EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS

THE ECONOMIC IMPACT OF THE AMERICAN RECOVERY AND REINVESTMENT ACT FIVE YEARS LATER

FINAL REPORT TO CONGRESS

FEBRUARY 2014

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EXECUTIVE SUMMARY

President Obama took office in the middle of the worst economic crisis since the Great Depression. In the previous year private employers shed 3.8 million jobs. Trillions of dollars of household wealth had been wiped out, and the economy's total output, as measured by real gross domestic product (GDP), was in the midst of its most severe downturn of the postwar era. In the face of this crisis, the President took immediate, bold, and effective action.

Five years ago, on February 17, 2009, less than a month into his first term, President Obama signed into law the American Recovery and Reinvestment Act of 2009, also known as the Recovery Act, or ARRA. In the four years following the Recovery Act, the President built on this initial step, signing into law over a dozen fiscal measures aiming to speed job creation, including extending Emergency Unemployment Compensation, measures for teacher jobs, aid to states for Medicaid, a temporary 2 percent payroll tax cut for 160 million working Americans, an even greater allowance for businesses to write off the cost of investments when computing their tax liability (that is, "expensing"), the cash-for-clunkers program, an expanded homebuyer tax credit, additional business tax incentives and small business tax cuts, the HIRE Act tax credit, and incentives to hire veterans.

Thanks in significant part to the actions of President Obama, the economic picture today is much brighter. GDP per capita started expanding in the third quarter of 2009 and reached its pre-crisis level in nearly four years, considerably faster than the historical record suggests is the typical pace of recovery following a systemic financial crisis.[1] Since 2010, the U.S. economy has also consistently added over 2 million private-sector jobs a year, bringing the overall unemployment rate down to its lowest level since October 2008. The broad-based growth in jobs across sectors has withstood significant headwinds, including more recent fiscal contraction at all levels of government. While there is more work to do to help provide opportunity for all, the Recovery Act and subsequent jobs measures were an important step in the right direction.

As part of the accountability and transparency provisions included in the American Recovery and Reinvestment Act of 2009 (ARRA), the Council of Economic Advisers (CEA) was charged with providing to Congress quarterly reports on the effects of the Recovery Act on overall economic activity, and on employment in particular. In this final report, we provide an assessment of the effects of the Act through the fourth quarter of 2013 as well as an assessment of subsequent jobs measures.

[1] See Reinhart and Rogoff (forthcoming).

New estimates from the Council of Economic Advisers (CEA) find that the President's Jobs Legislation Had a Substantial and Sustained Impact on the Economy

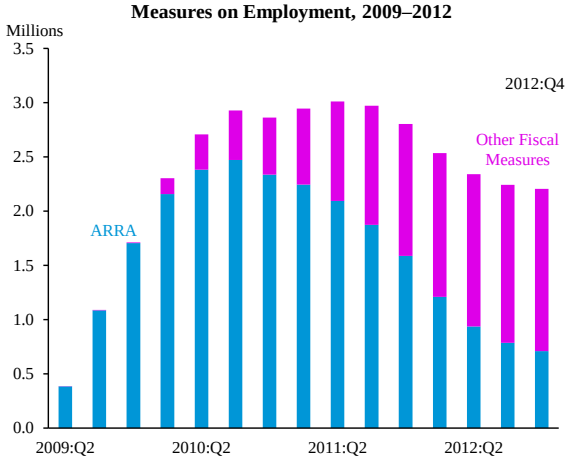
- **The Recovery Act, by itself, saved or created about 6 million job-years, where a job-year is defined as one full-time job for one year.** This translates to an average of 1.6 million jobs a year for four years through the end of 2012. This estimate is within the range of estimates provided by the Congressional Budget Office and other outside organizations.

- **In addition, the Recovery Act alone raised the level of GDP by between 2 and 3 percent from late 2009 through mid-2011.** This estimate is also within the range of estimates provided by the Congressional Budget Office (CBO) and private-sector forecasters.

- **Combining the effects of the Recovery Act and the additional fiscal measures that followed, the CEA estimates that the cumulative gain in employment was about 9 million job-years through the end of 2012.**

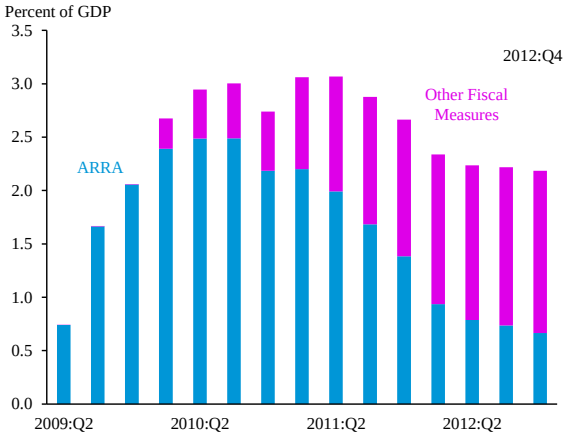
- **The cumulative boost to GDP from 2009 through 2012 is equivalent to 9.5 percent of fourth quarter of 2008 GDP.**

Quarterly Effect of the Recovery Act and Subsequent Fiscal Measures on Employment, 2009–2012



Source: Bureau of Economic Analysis, National Income and Product Accounts; Congressional Budget Office; CEA calculations.

Quarterly Effect of the Recovery Act and Subsequent Fiscal Measures on GDP, 2009–2012



Source: Bureau of Economic Analysis, National Income and Product Accounts; Congressional Budget Office; CEA calculations.

- **A wide range of other economic research, including publications in referred journals, has used evidence covering households, countries, and states to confirm that the Recovery Act had substantial economic effects.** Moreover, while these estimates are substantial, they still understate the full impact of the Administration's economic policies in tackling the Great Recession because they are based only on the effect of fiscal legislation. The CEA estimates do not account for the broader set of responses that included policies to stabilize the financial system, rescue the auto industry, and provide support for the housing sector—in addition to the independent actions undertaken by the Federal Reserve.

The Jobs Legislation Included a Mixture of Investments, Tax Cuts for Families and Businesses, and Relief for Individuals and States

- **As indicated in CBO's initial cost projections, the Recovery Act was fairly evenly distributed.** It included tax cuts ($212 billion), mandatory spending on programs such as Medicaid and unemployment benefits ($296 billion), and discretionary spending ($279 billion) in areas ranging from aid to individuals to investments in infrastructure, energy, education, and health care. Excluding the AMT patch, the Recovery Act is expected to provide a total fiscal impulse of $763 billion by 2019, with over 90 percent of that impulse occurring before the end of fiscal year 2012.

- **Over two-thirds of the money in the subsequent fiscal measures (also excluding routine tax extenders and other expected policies) went to tax cuts for individuals and businesses.** Of the $674 billion in fiscal support following the Recovery Act through 2012, the largest components were the payroll tax cut from 2011 to 2012 ($207 billion) and extended unemployment insurance benefits ($161 billion). The remaining portion of the subsequent fiscal measures included relief for States, tax incentives for businesses, and investments in education, infrastructure, among other areas.

- **Combining both the Recovery Act and subsequent fiscal measures, half of the total fiscal support for the economy, or $689 billion, came in the form of tax cuts—mostly directed at families.** The remainder went to investments in critical areas such as rebuilding bridges and roads, supporting teacher jobs, or providing temporary help for those who found themselves unemployed because of the impact of the Great Recession. Note these totals remove routine extensions of pre-existing provisions like the Alternative Minimum Tax patch or the Medicare Sustainable Growth Rate (SGR) fix.

The Recovery Act and Subsequent Jobs Measures Had Substantial Effects in Helping Families Through a Difficult Economic Period

- **Over 160 million workers annually got tax cuts.** The Making Work Pay tax credit in 2009 and 2010 provided $800 for a typical couple. The payroll tax cut provided $1,000 for an average earner. Additional tax cuts helped make college more affordable.

- **The Recovery Act and subsequent extensions protected against a large increase in poverty.** Based solely on market incomes, the poverty rate would have risen 4.5 percentage points from 2007 to 2010. However, after taking into account items like the Earned Income Tax Credit, the child tax credit, and nutrition assistance, the poverty rate rose just 0.5 percentage points. Without the Recovery Act's boost to household incomes, the poverty rate would have risen an additional 1.7 percentage points—which translates into about 5.3 million additional people that would have slipped into poverty in 2010.

- **The Recovery Act included lasting unemployment insurance reforms.** Two of the most significant reforms in unemployment insurance in decades were undertaken first in the Recovery Act and then as part of the extension of emergency unemployment compensation in February 2012. These reforms modernized state-based programs, extended coverage to

people that previously were falling through the cracks, and helped the unemployment insurance system do more to preserve jobs and connect workers to new jobs.

The Recovery Act Will Increase Long-term Growth—While Having Little Impact on the Long-Run Debt

- **The return on investments in the Recovery Act will elevate the productivity and output of the American economy long after the direct spending authorized by the Act has fully phased out.** The Recovery Act and subsequent jobs measures contained a large number of provisions that were aimed at strengthening long-run growth, providing for substantial investment in areas such as physical and technological infrastructure, education and job training, scientific research, and clean energy. For example, the Recovery Act:

    - Initiated more than 15,000 transportation projects, which will improve nearly 42,000 miles of road, mend or replace over 2,700 bridges, and provide funds for over 12,220 transit vehicles.

    - Made the largest-ever investments in American high-speed rail, constructing or improving approximately 6,000 miles of high-performance passenger rail corridors and procurement of 120 next-generation rail cars or locomotives.

    - Cleaned up 1,566 acres of properties that are now ready for reuse, far exceeding the original target of 500 acres, and led to 30,900 old diesel engines being retrofitted, replaced, or retired, which has reduced lifetime emissions of carbon dioxide by 840,300 tons and particulate matter by 3,900 tons.

    - Improved more than 3,000 water quality infrastructure projects and Clean Water projects, serving more than 78 million people nationwide, as well as bringing 693 drinking water systems (serving over 48 million Americans) into compliance with Safe Drinking Water Act standards.

    - Launched the innovative Race to the Top Program, which rewarded States that implemented critical reforms. Encouraged by the incentives in Race to the Top, 34 states modified state education laws and policies in ways known to help close the achievement gap and improve student outcomes.

    - Provided the Advanced Research Projects Agency-Energy (ARPA-E) with an initial appropriation of $400 million, to begin researching transformative energy technologies such as second-generation biofuels, more efficient batteries, superconducting wires, and vehicles powered by natural gas.

    - Boosted federal funding to renewable wind, solar, and geothermal energy as well as leveraging private dollars to help increase wind electricity net generation nationwide by 145 percent, and solar thermal and photovoltaic electricity net generation by more than fourfold from 2008 to 2012.

- Provided incentives for the adoption and meaningful use of health information technology, the use of which has risen from 17 percent to 40 percent of doctor's offices and from 9 percent to 44 percent of hospitals between 2008 and 2012.

- Added or improved more than 110,000 miles of broadband infrastructure, making high-speed connections available to about 20,000 community institutions, facilitating 16 million hours of technology training to more than four million users, and helping to spread the diffusion of broadband throughout the Nation.

