

Accounting for Changes in the U.S. Budget Deficit

By Troy Davig and Michael Redmond

After rising substantially during the Great Recession, the U.S. federal budget deficit has been declining the past few years. From 2008 through 2012, the deficit measured relative to the size of the economy was larger than in any year since 1945. By 2014, however, the deficit had fallen to where it was no longer unusually large compared with deficits during the previous three decades. While the cyclical recovery in economic activity has played a role in this improvement, about half of the decline since 2009 is due to an array of temporary factors, particularly Federal Reserve remittances to the U.S. Treasury, dividend payments from Fannie Mae and Freddie Mac, and the unwinding of one-time policies intended to stimulate economic activity following the Great Recession.

The pace of improvement over the next few years, however, is likely to slow as these temporary factors fade and economic growth proceeds closer to trend levels. Over the longer term, the Congressional Budget Office (CBO) projects the deficit to widen as an aging population, rising health care costs, and interest payments on an elevated level of debt place increasing demands on fiscal resources.

The first section of the article reviews a general accounting framework for understanding changes in the deficit. Section II discusses temporary factors that have affected the deficit over the past few years, with

Troy Davig is senior vice president and director of research at the Federal Reserve Bank of Kansas City. Michael Redmond is an associate economist at the bank. This article is on the bank's website at www.KansasCityFed.org.

particular focus on the role of Federal Reserve remittances, dividends from Fannie Mae and Freddie Mac, and stimulus programs following the crisis. Section III provides a framework for calculating the contribution of automatic stabilizers to the deficit. Section IV decomposes the decline in the deficit according to the accounting framework presented in the first section.

I. ACCOUNTING FOR CHANGES IN THE DEFICIT

Changes in the federal deficit arise, by definition, due to changes in government revenue or spending. Chart 1 shows fluctuations in the deficit over the last 50 years and highlights that the deficit often widens during and after recessions.¹ While legislated policy reforms certainly play a role, fluctuations in the economy reflecting the business cycle have a substantial influence, particularly on revenue. After the Great Recession, however, several unique and temporary factors not directly related to the business cycle have also had a notable impact.

In general, movements in the deficit can be separated into three components, as shown in the following equation:

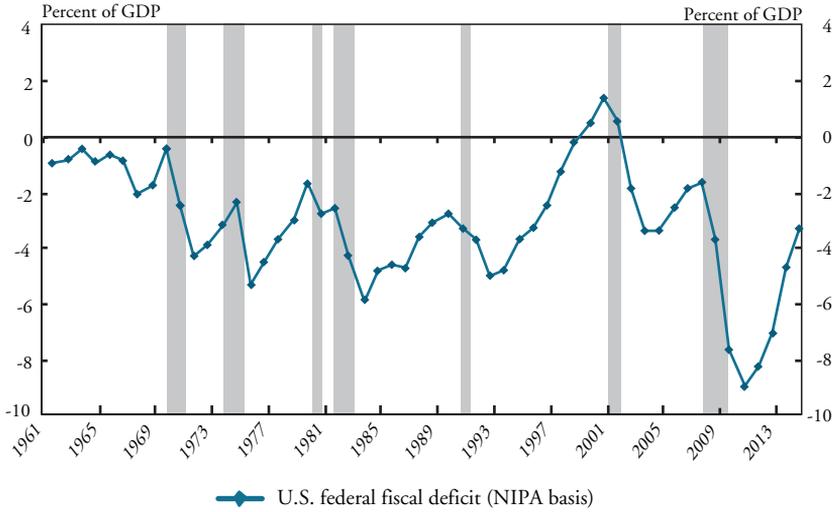
$$\text{Deficit} = \text{Temporary Factors} + \text{Automatic Stabilizers} + \text{Structural Deficit}.$$

Temporary factors include the cost or additional proceeds from unique factors that do not necessarily reflect the business cycle or long-lasting legislated policy changes. For example, following the Great Recession, the federal government realized substantially higher proceeds from the Federal Reserve than prior to the crisis, as well as significant dividends from the government-sponsored enterprises (GSEs) Fannie Mae and Freddie Mac. In addition, various stimulus packages were enacted to temporarily reduce federal government tax receipts or increase federal spending. Chart 2 shows temporary factors raised the federal deficit substantially in 2008-11, had a roughly neutral effect on the deficit in 2012, and then lowered the deficit in 2013-14.²

In contrast, automatic stabilizers are movements in revenues and costs that would have occurred absent any policy reforms—that is, they arise from cyclical fluctuations in the economy such as the interaction between the business cycle and the tax code or social safety net. For example, when recessions occur, declining economic activity reduces the tax base resulting in less government revenue, as shown in Chart 3. The

Chart 1

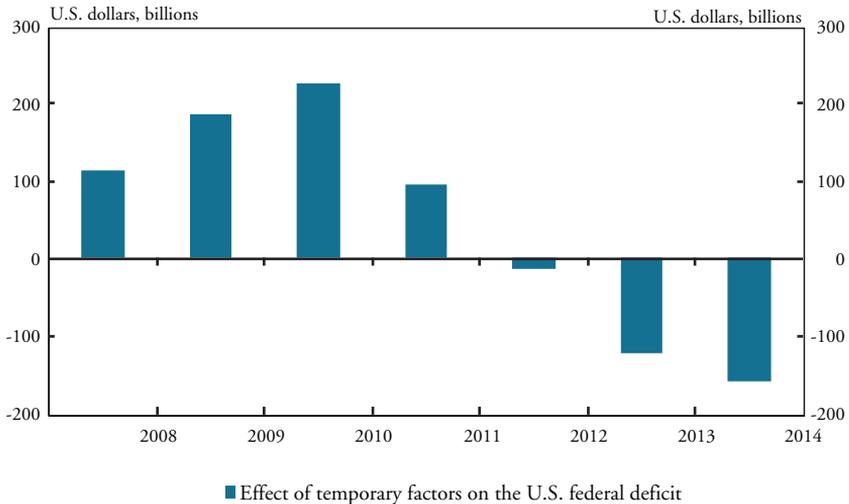
THE U.S. FEDERAL FISCAL DEFICIT RESPONDS TO BUSINESS CYCLE CONDITIONS



Sources: Bureau of Economic Analysis, NBER.
 Note: Gray bars represent NBER-defined recessions.

