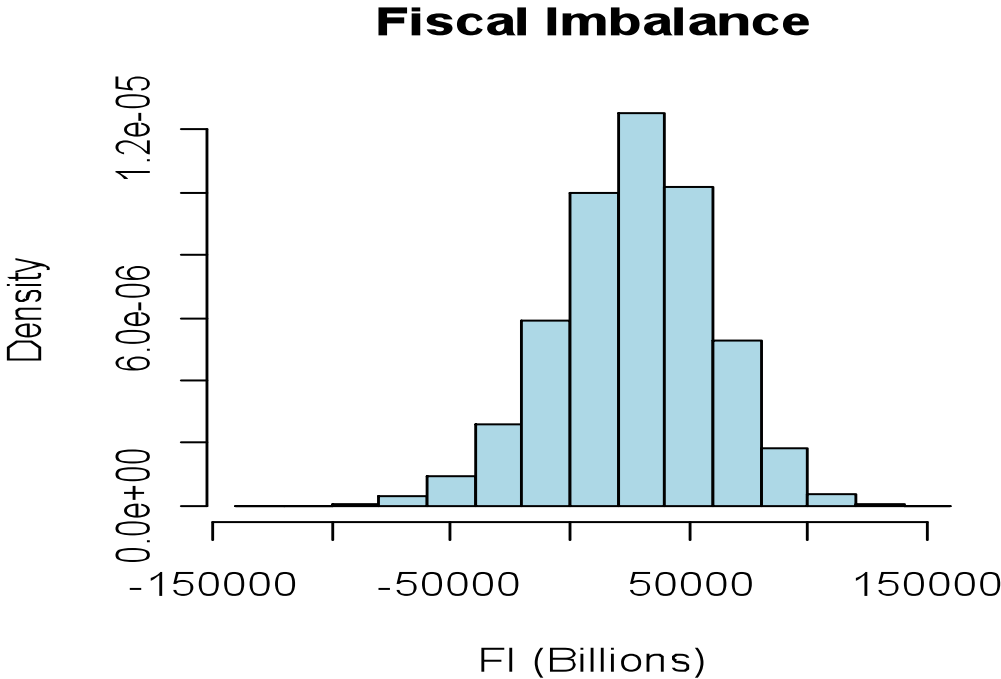


Figure 8