- **The Recovery Act had at most a minimal impact on the long-run debt—and the additional growth it produced likely further reduced or eliminated its cost.** Traditional budget scoring indicates that, because the Recovery Act was temporary, its impact on the long-run fiscal situation was minimal, adding less than 0.1 percent of GDP to the 75-year fiscal gap. This calculation may overstate the true cost of the Recovery Act because the direct output gains it produced are sufficient to cover one-quarter of its projected cost. Moreover, researchers have found that, to the degree anti-recessionary legislation generates long-term benefits for the economy, these benefits would further offset costs of the Recovery Act and reduce its contribution to the long-run debt. Although many of these macroeconomic feedback effects are not operative in a normally-functioning economy, when aggregate demand is insufficient and monetary policy is constrained by a zero lower bound, then fiscal policy can have a larger impact on output and thus a larger offset to any associated additions to the debt.

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I. INTRODUCTION

On February 17, 2009, President Obama signed into law the American Recovery and Reinvestment Act of 2009, also known as the Recovery Act, or "ARRA." At the time, the country was going through the worst economic and financial crisis since the Great Depression. In the year leading up to the passage of the Act, private employers shed 4.6 million jobs and another 698,000 were lost that February alone. Trillions of dollars of household wealth had been wiped out, and the economy's total output, as measured by real gross domestic product (GDP), was in the midst of its most severe downturn in the post-war era.

The purpose of the Recovery Act was to provide countercyclical fiscal support for the economy as part of a suite of monetary and fiscal policies aimed at containing the already-severe recession that, had it spiraled further, could have resulted in a second Great Depression. The Act was also intended to lay the foundation for a stronger and more resilient economy in the future.

In the four years following the Recovery Act, the President built on this initial step, signing into law over a dozen fiscal measures aiming to speed job creation. These measures, which extended key elements of the Recovery Act and provided new sources of support, were motivated by a deepening understanding of the severity of the initial shocks to the economy, as well as by new challenges that subsequently arose. These additional measures nearly doubled the size and impact of the Recovery Act's fiscal support to the economy through the end of 2012.

Nearly half of the jobs measures in the Recovery Act and subsequent legislation, or $688 billion, were tax cuts—with most of them directed at families. The other half was for investments critical areas such as rebuilding bridges and roads, supporting teacher jobs, or providing temporary help for those who found themselves unemployed because of the impact of the Great Recession.

The economic picture today is much brighter. GDP per capita started expanding in the third quarter of 2009 and reached its pre-crisis level in about four years, considerably faster than the historical record suggests is the typical pace of recovery following a systemic financial crisis.[2] Since 2010, the U.S. economy has also consistently added over 2 million private-sector jobs a year, bringing the overall unemployment rate down to its lowest level since October 2008. Job growth has been broad-based across sectors and has withstood significant headwinds, including more recent fiscal contraction at all levels of government, and concerns stemming from the European sovereign debt crisis.

As part of the unprecedented accountability and transparency provisions included in the American Recovery and Reinvestment Act of 2009 (ARRA), the Council of Economic Advisers (CEA) was charged with providing to Congress quarterly reports on the effects of the Recovery Act on overall economic activity, and on employment in particular. In this final report, we

[2] See Reinhart and Rogoff (forthcoming).

provide an assessment of the effects of the Act through the fourth quarter of 2013, and of subsequent jobs measures through 2012.

This report assesses the role of the Recovery Act and the subsequent jobs measures in helping to facilitate the economic turnaround since 2009. It updates previous estimates from the Council of Economic Advisers (CEA) and other sources on the Act's contribution to employment and output growth, and expands the estimates to reflect the impact of the full set of fiscal measures undertaken. The report also considers how many investments contained in the Recovery Act have laid the groundwork for a more productive economy in the years ahead and will support growth long after the spending authorized by the Act has fully phased out.

Consistent with the preponderance of evidence from numerous private-sector, academic, and government analyses, this report finds that the Recovery Act substantially boosted employment and output. The CEA estimates that, by itself, the Recovery Act saved or created an average of 1.6 million jobs a year for four years through the end of 2012 (cumulatively, equivalent to about 6 million job-years, where a job-year is defined as one full-time job for one year). In addition, the Recovery Act alone raised the level of GDP by between 2 and 3 percent from late 2009 through mid-2011. The Recovery Act also helped individuals, businesses, and State and local governments directly affected by the downturn, and put the economy on a better trajectory for long-run growth by undertaking targeted investments in education, energy, and health care, among other areas.

Combining effects of the Recovery Act and additional countercyclical fiscal legislation that followed, CEA estimates that the cumulative gain in employment was about 9 million job-years through the end of 2012. The cumulative boost to GDP from 2009 through 2012 is equivalent to 9.5 percent of fourth quarter 2008 GDP.

While these estimates are substantial, they still understate the full impact of the Administration's economic policies in tackling the Great Recession due to being based only on the effect of fiscal measures. The CEA estimates do not account for the broader set of responses that included policies to stabilize the financial system, rescue the auto industry, and provide support for the housing sector—in addition to the independent actions undertaken by the Federal Reserve.

II. THE 2007-09 RECESSION AND THE EARLY POLICY RESPONSES

In the run-up to the 2007-09 recession, the country experienced a dramatic escalation in home prices starting in the mid-1990s, fueled by lax mortgage underwriting standards and an abundance of global capital in search of a safe, dollar-denominated return. This escalation came to an abrupt halt in 2006. Home prices stopped rising and then started falling, eventually dropping by 30 percent nationwide and even more in some areas. Millions of homeowners found themselves "under water"–that is, their mortgage loan balances exceeded the value of their homes—and many were unable to make scheduled mortgage payments.

Fallout from the housing crisis quickly spread to the broader economy through a complex web of opaque financial instruments and questionable business practices, including excessive leverage and an overreliance on short-term debt (Financial Crisis Inquiry Report 2011). Investors pulled back from risky assets, and during one fateful week in September 2008, the investment bank Lehman Brothers went out of business, a prominent money market fund "broke the buck" (meaning that depositors could no longer count on getting all their money back in its entirety, an almost unprecedented event), and the large insurance firm American International Group (AIG) teetered on the edge of bankruptcy until the U.S. government provided $85 billion in financial support.

This financial turmoil led to sharp declines in real economic activity. From the third quarter of 2007 through the first quarter of 2009, the economy lost more than $13 trillion in wealth, nearly one-fifth of the total, because of rapidly declining stock and house prices. This was much larger than the initial decline in wealth at the outset of the Great Depression.[3] Falling asset prices reduced the value of collateral and further restricted the availability of credit, and as credit dried up, many small businesses and even some large, well known corporations reported trouble meeting basic expenses such as payroll. Faced with extraordinary uncertainty about the economic future, businesses stopped hiring, laid off workers, and shelved investment plans. As housing and financial wealth plummeted and concerns over job security mounted, consumers cut back on spending. The effect was immediate and drastic: in the fourth quarter of 2008, personal consumption expenditures fell by nearly 5 percent and private investment shrunk 31 percent at an annual rate.

Most economic forecasters underestimated the magnitude of the toll these shocks would take on the economy, in large part because the United States had not gone through a systemic financial crisis since the Great Depression. Forecasts made at the time were also subject to considerable uncertainty about the spillovers to the rest of the world, and about how the economy would respond to other macroeconomic policy interventions after the federal funds rate had already hit zero. As shown in Table 1, in December 2008, for example, the Blue Chip panel of economic forecasters projected that real GDP would fall at a 1.4 percent annual rate in the first half of 2009, less than half the 2.9 percent annualized rate of decline that actually occurred. Moreover, the Blue Chip panel of forecasters estimated that the unemployment rate would rise to

[3] See Romer (2011).

7.7 percent in the second quarter of 2009, well below the actual rate of 9.3 percent. Other indicators showed similarly large deteriorations relative to forecasts.

Table 1

Forecasted and Actual Real GDP Growth and Unemployment Rate

	Real GDP Growth[a]			Unemployment Rate		
	Blue Chip[b]	Survey of Professional Forecasters[c]	Actual	Blue Chip	Survey of Professional Forecasters	Actual
2008:Q4	-4.1	-2.9	-8.3	6.7	6.6	6.9
2009:Q1	-2.4	-1.1	-5.4	7.3	7.0	8.3
2009:Q2	-0.4	0.8	-0.4	7.7	7.4	9.3

Note: a. Percent change from prior quarter at an annualized rate.
b. Blue Chip forecasts for both GDP and Unemployment were reported on December 10, 2008.
c. Survey of Professional Forecasters forecasts for both GDP and Unemployment were reported on November 17, 2008.
Source: Blue Chip Economic Indicators; Survey of Professional Forecasters; Bureau of Labor Statistics, Current Population Survey; Bureau of Economic Analysis, National Income and Product Accounts.

A. Initial Policy Responses

As the economy slid into recession, Congress and the Bush Administration enacted the Economic Stimulus Act of 2008 in February. They designed the Act to counteract a short recession by providing temporary support to consumer spending, but it was not sufficient to reverse the emerging distress and, by design, did not have long-lasting effects. In fall 2008, as the initially mild recession turned into a full-blown financial crisis, the U.S. government mounted a coordinated emergency response to prevent a meltdown of the financial system.[4] The Federal Reserve, which had progressively cut its federal funds target rate several times over the previous year, lowered the rate still further in December 2008 to near zero, where it remains to this day.

To prevent runs on banks and other financial institutions, the Treasury Department established a temporary guarantee program for money market mutual funds and the Federal Deposit Insurance Corporation expanded its guarantee on bank deposits and debt. The Bush Administration proposed and Congress approved the Troubled Asset Relief Program (TARP), providing up to $700 billion to stabilize troubled banks, automakers, insurance companies, secondary markets for consumer and small business loans, and the housing sector.[5]

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[4] A comprehensive timeline of the policy actions taken by the U.S. government can be found on the Federal Reserve Bank of St. Louis website http://timeline.stlouisfed.org/

[5] The Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) later reduced that amount to $475 billion. A detailed description of the TARP can be found on the Treasury website http://www.treasury.gov/initiatives/financial-stability/Pages/default.aspx

These early policy responses proved fundamental to rescuing the global financial system. They helped repair the balance sheets of both financial and non-financial institutions, restored investor confidence, and restored the flow of credit to struggling businesses and families. Nevertheless, the economy continued to deteriorate, and aggregate demand remained depressed. With the traditional tool of monetary policy, the federal funds rate, reaching its lower bound of zero, conventional countercyclical monetary policy could go no further, and the Federal Reserve ultimately opted for additional, non-standard measures.

III. AN OVERVIEW OF THE RECOVERY ACT AND SUBSEQUENT JOBS MEASURES

Amid very real concerns about a substantial and protracted fall in GDP accompanied by persistent elevated unemployment, the incoming Obama Administration and the 111th U.S. Congress took immediate action. In December 2008, the President-Elect and the transition team proposed the overall scope and elements of what they called the American Recovery and Reinvestment Act. Just days after the President's inauguration, on January 26, 2009, House Appropriations Committee Chair David Obey introduced H.R. 1 with the same name on the floor of the U.S. House of Representatives. The legislation passed the House and Senate soon afterwards. By February 13, both houses of Congress agreed to a compromise measure, which the President signed into law on February 17, 2009.