Chart 2

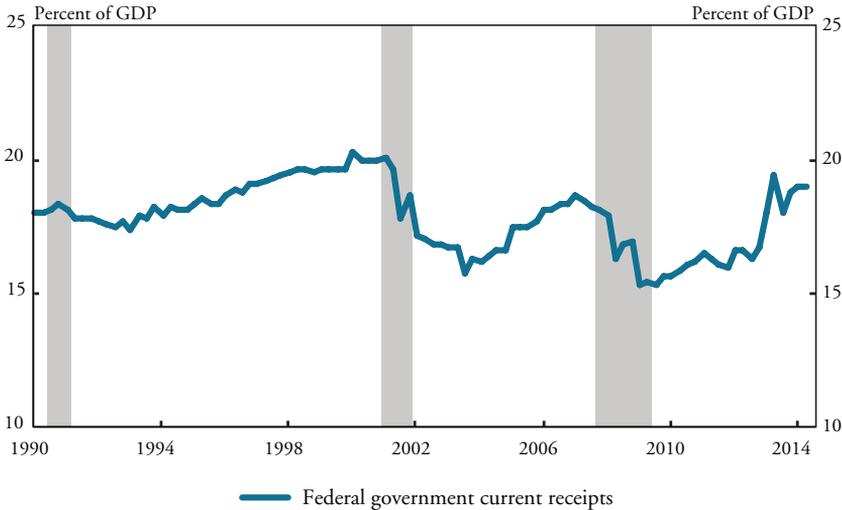
TEMPORARY FACTORS WIDENED THE DEFICIT IN 2008-12, BUT CAUSED IT TO NARROW IN 2013



Source: Authors' calculations.
 Note: Positive values denote temporary factors have increased the deficit, requiring additional government borrowing. Negative values lower the deficit, thereby reducing the need for additional borrowing.

Chart 3

FEDERAL TAX REVENUE OFTEN FALLS DURING AND FOLLOWING RECESSIONS



Sources: Bureau of Economic Analysis, NBER.

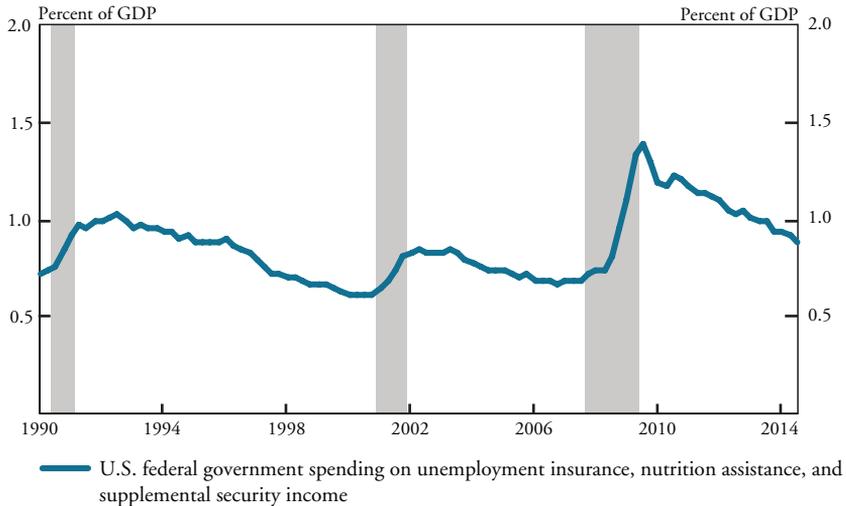
Note: Gray bars represent NBER-defined recessions.

fall is quite pronounced—not only does the level of tax revenue fall, but tax revenue also falls as a share of GDP. In addition, government expenses increase during recessions as costs related to social insurance programs rise. During expansions, on the other hand, tax revenue often rises as a share of GDP while spending for social insurance programs declines. Chart 4 shows these patterns for spending on major federal government social insurance programs.

These fluctuations in government revenues and spending are called automatic stabilizers since they move in a way that many models suggest stabilizes economic growth (Cohen and Follette). Automatic stabilizers are calculated as the difference between the actual level of the deficit after removing any temporary factors and an estimate of what the deficit would be if the economy were operating at its potential level. After the contribution of temporary factors and automatic stabilizers is removed from the actual deficit, the remaining value represents the structural deficit—that is, the deficit that would be realized if the economy were operating at its potential level and the contribution of temporary factors were neutral.

Chart 4

FEDERAL GOVERNMENT TRANSFER PAYMENTS RISE DURING AND FOLLOWING RECESSIONS



Sources: Bureau of Economic Analysis, NBER.

Note: Unemployment insurance excludes benefits paid under the emergency unemployment compensation program. Gray bars represent NBER-defined recessions.

II. TEMPORARY FACTORS AFFECTING THE DEFICIT

Temporary factors exerted a substantial influence on the deficit during and after the Great Recession. In particular, the measures taken by the Federal Reserve to boost the economy through its large-scale asset purchase programs and by the Federal Housing Finance Agency to rescue the faltering GSEs have resulted in a surge in temporary revenues. Moreover, the unwinding of various federal stimulus programs has temporarily slowed the pace of growth in government spending.

Federal Reserve remittances

In December 2007, the Federal Reserve began taking a series of steps in response to the financial crisis and subsequent slow recovery that would substantially expand its balance sheet. The Federal Reserve accumulated a historically large amount of interest-earning assets, first to support financial market liquidity and later to support the real economy.

When the Fed expands its balance sheet, it does so by creating liabilities that can either be held as reserves or converted into cash by

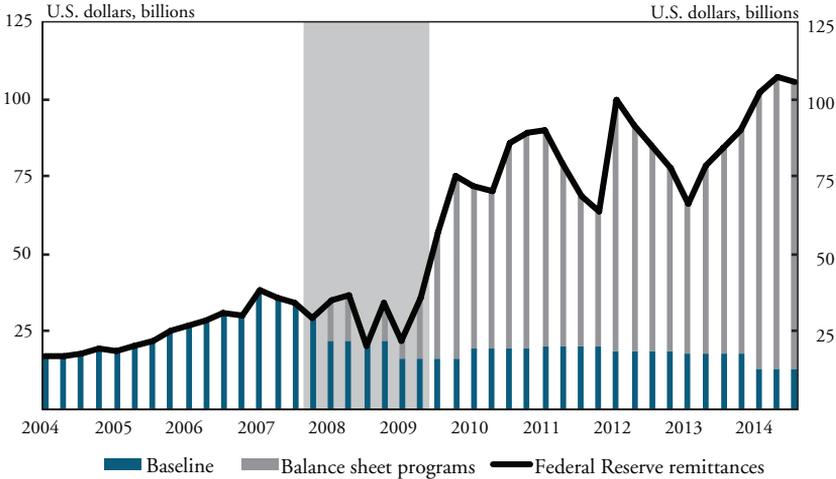
banks. Prior to the crisis, banks sought to hold only enough reserves to meet their minimum reserve requirements and ensure they could settle payments efficiently. Reserves in the banking system averaged about \$10 billion in the few years prior to 2008. By the end of 2013, however, the banking system had been flooded with liquidity created by the Fed's large-scale asset purchase programs, and banks held an abundant \$2.5 trillion of reserves. In late 2008, Congress authorized the Fed to begin paying interest on these reserves, the rate for which has been one-quarter of a percentage point but can change over time. In comparison, the assets the Fed has accumulated by issuing these reserves have substantially higher yields. For example, the yield on 10-year Treasury securities has fluctuated from 1.5 percent to 3.5 percent since 2011. Some of the assets the Fed purchased, such as agency mortgage-backed securities (MBS), often yield even more. Because the average returns on Fed-held securities have been high relative to the cost of paying interest on reserves, the Fed has received much more in interest income than it has paid in interest expenses.

After paying operating expenses, interest on reserves, and dividends to its member banks, the Federal Reserve remits the remainder of its earnings to the Treasury. Since 2008, these earnings have reduced budget deficits by more than was typical before the crisis and what would have been expected in a baseline, no-recession scenario. Chart 5 shows that remittances to the Treasury increased from about \$20 billion per year prior to the Great Recession to at least \$75 billion per year from 2010 to 2013.³

With an economy widely expected to normalize over the next few years, however, Federal Reserve projections indicate short-term interest rates will move higher (Federal Open Market Committee). As a result, the total amount of interest paid on reserves will also likely rise and cause remittances to decline. Further ahead, the legacy of the balance sheet programs will likely lower remittances below their pre-crisis level as the Fed pays interest on excess reserves that otherwise would not have been created. If interest rates rise more quickly than expected, remittances to the Treasury could drop even further (see Carpenter and others). Since higher remittances resulted from policies adopted in response to the crisis and are unlikely to be sustained, they are included in the set of temporary factors affecting the deficit.

Chart 5

REMITTANCES OF THE FEDERAL RESERVE TO THE U.S. TREASURY INCREASED AFTER THE GREAT RECESSION



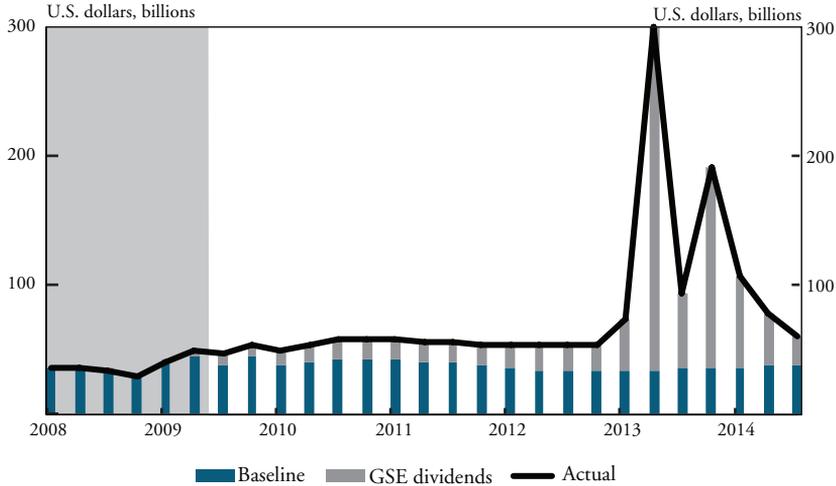
Sources: Federal Reserve, NBER, authors' calculations.
 Note: Gray bars represent NBER-defined recessions.

GSE dividends

Outside of Fed remittances, the federal government also began to receive substantially more income from its assets after the crisis, as shown in Chart 6. This rise primarily resulted from the terms of the September 2008 rescue of Fannie Mae and Freddie Mac. Following a large capital injection into these GSEs, the Treasury received the right to a full quarterly sweep of their profits. These payments surged in the second and fourth quarters of 2013, reflecting one-time accounting adjustments to recognize deferred tax assets. Payments are unlikely to reach those levels again in the near future, though most projections show Fannie Mae and Freddie Mac continuing to remain profitable as rising house prices and falling foreclosures support their exposure to the mortgage market. For example, the Office of Management and Budget (OMB) projected that the Treasury would receive an additional \$181.5 billion from the two GSEs over the next decade (OMB).

Chart 6

U.S. TREASURY RECEIPTS SURGED DUE TO DIVIDENDS FROM THE GOVERNMENT-SPONSORED ENTERPRISES



Sources: Federal Reserve, NBER, authors' calculations.

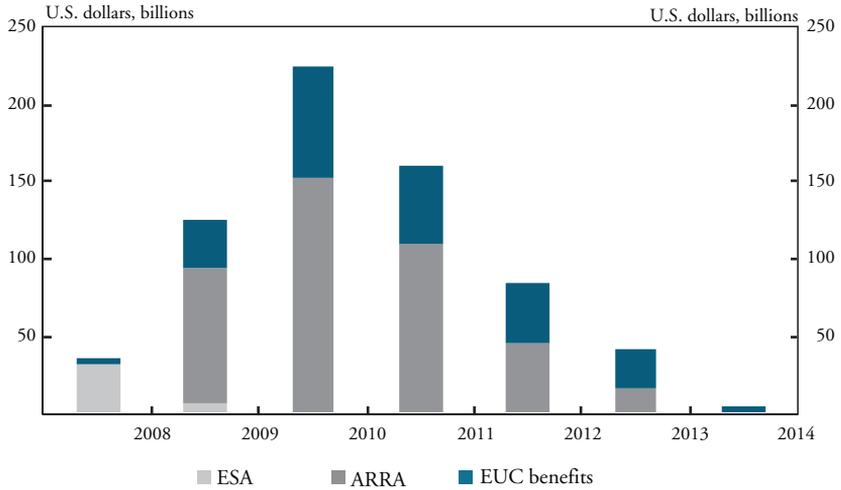
Note: Gray bars represent NBER-defined recessions.