A. The Recovery Act

In early 2008, before the Nation realized the full extent of the economic challenge, fiscal expansion policy was guided by the "3T's" advocated by Summers (2007), Sperling (2007), and Elmendorf and Furman (2008): timely, targeted, and temporary. By the end of 2008, however, it was clear that the recession had turned into a major financial crisis and that a new approach was needed, what Former Treasury Secretary Lawrence Summers called "speedy, substantial, and sustained."[6]

Several principles guided the new Administration's policymaking. First, the fiscal effort was to be implemented speedily, unlike previous incoming presidents' economic programs , which were generally not passed until they were six months or more into office. Second, it should be substantial, given the very large scope of the economic problem. Finally, it should be a sustained effort that would not only have significant spend-out over the first two years, but would continue some temporary support thereafter. The new approach would require a mix of instruments, with some being faster to spend-out, such as tax cuts and other temporary assistance that put cash in the hands of households who immediately needed it. Others components would be more lagged but have larger cumulative countercyclical impacts and greater longer-run benefits, such as investments in infrastructure and innovation. In all cases, however, the measures would end and would not have long-term impacts on the Federal Government's primary budget deficit. [7]

Goals of the Recovery Act. Overall, this approach was embodied in the stated goals of the Recovery Act, as written into the legislation:

(1) To preserve and create jobs and promote economic recovery;

(2) To assist those most impacted by the recession;

(3) To provide investments needed to increase economic efficiency by spurring technological advances in science and health;

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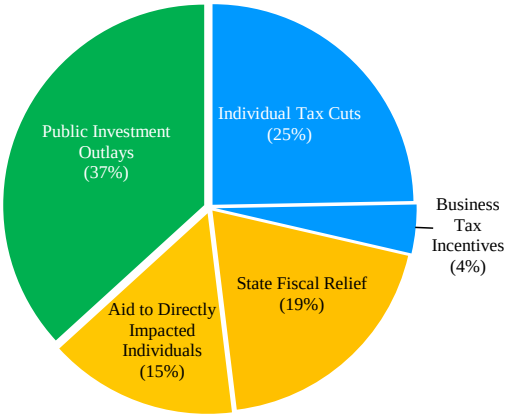
[6] Speech at the Wall Street Journal CEO Council conference in Washington, DC, Nov 19, 2008.

[7] The primary deficit excludes interest payments on the national debt.

(4) To invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits;

(5) To stabilize State and local government budgets, in order to minimize and avoid reductions in essential services and counterproductive State and local tax increases.

Figure 1
Recovery Act Programs by Functional Categories



Note: Percentages may not add to 100 due to rounding. Data does not include AMT Relief.
Source: Office of Management and Budget, Agency Financial and Activity Reports; Department of the Treasury, Office of Tax Analysis, based on the FY2013 Mid-Session Review.

Scale of the Recovery Act. At its passage, CBO estimated that the Recovery Act would cost $787 billion, although this estimate would increase as the full magnitude of the recession became apparent. The most recent CBO estimates show that the fiscal support from the Recovery Act will total $832 billion through 2019.[8] Of this total, $69 billion was allocated to a routine set of patches for the Alternative Minimum Tax (AMT). This part of the Act, a continuation of a long-standing practice, is best thought of as ongoing fiscal policy, not as a temporary fiscal impulse designed specifically to counter the effects of an economic recession. Excluding the AMT patch, the Recovery Act provided a total fiscal impulse of $763 billion.

Composition of the Recovery Act. The initial cost projections of the Recovery Act showed the law would be fairly evenly distributed across tax cuts ($212 billion), expansions to mandatory programs such as Medicaid and unemployment benefits ($296 billion), and discretionary spending ($279 billion) in areas ranging from direct assistance to individuals to investments in infrastructure, education, job training, energy, and health information technology. More specifically, Figure 1 shows how Recovery Act policies can be divided into six functional

[8] CBO's original estimate of the cost of the Recovery Act, $787 billion (CBO 2009b), was revised to $862 billion (CBO 2010a), then to $814 billion (CBO, 2010b), $821 billion (CBO 2011a), $831 billion (CBO 2012a), $830 billion (CBO 2013a), and most recently to $832 billion (CBO 2014). The estimates evolved because economic conditions deteriorated more than had been assumed in earlier projections, resulting in higher-than-expected use of certain assistance programs.

categories: individual tax cuts, AMT relief, business tax incentives, State fiscal relief, aid to directly impacted individuals, and public investments.[9]

Timing of the Recovery Act Spend-Out. The Nation felt the early effects of the Recovery Act almost immediately, as enhanced Medicaid payments started to flow to states on March 13, 2009 and individual income tax withholdings were reduced by April 1, 2009. As of the third quarter of 2009, roughly one-quarter of all spending and tax cuts had occurred, with another half spread across the four quarters after that, roughly consistent with CBO projections as of 2009. By September 30, 2013, the Federal Government had disbursed $805 billion on Recovery Act programs, as shown in Table 2.

Table 2

An Overview of Recovery Act Fiscal Impact

	Billions of Dollars, Fiscal Years					
	2009	2010	2011	2012	2013	Total Through 2013
Outlays	110.7	197.1	112.7	56.8	35.0	512.4
Obligations	256.3	196.1	41.2	21.8	18.5	533.8
Tax Reductions	69.8	188.7	37.2	-5.4	1.9	292.2
Sum of Outlays and Tax Reductions	180.5	385.8	149.9	51.4	37.0	804.6

Note: Items may not add to total due to rounding.
Source: Office of Management and Budget, Agency Financial and Activity Reports; Department of the Treasury, Office of Tax Analysis based on the FY2013 Mid-Session Review.

As shown in Table 3, individual tax cuts, aid to States, and aid to individuals directly affected by the recession were among the first Recovery Act programs to take effect, providing the largest initial boost to spending in fiscal year 2009. Each of these categories tapered after 2010, with only a small amount of outlays in 2012 and 2013, while public investment outlays now constitute the bulk of continuing Recovery Act expenditures.

[9] Additional detail on these components of the Recovery Act can be found in Appendix A.

Table 3

Recovery Act Programs by Functional Categories

	Billions of Dollars, Fiscal Years					
	2009	2010	2011	2012	2013	Total Through 2013
Individual Tax Cuts	42.9	91.3	46.6	0.4	0.4	181.7
AMT Relief	13.8	69.6	-14.4	0.0	0.0	69.0
Business Tax Incentives	23.1	18.2	-5.9	-3.7	-2.9	28.8
State Fiscal Relief	43.8	63.3	26.0	6.0	4.0	143.0
Aid to Directly Impacted Individuals	31.8	49.5	15.5	8.8	5.9	111.5
Public Investment Outlays	25.1	94.0	82.0	39.9	29.6	270.5
Total	180.5	385.8	149.9	51.4	37.0	804.6

Note: Items may not add to total due to rounding.

Source: Office of Management and Budget, Agency Financial and Activity Reports; Department of the Treasury, Office of Tax Analysis based on the FY2013 Mid-Session Review.

Accountability, Transparency, and Oversight. In keeping with the Administration's commitment to the highest standards of accountability, transparency, and oversight, the Recovery Act took unprecedented steps to track and report the use of Federal funds and to prevent waste, fraud, and abuse. The Act established a Recovery Accountability Transparency Board comprised of an independent director and 12 agency inspectors general, as well as a Recovery Implementation Office that reported directly to the Vice President. Recipients (including vendors, nonprofit organizations, and State and local governments) were required to report regularly to the Board on their use of funds and the number of jobs created or saved.[10]

All of the information received from agencies and recipients has been posted on a website (www.recovery.gov). Users can sort and display data on funding in different ways (by category of funding, by agency, by state), making it easy to obtain and analyze information. The website also offers the opportunity for the public to report fraud or waste. Reported instances of waste, fraud, and abuse remain low—at less than 1 percent of all grant awards.

B. Subsequent Jobs Measures

While the Recovery Act was the first and largest fiscal action undertaken after the financial crisis to create jobs and strengthen the economy, many subsequent actions extended, expanded, and built on the Recovery Act. Parts of the Recovery Act were extended to address the continuing needs of the economy, including Emergency Unemployment Compensation, accelerated depreciation of business investment for tax purposes (that is, "bonus depreciation"),

[10] Title XV, Section 1512

measures for teacher jobs, and aid to states for Medicaid. In other cases, new measures expanded on elements of the Recovery Act, such as the temporary payroll tax cut in 2011 and 2012, which was nearly 50 percent larger than the Making Work Pay credit it replaced, and an even greater allowance for businesses to write off the cost of investments when computing their tax liability (that is, "expensing"). The following measures built on the goals of the Recovery Act and are counted as part of the fiscal impulse in the analysis that follows: the cash-for-clunkers program enacted in summer 2009, an expanded homebuyer tax credit and business tax incentives in fall 2009, the HIRE Act tax credit and additional infrastructure investment incentives in March 2010, a small business tax cut and credit bill in fall 2010, Veterans hiring incentives in fall 2011, plus the additional payroll tax cut extensions and unemployment insurance extensions passed in 2011 and 2012. All told, these subsequent jobs measures, listed in Table 4, provided an additional $674 billion in countercyclical fiscal support through the end of 2012. This total excludes routine or expected policies such as continuing the 2001 and 2003 tax cuts, passing so-called "tax extenders" to address regularly expiring tax provisions, and fixing Medicare's Sustainable Growth Rate formula.[11]

Of the $674 billion in fiscal support following the Recovery Act, 31 percent was accounted for by the payroll tax cut from 2011 to 2012, 24 percent was accounted for by extended unemployment insurance, and the remainder included a variety of actions such relief for States and tax incentives for businesses. Figure 2 shows a breakout of the policies of the Recovery Act and the subsequent jobs legislation.

[11] This category includes items like the Research and Experimentation tax credit, the tax deduction for State and local sales taxes for States without income taxes, and numerous other tax provisions that have been routinely extended as a group in the past. Going forward, the President's budget is proposing that all tax extenders are either made permanent and paid for or allowed to expire.

Table 4

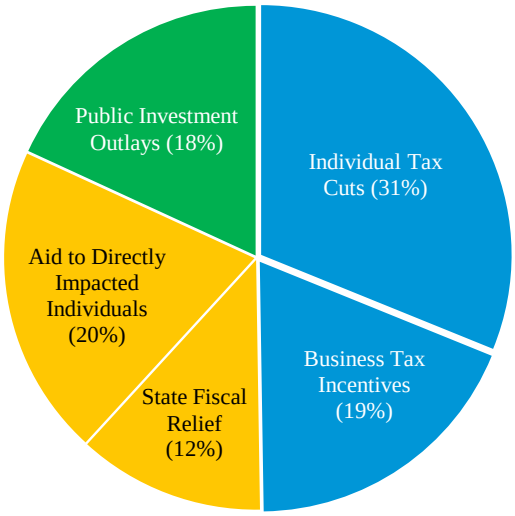
Fiscal Support for the Economy Enacted After the Recovery Act

	Billions of Dollars	
	2009-12	2009-19
Enacted 2009		
Worker, Homeownership, and Business Assistance Act (HR 3548)	35	24
Supplemental Appropriations Act of 2009 (HR 2346) (Cash for Clunkers)	3	3
Defense Appropriations Act of 2010 (HR 3326) (Unemployment Insurance and COBRA)	18	18
Enacted 2010		
Temporary Extension Act of 2010 (HR 4691)	9	9
Hiring Incentives to Restore Employment Act (HR 2847)	13	15
Continuing Extension Act of 2010 (HR 4851)	16	16
Unemployment Compensation Act of 2010 (HR 4213)	33	34
FAA Safety Improvement Act (HR 1586) (Education Jobs/ FMAP Extension)	26	12
Small Business Jobs Act (HR 5297)	68	10
Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act (HR 4853)	309	237
Enacted 2011		
Temporary Payroll Tax Cut Continuation Act (HR 3765)	28	29
VOW to Hire Heroes Act (HR 674)	0	0
Enacted 2012		
Middle Class Tax Relief and Job Creation Act of 2012 (HR 3630)	98	123
American Taxpayer Relief Act of 2012 (HR 8)	17	178
Total	674	709

Note: All measures use prospective CBO cost estimates for 2009-19. Routine tax extenders have been removed from the cost estimates. Column 1 contains data through the end of calendar year 2012, while Column 2 contains data through the end of fiscal year 2019.

Source: Congressional Budget Office; Joint Committee on Taxation.

Figure 2
Recovery Act and Subsequent Fiscal Measures by Functional Category



Note: Percentages may not add to 100 due to rounding. Data does not include AMT Relief.
Source: Office of Management and Budget, Agency Financial and Activity Reports; Department of the Treasury, Office of Tax Analysis, based on the FY2013 Mid-Session Review; Congressional Budget Office.

In addition, the President proposed further measures for the economy that were not passed by Congress, most notably the American Jobs Act, which was proposed in September 2011 and would have provided additional investments—totaling $447 billion—in everything from infrastructure to teacher jobs to a robust tax credit for small business hiring.[12]

C. Automatic Countercylical Measures

In addition to Obama Administration policies, previously enacted laws have built-in provisions that allow for automatic support when economic conditions worsen. For example, personal income tax payments decline when income declines, and spending on unemployment insurance picks up as more individuals struggle to find work. These automatic responses—known as "automatic stabilizers"—can help moderate business cycles (as shown for instance by Auerbach and Feenberg (2000) and Follette and Lutz (2010)) in addition to alleviating the human costs of economic downturns.

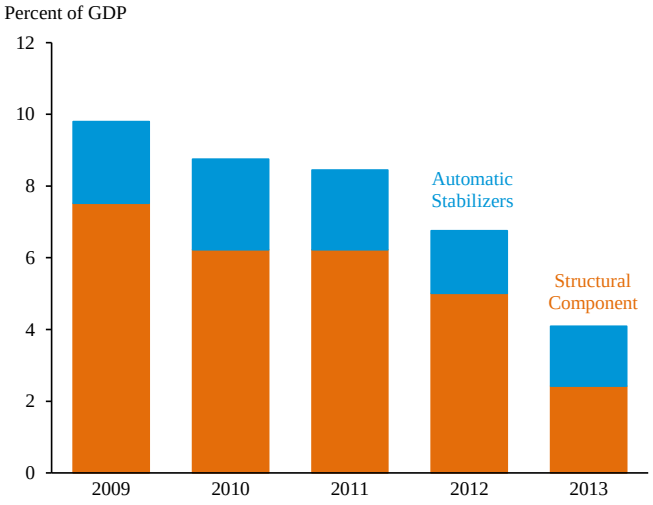
As has been the case over the last several decades, automatic stabilizers also played a significant role during the most recent recession and recovery.

Although CBO (2014) estimated that most fiscal expansion came from enacted legislation or discretionary fiscal policy, automatic stabilizers accounted for about one quarter of

[12] See http://www.whitehouse.gov/the-press-office/2011/09/08/fact-sheet-american-jobs-act

the countercyclical fiscal expansion that occurred in fiscal year 2009, and a much larger fraction thereafter as shown in Figure 3.

Figure 3
Federal Budget Deficit, 2009–2013

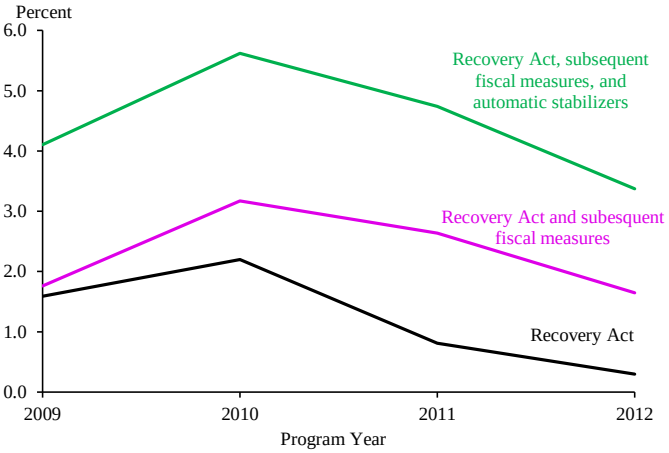


Source: Bureau of Economic Analysis, National Income and Product Accounts; Congressional Budget Office, The Budget and Economic Outlook: 2014 to 2024.

D. Total Fiscal Response

All told, the Great Recession triggered a substantial fiscal response. Figure 4 illustrates the scale of the Recovery Act and of the other major fiscal measures implemented by the Administration. As noted earlier, fiscal policy represented only one part of the Administration's broader economic strategy to foster recovery and protect households, as described more fully in Box 1.

Figure 4
Fiscal Expansion as a Percentage of GDP in Each Program Year



Note: Data is displayed in calendar year terms for all series.
Source: Congressional Budget Office, The Budget and Economic Outlook: 2014 to 2024; Office of Management and Budget; Bureau of Economic Analysis, National Income and Product Accounts.

Box 1: Other Administration Policy Responses to the Economic Crisis

The Recovery Act was part a comprehensive policy response to the economic crisis, one that included stabilizing the financial system, helping responsible homeowners avoid foreclosure, and aiding small businesses. Highlighted here are some of the other key non-fiscal programs (not counting the important steps taken independently by the Federal Reserve).

Housing. The Administration took several steps to strengthen the housing market. The most important initiative, the Making Home Affordable Program (MHA), provided several ways to help struggling homeowners avoid foreclosure. A detailed description is available at www.makinghomeaffordable.gov. The Home Affordable Modification Program was the cornerstone of the initiative, allowing eligible homeowners to reduce their monthly mortgage payments through loan modifications. Among the many other MHA programs, the Home Affordable Refinancing Program helped homeowners who, because of plummeting home prices, were "underwater" on their mortgages or in danger of becoming so, allowing them to refinance at a lower interest rate. The MHA also committed funds to help struggling homeowners in hard-hit areas (under the Hardest Hit Fund).

In addition, the Administration created the Consumer Financial Protection Bureau to establish safe mortgage standards to protect homebuyers and homeowners, among other purposes. The Administration also helped negotiate the National Mortgage Servicing Settlement with the largest mortgage servicers. While the housing market continues to heal, it is in much better shape overall than it was just a few years ago. Home prices are about 15 percent higher than they were at the end of 2011, and sales of new and existing homes are higher than at the end of 2011 while the number of seriously delinquent mortgages is now at its lowest level since 2008.

Auto Industry. Recognizing that a collapse of the auto industry would have resulted in huge job losses and the devastation of many communities, the Administration, under the Troubled Asset Relief Program, provided financial support to auto companies to keep them afloat. The Administration committed additional assistance to Chrysler and General Motors, while at the same time working on a comprehensive restructuring of these companies. Since then, these auto companies have become profitable again, and auto sales have been trending up since 2009. The auto industry has added more than 380,000 jobs since June 2009. In December 2013, the Treasury sold its remaining shares of General Motors.

Financial Industry. TARP and other programs implemented during the height of the financial crisis helped prevent a meltdown of the global financial system, but did not solve many longer-running, more structural problems. The Administration pushed for an overhaul of the financial regulatory system, and its proposals eventually led to the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. Among its many provisions, the Dodd-Frank Act required stress tests to assess the health of financial institutions, provided tools for orderly liquidations of large financial firms, and increased the transparency of derivatives markets. As a result of these actions, large banks are now much better capitalized and credit flows have resumed. While some of the Dodd-Frank Act's provisions are still being implemented and much work remains to be done, the financial system has become less vulnerable and families are better protected when making important financial decisions.

Small Businesses. Small business struggled under the weight of weak consumer demand and tight credit in the recession, and the Administration provided support in several ways. Specifically, the Administration extended the guarantees and the availability of Small Business Administration loans and created new programs such as the Small Business Lending Funds and the State Small Business Credit Initiative. It also helped small businesses indirectly by providing TARP funds to small and large banks across the country. Bank credit to small businesses, which had contracted sharply during the recession, has been expanding since 2011.

IV. NEAR-TERM MACROECONOMIC EFFECTS OF THE RECOVERY ACT AND SUBSEQUENT FISCAL LEGISLATION

This report reviews the range of evidence on the effect of the Recovery Act. In particular, it shows that a wide range of approaches—including model-based estimates by CEA, CBO and private forecasters, cross-state evidence and international evidence—all find that the Recovery Act had a large positive impact on employment and output.

Overall, the CEA estimates that the Recovery Act saved or created about 6 million job-years (where a job-year is the equivalent of one full time job for one year) through 2012 and raised GDP by between 2 and 3 percent in fiscal years 2010 and part of 2011. These estimates are consistent with estimates made by CBO (2013a) and by independent academic studies, which use a variety of methodologies and data sources. Adding the estimated effect of subsequent fiscal policy measures, the CEA model finds that the combined effect of these actions increased GDP above what it otherwise would have been by more than 2 percent a year for three years, and created or saved about 9 million job-years through 2012. Moreover, research on economic growth generally finds that these types of benefits have a long-lasting impact on the economy even after the initial policy impetus has expired. This is even more true when the policy itself included significant measures for long-term growth, as described later in this report.

A. Model-Based Estimates of the Macroeconomic Effects of the Recovery Act and Subsequent Fiscal Legislation

Evaluating effects of fiscal policy in general, and the Recovery Act in particular, is challenging for several reasons. Appendix B describes these challenges, and how economists have addressed them, in greater detail. A key issue is that estimating effects entails comparing what actually happened with what might have happened (what economists call the "counterfactual"). However, because counterfactual outcomes are not actually observed, other methods are needed.

Estimating the Short-run Macroeconomic Effect of Fiscal Policy. A key concept for estimating the macroeconomic effects of fiscal policy is what economists call the fiscal multiplier. The fiscal expenditure multiplier is the change in GDP resulting from a $1 increase in government expenditures, and the tax multiplier is the change in GDP resulting from a $1 decrease in taxes. Because a $1 increase in spending or decrease in taxes has ripple effects in subsequent transactions as it passes through the broader economy, theory suggests that the fiscal multiplier may be greater than one—a $1 increase in spending or reduction in taxes may support an increase in output of more than $1.

The standard theory of fiscal policy in a recession holds that when government demand goes up, firms hire workers and raise production, which boosts employment, income, and GDP. The initial effect is amplified as workers spend additional income, and businesses purchase more raw materials and make investments to meet increased demand. In its most basic form, the government spending multiplier is the sum of the first-round direct effect of spending on GDP, the second-round effect with consumption by those paid for providing goods and services, and the subsequent-round effects. In this model, the multiplier effect depends on the marginal

propensity to consume (MPC)—the fraction of an additional dollar of income that is spent rather than saved. [13] Because the MPC is thought to be large, especially in a recession when individuals face problems borrowing, models can generate multipliers much higher than one. Tax cuts also increase individual income, but the multiplier effect on overall output is generally thought to be slightly less than it is for government expenditures. Because the individual receiving the tax cut saves part of it, the first round effect on overall spending is smaller, making the subsequent ripple effects smaller as well. Thus, the basic multiplier for a tax cut is less than the government spending multiplier; specifically, the tax multiplier is the spending multiplier times the MPC.