Economic stimulus programs

In 2008 and early 2009, policymakers became increasingly aware of the severity of the economic situation. In response, Congress passed two major stimulus bills, the Economic Stimulus Act of 2008 (ESA) and the American Recovery and Reinvestment Act of 2009 (ARRA), to increase federal government spending and lower taxation. In addition, Congress passed a series of bills over this period to temporarily lower the Social Security contribution rate for employees and the self-employed—a policy widely known as the payroll tax holiday—and to provide additional weeks of benefits to unemployed workers through the Emergency Unemployment Compensation (EUC) program. Combined, these stimulus measures substantially lowered government revenues and increased spending, as can be seen in Charts 7 and 8.

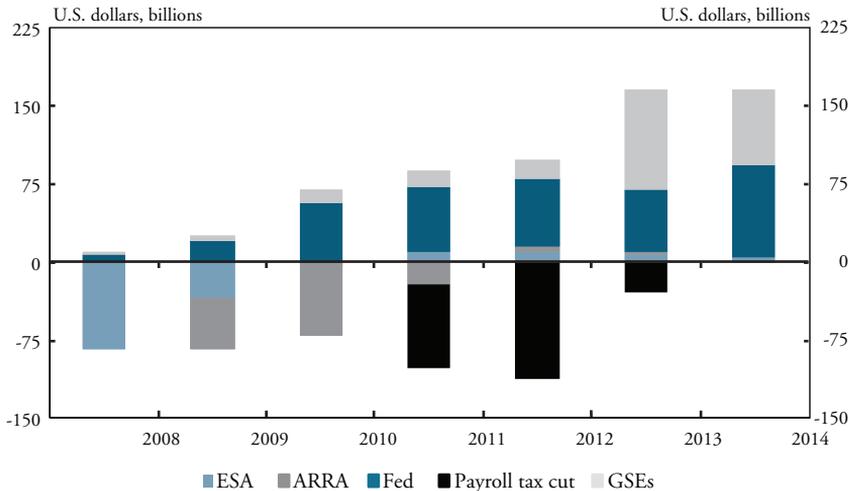
The ESA was the first stimulus measure to respond to the emerging Great Recession. The ESA was narrowly focused on boosting personal incomes and lowering corporate tax payments. It had a large effect on federal revenues and a smaller effect on federal transfer payments, both concentrated in 2008. As part of the ESA, the Internal Revenue Service

Chart 7
TEMPORARY FACTORS AFFECTING FEDERAL EXPENDITURES



Source: Authors' calculations.

Chart 8
TEMPORARY FACTORS AFFECTING FEDERAL REVENUES



Source: Authors' calculations.

distributed tax rebate checks to qualifying individual taxpayers. The Bureau of Economic Analysis (BEA) recorded these rebates in their national income and product accounts (NIPAs) as either offsets to personal current taxes or as social benefit payments, depending on the tax liability of the individual receiving the check (BEA 2008). The bill also temporarily lowered tax receipts from corporations by allowing firms to claim depreciation on qualifying investments on an accelerated schedule. However, this change largely delayed revenue collection rather than reducing it outright (Tax Policy Center).

The ESA's effect on the deficit had largely run its course by the time the ARRA took effect. At a total cost of \$832 billion, the ARRA was the largest stimulus measure Congress enacted in response to the Great Recession.⁴ It substantially, albeit temporarily, increased federal consumption and investment spending in many areas, including infrastructure, education, health care, and energy.⁵ Transfer payments to states and individuals also increased. The ARRA's boost to government spending peaked in fiscal year 2010 at over \$150 billion in additional expenditures before falling to a negligible amount by 2014. In addition, the ARRA included a variety of tax law changes, most notably the "Making Work Pay" tax credit that temporarily lowered federal revenues. As with expenditures, the ARRA's effect on revenue peaked in 2010, though at less than half the level of expenditures.

Two other stimulus programs are included as temporary factors in this analysis: the payroll tax holiday and the EUC program.⁶ Congress enacted the payroll tax holiday in 2011 to enable workers to keep a larger share of their earnings. A series of bills extended the program's 2-percentage-point cut to the Social Security contribution rate for employees and the self-employed through 2012 (BEA 2013). This tax cut lowered individuals' social insurance payments, increasing the deficit by just over \$110 billion in fiscal year 2012.

The EUC program was likewise legislated in pieces. As a large, temporary policy, it was similar enough to the other stimulus measures to be included in this analysis as a temporary factor. From July 2008 through December 2013, the EUC program extended unemployment benefits for additional weeks beyond what the regular Unemployment Compensation and the permanent Extended Benefit programs provided (Congressional Research Service). The program increased transfers

from the federal government to individuals during these years. The effect of the EUC program on the deficit peaked in fiscal year 2010 at about \$72 billion.

Together, these stimulus measures boosted expenditures and lowered revenues following the Great Recession, increasing the federal deficit. Charts 7 and 8 show the effects of these stimulus measures on federal revenues and expenditures, respectively. The charts also include the effects from the other temporary factors previously discussed. Their combined effect on raising the deficit peaked in 2010, and the deficit has narrowed over the past few years as these temporary factors faded. The stimulus measures largely ran their course by fiscal year 2013, and Federal Reserve remittances and GSE dividends are now the key temporary factors affecting the deficit.

III. AUTOMATIC STABILIZERS AND THE DEFICIT

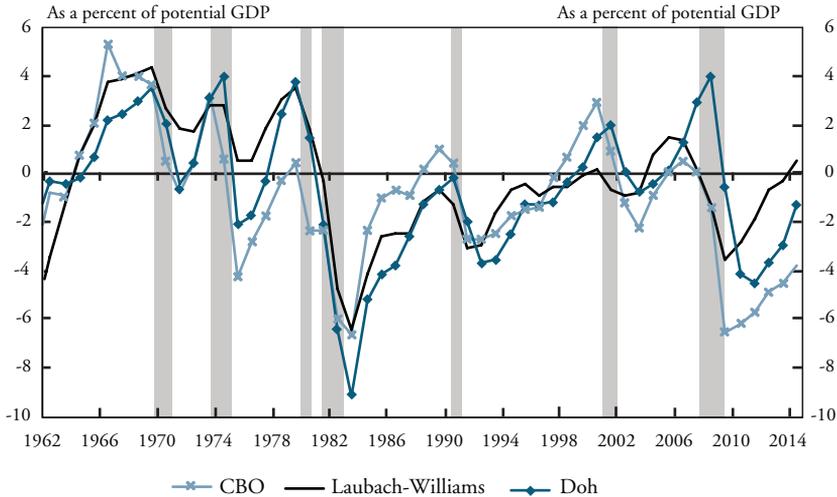
Automatic stabilizers also contribute to changes in the size of the deficit. Gauging the extent of their contribution, however, requires a framework that measures the size of any shortfall in economic output relative to its potential level—that is, the output gap—along with the effect this shortfall has on the deficit.