The model is a useful conceptual starting point, but it makes many simplifications. Appendix B to this report reviews recent theoretical research on the effects of fiscal policy, especially in a deep recession. This research suggests that, in normal times, fiscal multipliers can be small both because consumers save a substantial fraction of a temporary fiscal measure and because monetary policy tends to counteract the fiscal measure in an attempt to maintain stable inflation. In a severe recession, however, especially when monetary policy is constrained by the fact that interest rates cannot drop below zero (the zero lower bound), fiscal multipliers can be much larger. If one further takes into account the fact that long-term unemployment can lead to transitions out of the labor force, with a resulting long-term effect of depressing output and employment (an effect referred to as "hysteresis"), multipliers can be larger yet for fiscal policies that support aggregate demand and reduce the average duration of unemployment.

Numerical estimates of fiscal multipliers are typically computed using historical data on fiscal interventions and macroeconomic outcomes, and Appendix B also discusses the recent empirical research on this topic. This empirical work provides estimates of multipliers for different types of fiscal interventions (government spending and individual income tax cuts). Once estimated, the resulting multipliers can be used to estimate the macroeconomic effect of the Recovery Act; that is, to compare what happened under the Recovery Act with what likely would have happened in its absence.

CEA's and CBO's Estimates of the Recovery Act. To estimate the effect of the Recovery Act on GDP, CEA applied a different fiscal multiplier to each component, and then aggregated the effects of each component to arrive at the overall GDP effect. For government spending (corresponding to public investment outlays and income and support payments) and for tax cuts, CEA used multipliers derived from the empirical estimates of the spending and tax multipliers discussed in Appendix B. . For other components of the Act, such as State and local fiscal relief, CEA used a multiplier equal to a weighted average of one or both of the tax and spending multipliers.[14]

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[13] This basic multiplier thus equals $1 + MPC + MPC^2 + \ldots = 1/(1 - MPC)$.

[14] For State and local fiscal relief, CEA assumed that 60 percent of the transfer is used to avoid spending reductions, and 30 percent is used to avoid tax increases. One-time tax rebates and one-time payments to seniors, veterans, and disabled are assumed to have half of the effects of conventional tax cuts. The effect of business tax incentives is very uncertain. Conservatively, the multiplier to this component is set equal to 1/12 of the spending multiplier. See CEA (2009a).

The Congressional Budget Office used a similar approach in its quarterly reports on the effects of the Recovery Act (although their estimates include the impact of AMT relief and so are not completely comparable to CEA estimates).[15] Because of the range of estimates of multipliers in the economic literature, CBO provided an upper and a lower bound for the fiscal multipliers on the various components of the Act. As shown in Table 5, CEA multipliers are within the range suggested by CBO (2013a).

Table 5

Estimated Output Multipliers for Different Types of Stimulus

	CEA	CBO Low	CBO High
Public Investment Outlays[a]	1.5	0.5	2.5
State and Local Fiscal Relief	1.1	0.4	1.8
Income and Support Payments[b]	1.5	0.4	2.1
One-time Payments to Retirees	0.4	0.2	1.0
Tax Cuts to Individuals	0.8	0.3	1.5
Business Tax Incentives	0.1	0.0	0.4

Note: The CEA multipliers show the impact of a permanent change in the component of 1% of GDP after 6 quarters, or, equivalently, the cumulative impact of a one-time change of 1% of GDP over 6 quarters. The CBO multiplers show the cumulative impact of a one-time change of 1% of GDP over several quarters.

a. Includes transfer payments to state and local government for infrastructure and tax incentives to businesses directly tied to certain types of spending.

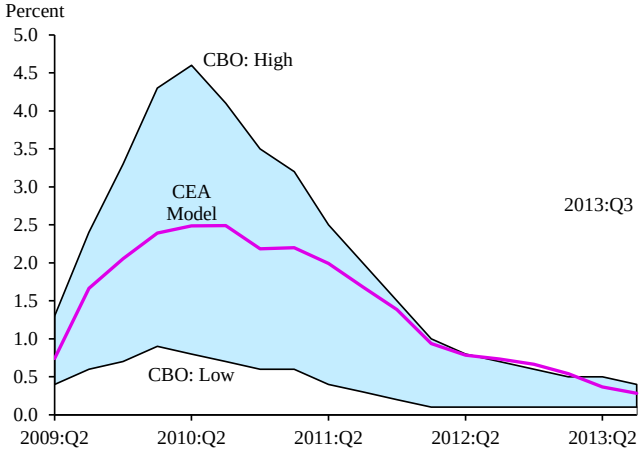
b. Includes such programs as unemployment compensation, COBRA, and SNAP

Source: Congressional Budget Office, Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2012 Through December 2012; CEA Calculations.

The multipliers presented here indicate that the Recovery Act had a large effect on output. As shown in Figure 5, the Recovery Act quickly raised the level of GDP in the first half of 2009, jump-starting the recovery. According to these estimates, the Act raised GDP by 2 to 3 percent between the fourth quarter of 2009 and the second quarter of 2011, and it continued to exert a positive effect even as it was winding down in 2012. These numbers are almost entirely within the range of those implied by the CBO analysis, with the exception being a few quarters around the end of 2012, when the CEA estimate is slightly higher.

[15] CBO's methodology is described in Reichling and Whalen (2012).

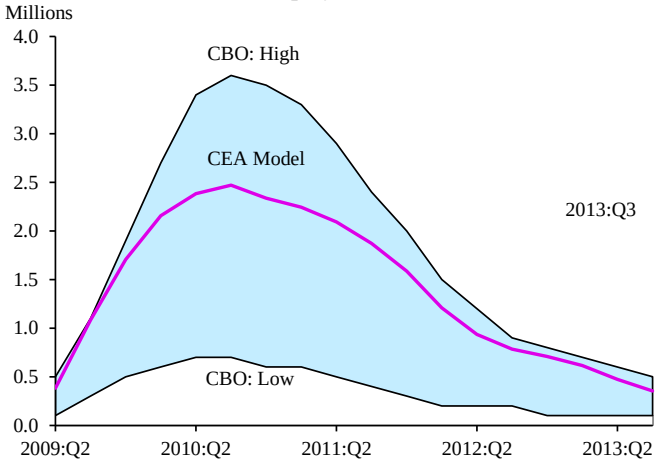
Figure 5
Estimates of the Effects of the Recovery Act on the Level of GDP, 2009–2013



Source: Congressional Budget Office, Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2012 Through December 2012; CEA calculations.

Using the historical relation between increases in GDP and employment, CEA and CBO also estimated the number of jobs generated by the Recovery Act. According to the CEA model, the Recovery Act increased employment by more than 2.3 million in 2010 alone, and continued to have substantial effects into 2012, as demonstrated in Figure 6. Cumulating these gains through the end of fiscal year 2013, the Recovery Act is estimated to have generated about 6.4 million job-years. These estimates are also within the range of CBO's upper- and lower-range estimates of 1.6 to 8.4 million job-years.

Figure 6
Estimates of the Effects of the Recovery Act on Employment, 2009–2013



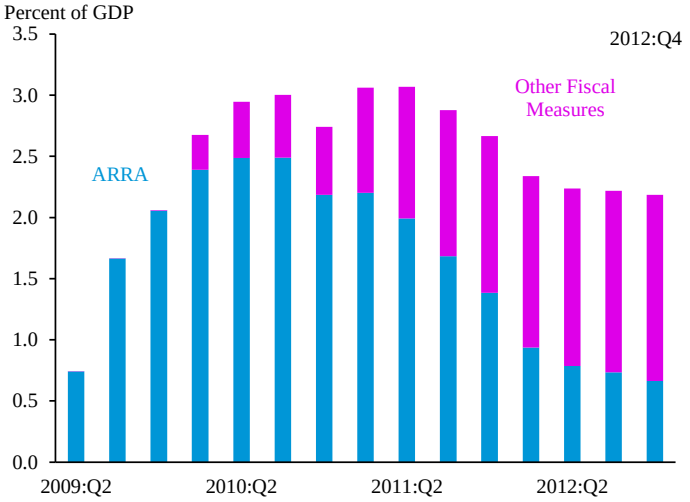
Source: Congressional Budget Office, Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2012 Through December 2012; CEA calculations.

CEA Estimates of the Recovery Act and Subsequent Fiscal Measures Combined. The combined effect of the Recovery Act and the subsequent countercyclical fiscal legislation is

substantially larger and longer lasting than the effect of the Recovery Act alone.[16] The Recovery Act represents only about half of total fiscal support for the economy from the beginning of 2009 through the fourth quarter of 2012. Moreover, as shown in Figures 7 and 8, the bulk of the effects of the other fiscal measures occurred as the Recovery Act was phasing down. These other measures thus served to sustain the recovery as effects of the Recovery Act waned. The CEA multiplier model indicates that by themselves these additional measures increased the level of GDP by between 1.0 and 1.5 percent per quarter from mid-2011 through the end of calendar year 2012. Altogether, summing up the effects for all quarters through the end of calendar year 2012, the Recovery Act and subsequent fiscal measures raised GDP by an average of more than 2.4 percent of GDP annually—totaling a cumulative amount equal to about 9.5 percent of fourth quarter 2008 GDP.

The contribution of all fiscal measures to employment is equally substantial. Other fiscal measures beyond the Recovery Act are estimated to have raised employment by 2.8 million job-years, cumulatively, through the end of calendar year 2012. Adding these jobs to those created or saved by the Recovery Act, the combined countercyclical fiscal measures created or saved more than 2.3 million jobs a year through the end of 2012—or 8.8 million job-years in total over the entire period.

Figure 7
Quarterly Effect of the Recovery Act and Subsequent Fiscal Measures on GDP, 2009–2012

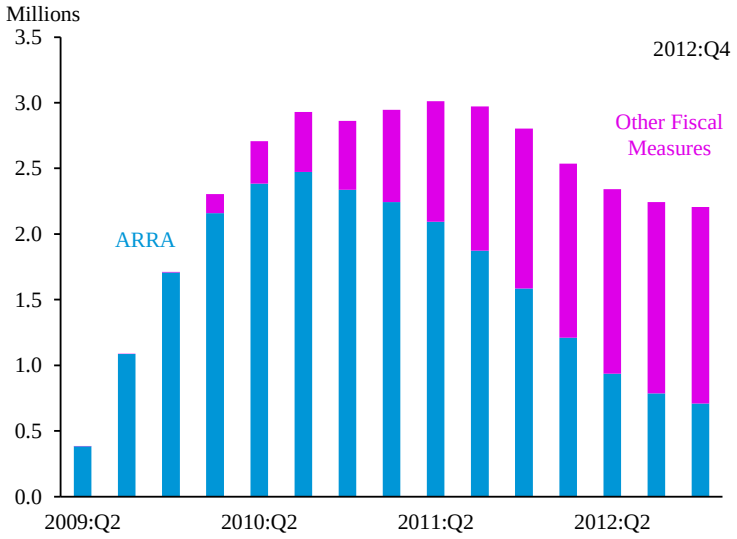


Source: Bureau of Economic Analysis, National Income and Product Accounts; Congressional Budget Office; CEA calculations.

[16] CEA's estimates of the effects of the subsequent fiscal measures are based on CBO's initial cost estimates, not actual spending. The CEA assigned each of the subsequent fiscal measures to the same functional categories that were used to analyze the Recovery Act, and then applied the corresponding multipliers as discussed above. Quarterly costs were interpolated when only annual cost estimates were available.

Figure 8

Quarterly Effect of the Recovery Act and Subsequent Fiscal Measures on Employment, 2009–2012



Source: Bureau of Economic Analysis, National Income and Product Accounts; Congressional Budget Office; CEA calculations.

Estimates from Private Forecasters. Private forecasters and domestic and international institutions have used large-scale macroeconomic models, mostly to estimate the effects of either the Recovery Act by itself or other policies in isolation. The models used by these individuals and organizations generally employ a similar multiplier-type analysis as is found in CEA and CBO work, although they vary considerably in their structure and underlying assumptions. Although no outside estimates of the total impact of *all* the fiscal measures are available, Table 6 displays the estimates of the impact of the Recovery Act offered by several leading private-sector forecasters before the Act was fully implemented. Despite the differences in the models, these private-sector forecasters all estimated that the Recovery Act would raise GDP substantially from 2009 to 2011, including a boost to GDP of between 2.0 and 3.4 percent in 2010.

Table 6

Estimates of the Effects of the Recovery Act on the Level of GDP

	Percent				
	2009	2010	2011	2012	2013
CEA: Model Approach	+1.1	+2.4	+1.8	+0.8	+0.3
CBO: Low	+0.4	+0.7	+0.4	+0.1	+0.1
CBO: High	+1.7	+4.1	+2.3	+0.8	+0.3
Goldman Sachs	+0.9	+2.3	+1.3	-	-
HIS Global Insight	+0.8	+2.2	+1.6	+0.6	-
James Glassman, JP Morgan Chase	+1.4	+3.4	+1.7	0.0	-
Macroeconomic Advisers	+0.7	+2.0	+2.1	+1.1	-
Mark Zandi, Moody's Economy.com	+1.1	+2.6	+1.7	+0.4	-

Note: Firm estimates were obtained from and confirmed by each firm or forecaster, and collected in CEA's Ninth Quarterly Report.

Sources: Congressional Budget Office, Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2012 Through December 2012; CEA Ninth Quarterly Report; CEA Calculations.

Taking a broader view that incorporates fiscal measures in addition to the Recovery Act, Blinder and Zandi (2010) estimate the effect of the fiscal policies enacted through 2009 (the Economic Stimulus Act, the Recovery Act, cash for clunkers, the unemployment insurance benefits extensions of 2009). They find that these policies raised the level of GDP in 2009 by 3.4 percent in the third quarter and by 4.3 percent in the fourth quarter.

B. Cross-State Evidence

A different approach to estimating the effect of fiscal policy is to use variation in spending across states. As noted earlier, estimates of the effects of macroeconomic policy are inherently difficult because the counterfactual outcome is not observed. One way economists have attempted to address this difficulty is to isolate a component of the Act that was implemented in a random or quasi-random manner across different states, mimicking a randomized controlled trial used for research in other disciplines like medicine. If some states received more Recovery Act funds than others for reasons unrelated to their economic needs, then this portion of the funds can allow for an independent, unbiased evaluation of the effects, much like two groups of individuals participating in a drug trial that receive different dosages of the same medicine.

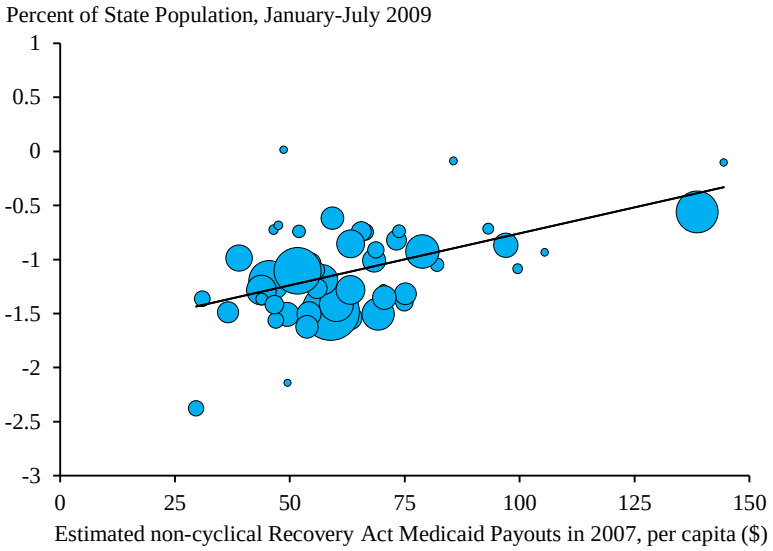
A notable drawback of using State-level data, however, is that this approach estimates local, not economy-wide, multipliers. These local multipliers do not incorporate out-of-state spending effects, nor do they incorporate the general equilibrium and monetary policy feedback effects that are the focus of much of the theoretical work discussed above and in the Appendix. [17]

One portion of the Act that was distributed independently of states' immediate economic needs was the additional grants to states for Medicaid. Under the Act, states received a 6.2 percentage point increase in their expected Federal reimbursement rate (the Federal Medical Assistance Percentage).[18] This increase was worth more to states that spent more per capita on Medicaid before the recession (in fiscal year 2007). To the extent that the relative severity of the recession at the State level was unrelated to its previous level of per-capita Medicaid spending, this portion of funds might be thought of "as if" randomly assigned. In other words, the spending was effectively independent of the strength or weakness of the state-level economy once the recession hit. As Figure 9 shows, states that received more funds stemming from this non-cyclical part of the formula tended to exhibit greater employment gains through the first half of 2009 compared with states receiving less funds.

[17] See Nakamura and Steinsson (forthcoming) and Farhi and Werning (2012) for formal discussion of the relationship between local multipliers and the economy-wide multiplier.

[18] In addition, States were "held harmless" from planned reductions in FMAP rates due to personal income growth prior to the recession and they received an additional increment in the FMAP linked to local unemployment. The analysis presented here relies only on the 6.2 percent (non-cyclical) increase.

Figure 9
Change in Nonfarm Employment



Note: Size of circle is proportional to 2008 state population.
Source: Centers for Medicare and Medicaid Services, Data Compendium; Bureau of Labor Statistics, Current Employment Statistics; CEA Calculations.

Refining this approach, Chodorow-Reich et al. (2012) found that each additional $100,000 of formula-based Medicaid grants generated an additional 3.8 job-years, which translates into a $26,000 cost per job. Other academic papers following a similar approach, but assessing broader measures of Recovery Act spending, reached similar conclusions. For example, Wilson (2012) estimates a cost per job of about $125,000 for all Recovery Act spending programs other than those implemented by the Department of Labor (mostly unemployment insurance). Feyrer and Sacerdote (2011) and Conley and Dupor (2013) also find positive effects of the Act on employment, although the ranges of effects estimated in both papers include magnitudes similar to those discussed above as well as somewhat smaller effects.

C. International Comparison

The 2008 crisis reverberated worldwide. In addition to seeing sharp reductions in output and employment, many countries also experienced large government budget deficits because of countercyclical fiscal policies and a fall in tax revenues caused by the recession. These changes in budget deficits across countries can be used to derive an international estimate of the impact of fiscal policy. The International Monetary Fund's (IMF) early estimates using pre-crisis cross-country data suggested expenditure multipliers averaging 0.5, although with substantial variation across countries.[19] However, subsequent research by IMF (2012) and Blanchard and Leigh (2013) reassessed this earlier work and estimated multipliers substantially above 1.0 during the crisis, consistent with the discussion earlier in this report about recent fiscal multipliers in the United States.

[19] See for example Ilzetzki, Mendoza, and Vegh (2011).

This international evidence also suggests that the structural reductions in government budget deficits (or "fiscal consolidation") implemented by many countries has had a large negative impact on economic activity in the short run, at least when interest rates are low or at the zero lower bound and when there is already substantial economic slack. Previous research, summarized in Alesina and Ardagna (2010), hypothesized that fiscal consolidation can sometimes boost GDP because it increases investors' confidence and lowers interest rates. But Blanchard and Leigh's (2013) results, as well as findings by Perotti (2011) and Guajardo, Leigh, and Pescatori (forthcoming), point instead to significant short-run costs of deficit reductions and suggest a more gradual strategy of fiscal consolidation, as explained for instance in Blanchard, Dell'Ariccia, and Mauro (2010).

It is notable that the United States is one of only two of the 12 countries that experienced systemic financial crises in 2007 and 2008 but have seen real GDP per working-age person return to pre-crisis levels (see Box 2). Although this does not provide any specific evidence on the effect of U.S. fiscal measures, it is consistent with the proposition that the full set of U.S. policy interventions made a sizable difference in reversing the downward spiral of falling employment and output.

Box 2: The U.S. Recovery in Comparative International and Historical Context

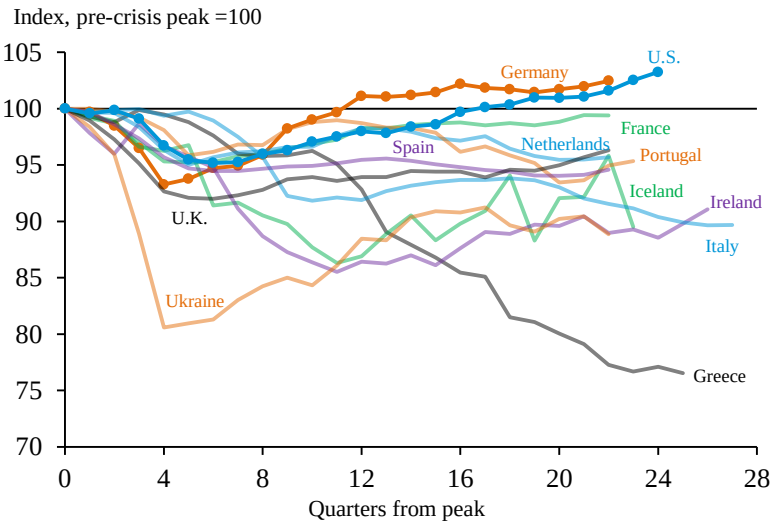
The 2007-09 recession was the most severe recession experienced by the United States in the post-war era. The so-called Great Recession lasted 18 months from the business-cycle peak in December 2007 to the trough in June 2009, nearly twice the 10-month average length of the previous post-war recessions. The 2007-09 recession was also the sharpest, with a 4.5 percent peak-to-trough drop in real GDP, compared to an average decline of 2 percent in previous post-war recessions.

Most importantly, the 2007-09 recession was the only post-war U.S. recession associated with a systemic financial crisis. Severe financial crises tend to have long-lasting effects that can stymie an economic rebound in several ways. First, households burdened by high debt and losses on their assets can be reluctant to increase spending for an extended period of time, instead choosing to pay down debt and repair their finances. Business and residential investment can also be slow to resume, because over-leveraged banks and other financial institutions reduce the supply of credit as they reestablish the health of their balance sheets. When both credit supply and demand are suppressed, low interest rates induced by conventional monetary policy have a more limited impact than they otherwise would.

The U.S. economy has performed better over the past five years than would be suggested by the historical record of financial crises. Although the financial shocks that the United States suffered in 2007 and 2008 were similar to, if not larger than, the shocks that set off the Great Depression, the outcome was strikingly different. In the recent crisis, GDP per working-age person returned to its pre-crisis level in about four years, while it took 11 years in the US during the Great Depression, and, on average, 10 years in the 13 other countries affected by systemic crises during the 1930s identified by Reinhart and Rogoff (2009).