Real-time uncertainty about the output gap

The output gap, the amount of spare capacity in the economy, is expressed as the percentage difference between actual GDP and its potential level. Chart 9 compares three estimates of the output gap on an annualized basis. According to the often-cited CBO estimate, actual output was about 0.25 percent above its potential level at the end of 2007. When output exceeds potential, as appeared to be the case in 2007, the economy is sufficiently strong to attract workers who may have been uninterested in working or unable to find work under weaker economic conditions. Some equipment and facilities may also be put to use that would otherwise be idle. Thus, potential output is not a ceiling on economic activity, but a measure that captures the level of production the economy could achieve without undo strain on its available resources. Historically, wage and consumer price pressures build when the economy is operating above its potential level. In contrast, the economy operates below its potential level during a recession

Chart 9

MEASURES OF THE OUTPUT GAP CAN VARY CONSIDERABLY



Sources: Congressional Budget Office, Federal Reserve Bank of Kansas City, Federal Reserve Bank of San Francisco, NBER.

and recovery, as has been the case since late 2007. In the third quarter of 2014, the CBO estimated actual GDP was about 3.5 percent below its potential level, an improvement from the nearly 8-percentage-point gap during the financial crisis.

The CBO's estimate, however, is only one measure of the output gap. Another measure is based on Doh's model for the natural rate of unemployment, which is the rate consistent with an economy producing GDP at its potential level. This framework allows for time-variation in the relationships between inflation and interest rates when measuring the natural rate. To convert the gap between the actual and natural unemployment rates to an output gap measure, the following Okun's law relationship is used:

$$\text{Output Gap} = \ln(Y_t/Y_t^*) = -2(U_t - U_t^*) \quad (1)$$

where Y_t is real GDP, Y_t^* is potential real GDP, U_t is the unemployment rate, and U_t^* is the Doh measure of the natural unemployment rate. For example, the relation indicates actual output is 2 percentage points

above its potential level when the unemployment rate is 1 percentage point below its natural rate.

The output gap based on Doh's measure implies the economy was operating well above its potential level in 2007, the year before the financial crisis, and had less spare capacity at the end of 2013 than the CBO measure implies. As of the third quarter 2014, this measure indicates the output gap is about 0.5 percent, substantially below the CBO estimate.

The third measure in Chart 9 is based on an econometric model from Laubach and Williams. This measure uses information from interest rates and inflation to estimate the output gap. According to this measure, actual output was modestly above its potential level in the second quarter of 2014. The differences in Chart 9 highlight an important issue associated with real-time estimates of the output gap—namely, that they are often highly uncertain.⁷ As a consequence, evaluating a range of measures is often appropriate. In the next section, we combine these measures along with some fiscal variables to extract a composite measure of the output gap and its relationship to the deficit.

The deficit and economic fluctuations

The output gap is not the only factor affecting the contribution of automatic stabilizers to the deficit. The sensitivity, or elasticity, of tax revenue and government spending to the output gap is also important. To illustrate, one approach to describing the relationship between tax revenue and its structural level is given by

$$R_t^* = R_t (Y_t^* / Y_t)^{1+\varepsilon_{R,Y}} \quad (2)$$

where R_t is tax revenue after any temporary influences have been removed and R_t^* is the structural level of tax revenue when it is unaffected by the business cycle. If actual output is equal to its potential or revenues are completely insensitive to the state of the business cycle, then the structural level of revenues will be the same as actual revenues. The difference between the structural and actual level reflects the contribution of the automatic stabilizers.

To estimate the elasticity, equation (2) can be rewritten as

$$\ln(R_t / Y_t) = \ln(R_t^* / Y_t^*) + \varepsilon_{R,Y} \ln(Y_t / Y_t^*), \quad (3)$$

which shows regressing the log of the ratio of revenue to GDP on the output gap produces an estimate of $\varepsilon_{R,Y}$. In this case, the intercept measures the steady-state level of revenue relative to GDP, which can be affected by changes in tax law.

Of course, an estimate of the output gap is required to run the regression in (3) and gap measures can vary substantially. To address these issues, the statistical framework incorporates information from the various output gap estimates in Chart 9 as well as fiscal policy variables to produce both a “composite” measure of the output gap and, simultaneously, estimates of the elasticities. The model is cast in a state-space framework using the following measurement equations to capture the dynamics of the observable variables:

$$r_{j,t} = r_j + \gamma_i d_{i,t} + \varepsilon_{j,x} x_t + \delta Z_t + u_{j,t} \quad (4)$$

$$g_t = g + \varepsilon_{g,x} x_t + u_{g,t}, \quad (5)$$

$$x_{k,t} = x_t + e_{k,t}, \quad (6)$$

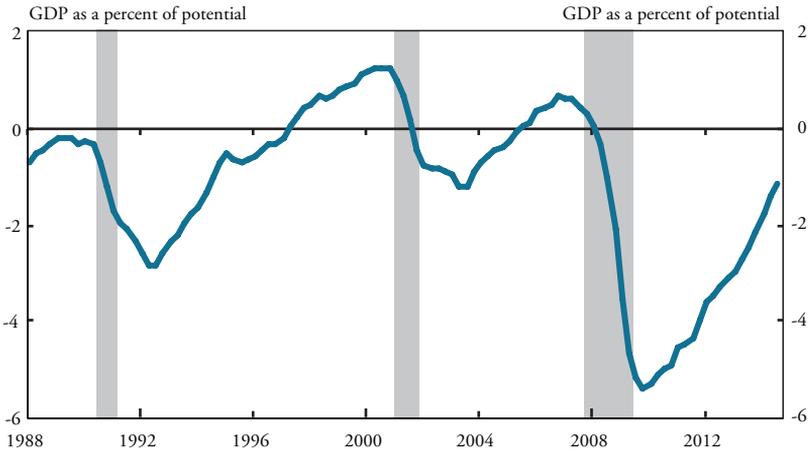
and the following state equation to capture the dynamics of the unobserved output gap:

$$x_t = p_1 x_{t-1} + p_2 x_{t-2} + v_t \quad (7)$$

The first set of observation equations is represented by (4), where $r_{j,t}$ is the log of tax revenue as a share of GDP from source j at time t .⁸ Tax revenue is split into three different components—personal income taxes, corporate taxes, and social insurance taxes. Breaking revenues out by their different sources is consistent with the methodology used, for example, by Girouard and André when comparing the fiscal stance across a range of countries.⁹ In 2013, these three sources of revenue accounted for about 87 percent of total federal revenue. Temporary revenue sources, such as remittances from the Federal Reserve and dividends from the GSEs, accounted for about another 8 percent. However, because these temporary sources generally lack cyclicity, they are not included in this framework. The framework also allows factors other than the output gap to affect revenues, as the variable Z_t reflects. For example, detrended equity prices are included in the equation describing personal income taxes to control for the cyclical effect of stock

Chart 10

A COMPOSITE OUTPUT GAP MEASURE



Sources: NBER, authors' calculations.

Note: Gray bars represent NBER-defined recessions.

market fluctuations on revenue from capital gains. Dummy variables, d_t , correspond to major tax reforms.¹⁰

Equation (5) measures the impact of the output gap on social insurance benefits paid by the federal government, g_t . The variable x_t then denotes the composite output gap, while $x_{k,t}$ represents a noisy signal on the gap from source k .

The four observation equations represented by (6) use the three measures of the output gap presented earlier as well as an Okun's law equation relating movements in the unemployment rate to the output gap. The model views each measure of the output gap as a noisy signal of the underlying true gap and combines that information with movements in the fiscal variables to estimate the output gap and the tax elasticities. Chart 10 shows the output gap measure from the model, referred to as the "composite" gap, which was about 1.1 percent in the third quarter of 2014.

Table 1 shows the tax elasticities vary substantially across tax receipt sources. For example, corporate income taxes are quite sensitive to the cycle. A 1-percentage-point change in the output gap results in about a 7-percentage-point change in corporate taxes.¹¹ Although this may seem extreme, consider that corporate tax revenues fell by over 50

Table 1

ESTIMATED ELASTICITIES OF FISCAL VARIABLES WITH RESPECT TO THE OUTPUT GAP

	Personal Taxes ($1+\epsilon_{1x}$) (percentage point)	Corporate Taxes ($1+\epsilon_{2x}$) (percentage point)	Social Security Taxes ($1+\epsilon_{3x}$) (percentage point)	Spending ($1+\epsilon_{gs}$) (percentage point)
Change due to a 1-percentage-point increase in the output gap	3.74*	7.24*	1.42*	-14.07*

* Significant at the .05 percent level.

percent in the fourth quarter of 2008 from their level one year earlier but then rebounded by about 50 percent the following year.¹² For personal taxes, a 1-percentage-point change in the output gap results in about a 3.7-percentage-point change in personal tax receipts. Social Security taxes are less responsive to economic fluctuations, as they are based on a flat percentage of income earned up to a threshold and therefore move close to one-for-one with the cycle. For social insurance spending, a 1-percentage-point change in the output gap changes spending in this category by about 14 percentage points. All these movements reflect the contribution of automatic stabilizers since they occur without directed policy changes from lawmakers.

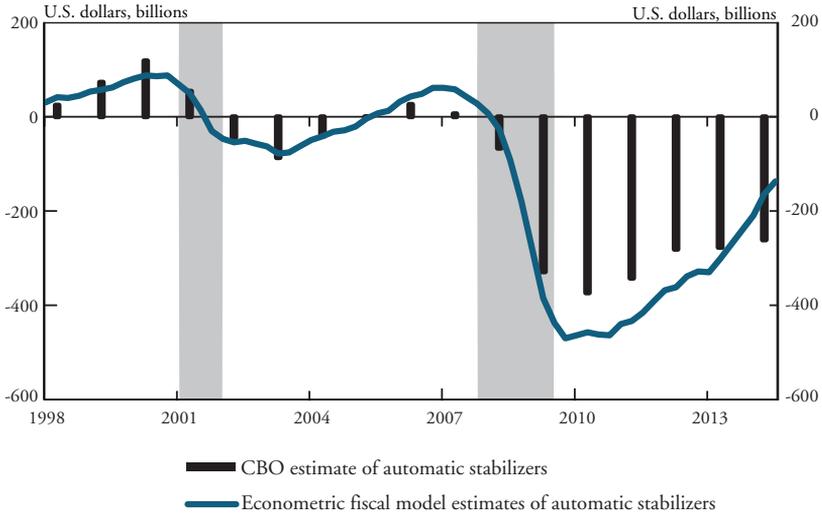
Automatic stabilizers over the business cycle

With an estimate of the output gap and elasticities in hand, equation (2) forms the basis for calculating the structural level of revenues—that is, the level of tax revenues that would be realized if the economy were operating at full employment. A similar calculation provides the structural level of the social insurance component of government spending. The automatic stabilizing aspect of each component is the difference between its realized level and structural level, computed using equation (2). If the output gap is negative, actual GDP is below potential. As a result, taxes are lower and spending is higher than they would be if real GDP were equal to potential.

Chart 11 shows the overall contribution of automatic stabilizers. For comparison, the model's estimate is plotted against estimates from the CBO (CBO 2014c). Both estimates show that in the mid- to late-1990s, the high level of output resulted in a positive level for the automatic stabilizers. Due to the positive output gap, taxes were above the structural level and spending on social insurance was low. In 2000,

Chart 11

AUTOMATIC STABILIZERS



Sources: Congressional Budget Office, NBER, authors' calculations.
 Note: Gray bars represent NBER-defined recessions.

both estimates show automatic stabilizers increased the fiscal surplus by about \$100 billion. During the 2001 recession, output fell below potential and the automatic stabilizers declined. At the end of 2003, output remained below potential, and estimates from the econometric model indicate automatic stabilizers added about \$70 billion to the deficit. Estimates from the CBO and the econometric model differ slightly in the timing during this period, but the overall magnitudes are quite similar.