The Figure below compares the performance of the U.S. economy with that of the other economies hit by the recent financial crisis. Of the 12 countries that suffered systemic financial crises in 2007 and 2008, real GDP per working-age adult has recovered to its pre-crisis levels in only the United States and Germany. (For a historical account of financial crises in the United States and abroad, see Reinhart and Rogoff (2009) and Laeven and Valencia (2012))

Real GDP Per Working Age Population
in 2007–2008 Banking Crisis Countries, 2007–2013



Note: U.S. as of 2013:Q4, all others as of 2013:Q3 except Iceland (Q2). Working age population is 16-64 for U.S. and 15-64 for all others. Population for Ukraine is interpolated from annual estimates. Selection of countries based on Reinhart and Rogoff (forthcoming).
Source: Statistical Office of the European Communities; national sources; CEA calculations.

D. Benchmarking the Economy's Performance Since 2009

While the bulk of the available evidence indicates that the Recovery Act and subsequent fiscal legislation helped avert what might have become a second Great Depression and paved the way for stronger economic growth, many households continue to struggle with the after-effects of the recession. In addition, from a macroeconomic perspective, the average rate of real GDP growth in this recovery (2.4 percent a year) has been slower than many would have liked. Some critics have argued that this slower growth is evidence that economic policymaking has gone awry, and that the interventions undertaken since 2008 have had unintended detrimental consequences on growth. Taylor (forthcoming) argues that fiscal policy not only failed to help but actually hurt the economy.

As discussed earlier, it is impossible to infer the causal impact of a set of policies from the observed outcomes because these observed outcomes do not tell you what would have happened absent the policy interventions. The research that attempts to answer that counterfactual conclusion using a variety of different methods has generally come to the conclusion that the Recovery Act and subsequent measures had a large positive impact on growth and employment.

In particular, claims based on the recovery are often based in part on a misleading apples-to-oranges comparison to past growth and also fail to take into account the key features of the recession and recovery. First, the economy's *potential* growth rate is slower now than it has been in previous postwar recoveries for long-standing reasons unrelated to the Great Recession or the policies that followed in its wake. This lower rate of potential growth reflects several key factors: slowing growth in the working-age population as baby boomers move into retirement, a plateauing of female labor force participation following several decades of transformative increases, and a slowdown in productivity growth. CBO (2012a) estimates that slower growth of potential GDP accounts for about two-thirds of the difference between observed real GDP growth in the current recovery and growth on average in the preceding postwar recoveries, an estimate that is in line with other recent studies (see the 2013 Economic Report of the President for further discussion).

Second, the economy has encountered a long list of additional headwinds in recent years. This list includes international events like the European sovereign debt crisis, the tsunami and nuclear accident in Japan, and the disruption of Libya's oil supply. It includes extreme weather like Hurricane Sandy and the 2012 drought that was described by the U.S. Department of Agriculture as the "most severe and extensive drought in at least 25 years."[20] It includes fiscal austerity at the State and local level that intensified as the Recovery Act began to phase out and has cost hundreds of thousands of additional job losses even during the expansion period. And it includes measures like the sequester which CBO estimated took 0.6 percentage point off growth in 2013, the 16-day government shutdown which the Bureau of Economic Analysis (BEA)

[20] http://www.ers.usda.gov/topics/in-the-news/us-drought-2012-farm-and-food-impacts.aspx#.Uu1MXfldV5A

estimated *directly* subtracted 0.3 percentage point from growth in the fourth quarter, and dangerous brinksmanship around the debt limit in 2011 and 2013.

In addition, the unique after-effects of financial crises discussed in Box 3 have also created substantial challenges for faster growth. The Great Recession was the first downturn brought about by a systemic financial crisis in nearly 80 years. Macroeconomic data from the Great Depression is limited, and models based on more readily available post-war data do not contain any comparable benchmark for the shock that hit the economy in 2008. Many of these models are still being refined to include more extensive and detailed linkages between the macroeconomy and the financial sector, based on lessons learned as a result of the crisis.

All these factors must be taken into account in assessing the economy's performance in recent years—and understanding what would have happened without the significant policy actions that are described in this report.

V. EFFECTS OF THE RECOVERY ACT IN PROVIDING RELIEF FOR INDIVIDUALS

As noted at the outset of this report, the Recovery Act had goals beyond preserving and creating jobs and promoting economic recovery. This section evaluates the impact of the Recovery Act in helping those most affected by the recession weather an extraordinarily trying period. The Recovery Act included substantial assistance for middle-class families, unemployed workers struggling to find a job, and households in poverty or in danger of slipping into poverty. Many of these measures were extended or retooled in subsequent legislation. This assistance was partly to help families maintain their consumption even when income fell and credit dried up, a phenomenon economists refer to as "consumption smoothing." But the support was also motivated by the fact that people would quickly spend a large fraction of this assistance, boosting aggregate demand and in turn, job creation. Table 7 shows the programs that provided direct assistance to individuals.

Table 7
Tax Relief and Income Support in the Recovery Act
and Subsequent Measures, 2009–2012

	Billions of Dollars		
	Recovery Act	Subsequent Legislation	Total
Making Work Pay	112.2	--	112.2
Payroll Tax Cut	--	206.8	206.8
Other tax relief for individuals and families			
EITC third child and marriage penalty	6.0	4.3	10.3
Child tax credit refundability	18.7	12.3	31.0
American Opportunity tax credit	17.8	11.3	29.1
Partial exemption of tax on unemployment benefits	6.5	--	6.5
Sales tax deduction for vehicle purchase	1.3	--	1.3
First-time homebuyer tax credit	4.6	12.0	16.6
Unemployment Insurance			
Emergency Unemployment Compensation and Extended Benefits	43.2	160.6	203.8
Additional $25 payment	14.1	--	14.1
Unemployment Insurance Modernization	3.5	--	3.5
COBRA	9.2	9.8	19.1
Supplemental Nutrition Assistance Program	37.6	0.4	38.0
$250 Payment to Seniors, Veterans, and the Disabled	13.8	--	13.8
Wounded Warrior Tax Credit	--	0.3	0.3
TANF emergency fund	4.7	--	4.7
Total	293.3	417.8	711.1

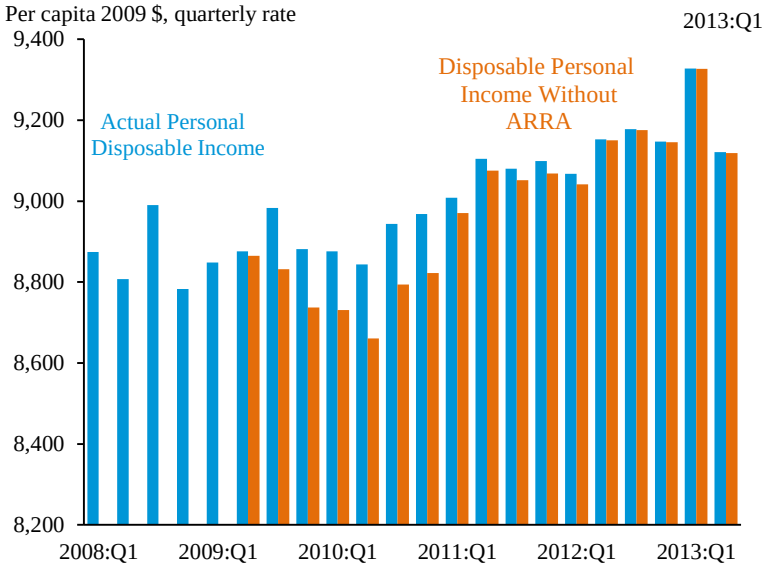
Note: Data consist of cumulative outlays through the end of calendar year 2012. Items may not add to total due to rounding.

Source: Department of the Treasury, Office of Tax Analysis; Office of Management and Budget, Agency Financial and Activity Reports; Congressional Budget Office.

A. Tax Cuts for Families

The Recovery Act's income support and individual tax cut provisions allowed households to maintain their purchasing power through one of the worst recessions of the century. The Making Work Pay tax credit in effect in 2009 and 2010 provided 95 percent of workers with a tax cut worth $400 for a typical single worker and $800 for a typical married couple. Without these provisions, aggregate real disposable personal income would have been $354 billion lower than what it actually was in 2009. As shown in Figure 10, despite $300 billion in lost private wages and salaries, real disposable incomes actually grew throughout calendar year 2009 (CEA 2010b), primarily due to tax cuts for families, the largest of which was the Making Work Pay tax credit in the Recovery Act. The Making Work Pay credit was replaced by the even-larger payroll tax cut in 2011 and 2012 which provided a tax cut for all 160 million workers, with $1,000 for the typical worker making $50,000 per year.

Figure 10
Disposable Personal Income With and Without the ARRA



Note: Figures deflated using the price index for personal consumption expenditures.
Sources: Bureau of Economic Analysis, Effect of the ARRA on Selected Federal Government Sector Transactions, National Income and Product Accounts.

B. Unemployment Insurance

Regular state-based unemployment insurance (UI) programs typically provide benefits for 26 weeks, but as the average duration of unemployment rose to record highs in the 2007-09 recession and its wake, additional steps were needed. The Recovery Act expanded unemployment insurance in several ways. First, the Act provided for a 100 percent Federal contribution to the Extended Benefits program, which has been in place since 1970 to assist states that experience especially sharp increases in unemployment but has traditionally been jointly financed by Federal and State governments. The Recovery Act also extended the Emergency Unemployment Compensation (EUC) program enacted in 2008, which extended the duration of benefits available under Extended Benefits. It also provided an additional $25 per week in benefits through the end of 2009 and offered incentive funds for States that chose to

modernize their unemployment insurance systems. Subsequent to the Recovery Act, Congress passed several more extensions and expansions of unemployment insurance, and another round of reforms aimed at assisting people searching for work.

Effects of unemployment insurance on workers. In total, 24 million U.S. workers have received extended unemployment insurance benefits. Counting workers' families, over 70 million people have been supported by extended UI benefits, including more than 17 million children. Benefits have helped a broad swath of individuals, including 4.8 million with a bachelor's degree or higher. The impact was profound: the Census Bureau estimates that from 2008 to 2012, unemployment insurance kept over 11 million people out of poverty.

Beyond providing income support and keeping families out of poverty, unemployment benefits also affect labor markets, as discussed in the Executive Office of the President report on unemployment insurance (Council of Economic Advisers and Department of Labor, 2014). Recent research bysuggests that elevated unemployment rates in recent years were driven by declines in the demand for labor, with only slight reductions in labor supply stemming from unemployment insurance extensions. Moreover, as shown by Chetty (2008), unemployment benefits can also have a positive effect on labor productivity, because they give people time to search for a job better suited to their skills.

In addition to supporting incomes, unemployment benefits deter the long-term unemployed from dropping out of the labor force. After the extension of the unemployment benefits program in 2008, the long-term unemployed dropped out of the labor force at a considerably reduced rate, and Rothstein (2011) suggests that most of the small increase in unemployment rates due to extended benefits can be attributed to this phenomenon. While job-finding rates for the long-term unemployed remain low, keeping people in the labor market increases the chance that they will eventually resume working, which supports the economy's long-run potential.

Unemployment insurance reforms. The Recovery Act also included the most significant reforms to unemployment insurance in decades through a $7 billion fund to incentivize states to modernize their UI systems and to update eligibility rules to reflect the changing labor market. States received an incentive payment if they implemented some suggested improvements to their eligibility rules. These suggested improvements included allowing a worker to become eligible based on his or her most recent earnings (rather than earnings in the previous calendar year) or when quitting a job because of certain circumstances (compelling family responsibilities, a relocating spouse, domestic violence, or sexual assault). Proposed reforms also included offering benefits to individuals seeking only part-time work and providing for a dependent allowance.