In the latter phases of the housing boom, the composite output gap estimate from the econometric model indicates real GDP was almost 1 percentage point above potential at the end of 2006. As a result, automatic stabilizers were positive and thus kept the deficit below levels that would have been realized if real GDP had been closer to potential.

During and after the financial crisis, automatic stabilizing effects kicked in forcefully. According to the econometric model, they moved from reducing the deficit by about \$25 billion by the end of 2007 to widening it by more than \$50 billion by the end of 2008 and over \$400 billion by the end of 2010. The extent to which these changes stabilized economic activity during the crisis depends on several factors,

including the fiscal multiplier. The fiscal multiplier determines how much output will change in response to a change in revenue flowing to the government or expenditures flowing from it. For example, a fiscal multiplier of 1 would suggest that without the \$400 billion automatic stabilizing adjustments to the deficit in 2010, real GDP would have been \$400 billion, or nearly 3 percentage points, lower. Substantial uncertainty surrounds estimates of the fiscal multiplier, but even an estimate of 0.5—a value at the lower end of most estimates—would suggest the effect of the automatic stabilizers on real GDP during the crisis and early in the recovery would have been about 1.5 percentage points. Furthermore, research suggests the fiscal multiplier may be even higher when nominal interest rates are constrained at the zero lower bound as they have been since the end of 2008 (Christiano, Eichenbaum, and Rebelo). Thus, automatic stabilizers likely played an important role in supporting activity during this period.

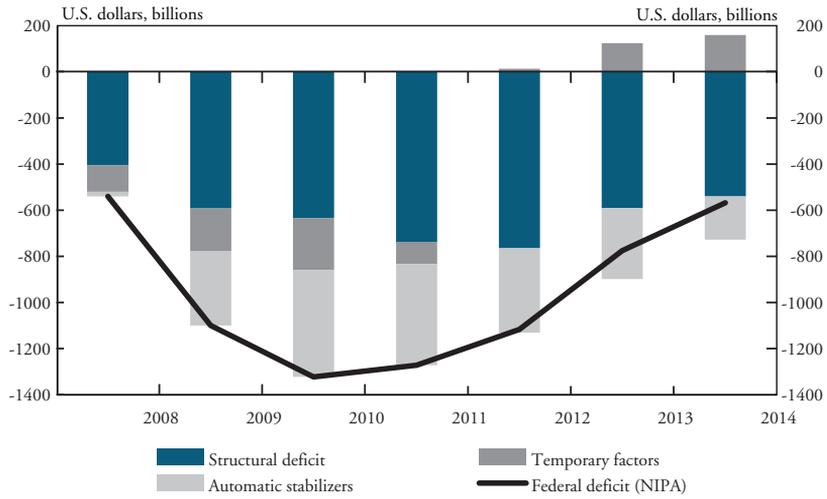
Although the econometric model suggests this support has declined since the end of the crisis, the contribution of automatic stabilizers remains substantial. In addition, the CBO estimates in Chart 11 indicate the improvement from continued economic growth may be larger than the model suggests. The difference largely reflects different estimates of the output gap, as the composite gap measure—which is incorporated in the econometric model—is currently about one-third the size of the CBO estimate.

IV. DEFICIT ACCOUNTING SINCE THE CRISIS

The federal deficit has narrowed substantially over the past few years. On a NIPA basis, the deficit declined by about \$753 billion from 2010 to 2014. To gauge how much of the improvement is driven by the cyclical rebound in the economy relative to temporary factors, Table 2 reports the breakdown across the various components using the accounting framework and econometric model from the previous sections. The breakdown is also displayed in Chart 12 .

Table 2 shows that a swing in temporary factors explains about \$384 billion of the improvement in the deficit. Stimulus measures added to the deficit during the first few years of the recovery, but their effect largely wound down by 2013. Meanwhile, growing contributions to revenues from Federal Reserve remittances and dividend payments

Chart 12
DECOMPOSING THE DEFICIT



Sources: Congressional Budget Office, authors' calculations.

Table 2
ACCOUNTING FOR CHANGES IN THE DEFICIT

	Federal deficit (NIPA basis)	-	Temporary factors	-	Automatic Stabilizers				=	Deficit without temporary factors and automatic stabilizers
					Personal	Corporate	Social Insurance	Spending		
2008	-541		-115		-11	-4	-4	4	-23	-403
2009	-1100		-186		-152	-48	-55	74	-343	-570
2010	-1322		-225		-207	-99	-76	96	-480	-617
2011	-1272		-96		-202	-91	-69	87	-444	-731
2012	-1117		13		-164	-82	-55	69	-367	-763
2013	-775		123		-142	-69	-45	55	-307	-592
2014	-569		159		-84	-45	-26	32	-187	-540
Change from 2010 to 2014	753		384		123	56	50	-64	293	77

from the GSEs resulted in a deficit in 2014 that was \$159 billion less than it would have been absent these temporary factors. Of the overall \$753 billion decline in the deficit, about half is attributable to temporary factors.

Automatic stabilizers have also played an important role in reducing the deficit. In 2010, the automatic stabilizers resulted in a deficit \$480 billion larger than it would have been had the economy been operating at full employment. Although the estimates from the econometric model indicate that real GDP is still below potential, it is substantially closer than it was in 2010. As a result, automatic stabilizers added \$187 billion to the deficit in 2014, about \$293 billion less than in 2010.

V. CONCLUSIONS

Automatic stabilizers and temporary factors have played an important role in first increasing the deficit to historic highs and then in leading the rapid return to more typical deficit levels. A number of stimulus measures increased the deficit in the early stages of the recovery, while the waning effects of those measures coupled with temporarily elevated revenues from Fed remittances and GSE dividends actually decreased the deficit more recently.

Looking ahead, a number of factors will significantly affect the fiscal outlook. As the economy recovers and real GDP continues to approach its potential level, the contribution of automatic stabilizers to the deficit will decline. If the economy reaches its potential within the next few years, estimates from the econometric model suggest the deficit will narrow by an additional \$187 billion from its 2014 level. However, the decline in the deficit resulting from the economic recovery will likely be partially offset by smaller contributions from the temporary factors as Federal Reserve remittances and dividend payments from the GSEs decline. In addition, structural factors related to the aging population will also play a central role in the fiscal outlook over the longer run. Overall, the deficit is likely to continue to decline over the next year or two due to the economic recovery, but at a more modest pace compared with the past few years.

ENDNOTES

¹All deficit values are reported on a U.S. federal fiscal year basis. The transactions used are recorded in the national income and product accounts (NIPAs) produced by the Bureau of Economic Analysis (BEA) rather than the more commonly cited budget scoring provided by the Office of Management and Budget's (OMB) Budget of the United States Government. The BEA's measure better reflects how federal fiscal policy affects the economy. See "CBO's Projections of Federal Receipts and Expenditures in the National Income and Product Accounts."

²The temporary factors included in this analysis are those from the Economic Stimulus Act of 2008 and the American Recovery and Reinvestment Act of 2009 excluding the adjustment to the Alternative Minimum Tax (AMT), as well as the temporary 2-percentage-point payroll tax reduction starting in 2011, Fed remittances above the pre-crisis level, dividends from the GSEs, and emergency unemployment compensation.

³Structural estimates of Fed remittances are based on how much the Fed would have been sending to the Treasury had the crisis-era programs not been launched, assuming an unchanged path for interest rates. See Fleming and others.

⁴Another large crisis-era program, the Troubled Asset Relief Program (TARP), disbursed over \$400 billion from 2008 to 2011. The program had only a limited effect on net federal saving in the national accounts and is therefore excluded from this analysis (see BEA 2009).

⁵The ARRA's funding for the Alternative Minimum Tax rate "patch" is not included in this measure of temporary factors because the legislative change occurred so regularly that it was akin to a structural policy. The ARRA's funding of the EUC program is also treated separately, as funding for that program began before the ARRA and continued afterward.

⁶Other measures could have been counted as temporary factors but were not large enough or clearly distinguishable from routine changes to government spending and tax policy. For example, see Council of Economic Advisers.

⁷For example, see Orphanides; Orphanides and Van Norden; and Orphanides and Williams.

⁸Quarterly data from the NIPAs from 1988:Q1 through 2014:Q3 are used.

⁹Girouard and André use detailed information from the tax code to generate their estimate of the elasticity of personal current taxes to the aggregate wage bill. They then use econometric methods to estimate the elasticity of the wage bill to the output gap. For the output gap estimate, they use estimates reported by the Organisation for Economic Co-operation and Development based on methodology described in Cotis, Elmeskov, and Mourougane.

¹⁰For personal taxes, dummies are included for the major tax reforms since 1988, such as those occurring in 1990, 2001, 2003, and 2013.

¹¹The effect is based on the $\varepsilon_{R,Y}+1$ in equation (5).

¹²The change in corporate taxes is computed excluding the effects of Federal Reserve remittances.

REFERENCES

- Bureau of Economic Analysis. 2013. "Federal Recovery Programs and BEA Statistics," August.
- _____. 2009. "NIPA Translation of the Fiscal Year 2010 Federal Budget," June.
- _____. 2008. "How Are the Rebates for Individuals in the 2008 Economic Stimulus Act Recorded in the NIPAs?" May.
- Carpenter, Seth B., Jane E. Ihrig, Elizabeth C. Klee, Daniel W. Quinn, and Alexander H. Boote, "The Federal Reserve's Balance Sheet and Earnings: A Primer and Projections," Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series, 2013-01.
- Christiano, Lawrence, Martin Eichenbaum, and Sergio Rebelo. "When is the Government Spending Multiplier Large?" *Journal of Political Economy*, vol. 119, no. 1, pp. 78-121.
- Cohen, Darrel S., and Glenn R. Follette. 1999. "The Automatic Fiscal Stabilizers: Quietly Doing their Thing," Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series, 1999-64.
- Congressional Budget Office. 2014a. "An Update to the Budget and Economic Outlook: 2014 to 2024," August.
- _____. 2014b. "CBO's Projections of Federal Receipts and Expenditures in the National Income and Product Accounts," August.
- _____. 2014c. "The Effects of Automatic Stabilizers on the Federal Budget as of 2014," February.
- _____. 2004. "A Summary of Alternative Methods for Estimating Potential GDP," March.
- _____. 2001. "CBO's Method for Estimating Potential Output: An Update," August.
- Congressional Research Service. 2014. "Emergency Unemployment Compensation (EUC08): Status of Benefits Prior to Expiration," August.
- Cotis, Jean-Philippe, Jørgen Elmeskov, and Annabelle Mourougane. 2005. "Estimates of Potential Output: Benefits and Pitfalls from a Policy Perspective," in Lucrezia Reichlin, ed., *The Euro Area Business Cycle: Stylised Facts and Measurement Issues*, London: CEPR.
- Council of Economic Advisers. 2014. *2014 Economic Report of the President*, March.
- Doh, Taeyoung. 2011. "Is Unemployment Helpful in Understanding Inflation?" Federal Reserve Bank of Kansas City, *Economic Review*, vol. 96, no. 4, pp. 5-26.
- Federal Open Market Committee. 2014. "Summary of Economic Projections," September.
- Fleming, Michael, Deborah Leonard, Grant Long, and Julie Remache. 2014. "What If? A Counterfactual SOMA Portfolio," Federal Reserve Bank of New York, *Liberty Street Economics*, August.
- Girouard, Nathalie, and Christophe André. 2005. "Measuring Cyclically Adjusted Budget Balances for OECD Countries," Organisation for Economic Co-operation and Development, Economics Department Working Papers, No. 434.

- Laubach, Thomas, and John C. Williams. 2003. "Measuring the Natural Rate of Interest," *Review of Economics and Statistics*, vol. 85, no. 4, pp. 1063-1070.
- Office of Management and Budget. 2014. "Analytical Perspectives, Budget of the United States Government, Fiscal Year 2015."
- Orphanides, Athanasios. 2001. "Monetary Policy Rules Based on Real-Time Data," *American Economic Review*, vol. 91, no. 4, pp. 964-85.
- _____, and Simon Van Norden. 2002. "The Unreliability of Output Gap Estimates in Real Time," *Review of Economics and Statistics*, vol. 84, no. 4, pp. 569-83.
- _____, and John C. Williams. 2002. "Robust Monetary Policy Rules with Unknown Natural Rates," *Brookings Papers on Economic Activity*, no. 2.
- Pew Research Center. 2014. "Debt and Deficit: Key Data Points from Pew Research," January.
- Tax Policy Center, Urban Institute, and Brookings Institution. 2008. "Economic Stimulus: What Does the 2008 Stimulus Act Do for Businesses?" March.