Overall, states invested $3.5 billion of Recovery Act funds toward these modernization efforts. The law prompted 41 states to make nearly 100 reforms to their unemployment insurance programs. Numerous states expanded eligibility to workers whose job loss was due to compelling family circumstances, with 13 states adding coverage for domestic violence, 14 states adding coverage to care for a sick family member, and 16 states extending coverage to a relocating spouse.

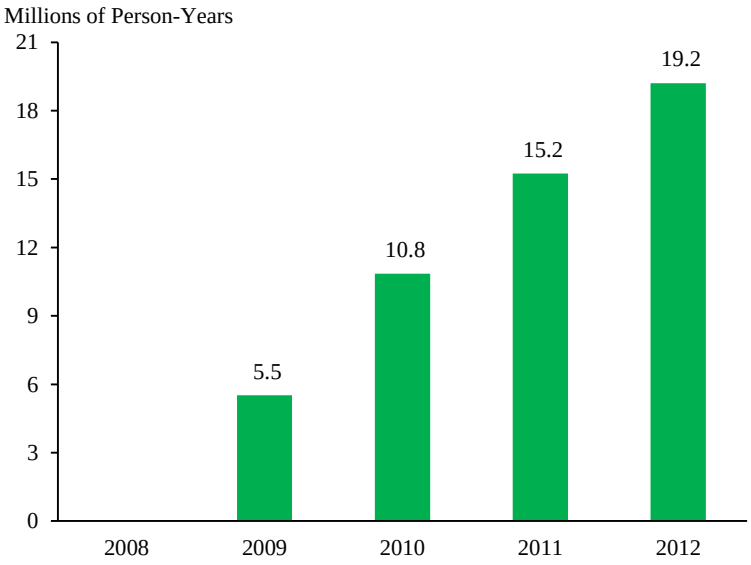
In February 2012, the President signed into law more reforms to unemployment insurance—many of which were originally proposed in the American Jobs Act—including measures to help the long-term unemployed get back to work. Specifically, the new law created opportunities for states to test new strategies to help the long-term unemployed find new work. The Administration also expanded "work-sharing" programs across the country, which will help prevent layoffs by encouraging struggling employers to reduce hours for workers rather than cut headcount. Additionally, for the first time, the reforms allowed the long-term unemployed who were receiving federal benefits to start their own businesses, while also providing support to states to expand entrepreneurship programs.

Protecting the Most Vulnerable. The Recovery Act and subsequent legislation also included a range of proposals focused on protecting the most vulnerable. These measures included expanding the Earned Income Tax Credit (EITC) and the refundable portion of the child tax credit, both of which provide an additional reward to work for low-income families. The Administration also sought to ensure that the Making Work Pay credit was refundable, so that it benefited not just middle-class families but moderate-income working families as well. The Recovery Act expanded the Supplemental Nutrition Assistance Program (SNAP) to help families through tough times while also providing emergency benefits through Temporary Assistance to Needy Families (TANF), including subsidies to encourage hiring of low-income parents. The Recovery Act also ended or prevented homelessness for over 1.3 million families through the Homelessness Prevention and Rapid Rehousing Program.

All told, the pre-existing social insurance system combined with the expansions in the Recovery Act and subsequent extensions were very effective in preventing a large rise in the poverty rate, despite a substantial downturn in the economy. Even though the economy was dealt its most severe blow since the Great Depression, Wimer et al. (2013) find that from 2007 to 2010, the poverty rate measured to include the effects of antipoverty policy measures rose just half a percentage point. Excluding these measures, the poverty rate would have risen 4.5 percentage points—nine times greater than the actual increase. Further analysis indicates that the aforementioned expansions to antipoverty programs included in the Recovery Act were responsible for averting much of the increase in poverty that would have otherwise taken place. Specifically, the Recovery Act lowered the poverty rate by 1.7 percentage point in 2010 and the Recovery Act and subsequent extensions lifted 19 million people-years cumulatively out of poverty through 2012, as shown in Figure 11. Because these figures are only based on expansions to safety net programs and do not account for the antipoverty impact of the Recovery Act's job creation measures, they should be thought of as a lower bound estimate of the Act's full impact on vulnerable households.

Figure11

Recovery Act and Subsequent Extensions: Cumulative Person-Years Kept from Poverty, 2008–2012



Source: Bureau of Labor Statistics, Current Population Survey, Annual Social and Economic Supplement; CEA Calculations.

VI. THE EFFECT OF THE RECOVERY ACT ON LONG-TERM GROWTH

The Recovery Act and subsequent jobs measures also contained a large number of provisions that were aimed at strengthening long-term growth. In designing the Act, the Administration believed that it was not just the quantity of the fiscal support that mattered, but the quality of it as well. In this sense, the Administration took to heart a lesson that has been pointed out by many but can be traced back as early as the 19th century to a French writer and politician named Frederic Bastiat. Bastiat (1848) wrote of a shopkeeper's careless son who broke a window in the storefront. When a crowd of onlookers gathered to inspect the damage, Bastiat took objection to the discussion that ensued: "But if, on the other hand, you come to the conclusion, as is too often the case, that it is a good thing to break windows, that it causes money to circulate, and that the encouragement of industry in general will be the result of it, you will oblige me to call out, 'Stop there!'"

For this reason, the Recovery Act was designed not just to provide an immediate, short-term boost to the economy, but also to make investments that would enhance the economy's productivity and overall capacity even after the direct spending authorized by the Act had phased out. The Act's investments in expanding broadband infrastructure and laying the groundwork for high-speed rail, to take two examples, are a far cry from the broken window in Bastiat's parable because they do so much more than simply restore things to how they once were. Rather, these types of investments will raise the economy's potential output for years to come, from a rural school that can now offer its students and teachers high-speed Internet access, to a business that has a new option to transport its goods more quickly.

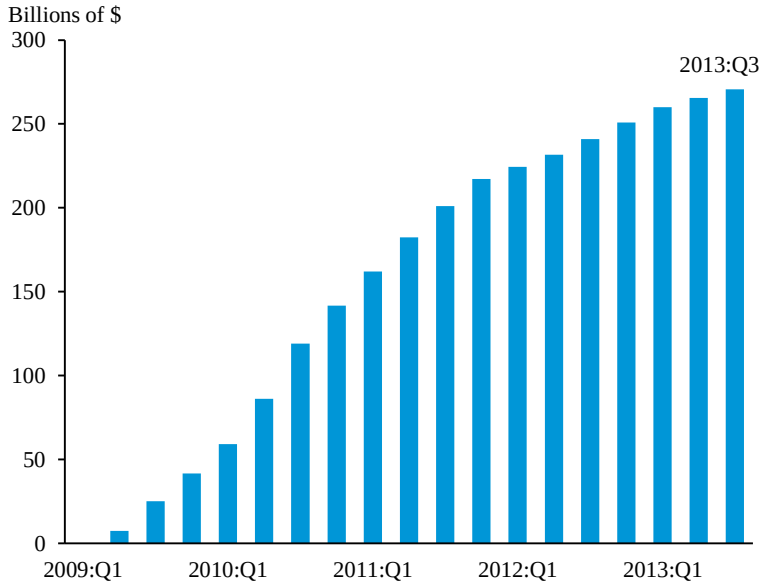
As shown in Table 8, the Recovery Act included $300 billion of these types of investments in areas such as clean energy, health information technology, roads, and worker skills and training. Figure 12 suggests that the timing of these investments was relatively more spread out than some of the Act's other measures, consistent with the longer-term focus of these projects.

Table 8
Recovery Act Long Term Growth Investment by Category

	Billions of Dollars
	Estimated Cost (2009-2019)[a]
Capital	
Construction of Transportation Infrastructure	30.0
Environmental Cleanup and Preservation	28.0
Construction of Buildings	23.9
Public Safety and Defense	8.9
Economic Development	14.6
Memo: Business Tax Incentives	*11.7*
Labor	
Pell Grants	17.3
Special Education	12.2
Help for Disadvantaged Children	13.0
Other Human Capital	10.3
Technology	
Scientific Research	18.3
Clean Energy	78.5
Health and Health IT	32.0
Broadband	6.9
Other	6.7
Total Public Investment[b]	300.6

Note: a. Estimated cost includes appropriations and tax provisions through 2019:Q3.
b. Items may not add to total due to rounding. Total excludes Business Tax Incentives.
Source: Office of Management and Budget; Department of the Treasury, Office of Tax Analysis based on the FY2011 budget; CEA calculations.

Figure 12
Recovery Act Cumulative Public Investment Outlays, 2009–2013



Source: Office of Management and Budget; Department of the Treasury, Office of Tax Analysis, based on the FY2013 Mid-Session Review.

A. Protecting and Expanding Investments in Physical Capital

The Recovery Act and subsequent jobs measures were designed to expand both private capital and public capital.

Business tax incentives for private capital. The theory behind incentivizing private capital holds that, at a time of systemic financial crisis, firms might not have access to sufficient capital through financial markets to invest or might be overly deterred from investing due to uncertainty, as explained in a report by the Treasury's Office of Tax Policy (2010a). To overcome these impediments to private investment, the Recovery Act and subsequent measures included business tax cuts designed to increase cash flows—like extended periods for net operating loss carrybacks and bonus depreciation—that, in effect, constituted an interest-free loan to businesses. Some economic research (House and Shapiro 2008) has shown that bonus depreciation policies can noticeably raise investment. At low interest rates, these measures had a small net present value cost to the Federal Government, but provided resources to credit-constrained firms to support investment. Building on this approach, in fall 2010 the President proposed 100 percent expensing for business investment, which, as passed by Congress in December 2010, became the largest temporary business investment tax incentive in history.

Transportation and other investments in public capital. A modern and effective transportation infrastructure network is both necessary for the economy to function and a prerequisite for future growth. Numerous studies have found evidence of large private-sector productivity gains from public infrastructure investments, as highlighted in a report by the Department of Treasury and CEA (2012).[21] The early stage of the recovery has been a particularly opportune time to undertake such investments because of the high level of underutilized resources in the economy and low construction costs. The Treasury report also points out that transportation investments can create middle-class jobs and lower transportation costs, which would otherwise weigh on household budgets.

The Recovery Act allocated $48 billion to programs administered by the Department of Transportation, with almost 60 percent for highways and 37 percent for public transportation and intercity passenger rail. The magnitude of this aid was substantial. While it is difficult to estimate what transportation expenditures would have been without the Recovery Act, total highway spending in 2010 was about $27 billion (or 24 percent) higher than in 2007. This increase occurred in a period when user revenues (such as fuel taxes and other fees), the usual source of funding for states for transportation projects, were declining. Moreover, an equal dollar amount of expenditures was more effective during the recession, because construction costs for highways (as measured by the National Highway Construction Cost Index) declined about 20 percent between mid-2008 and mid-2009, and remained relatively flat through 2011.[22]

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[21] Many of these studies are summarized in Munnell (1992) and Fernald (1999).

[22] See Transportation Investments in Response to Economic Downturns, Special Report 312, Transportation Research Board of the National Academies.

In addition to these direct programs, the Recovery Act also provided indirect support for transportation projects through Build America Bonds. The Federal Highway Administration estimated that 26 percent of the total funds raised by Build America Bonds (or $48 billion) were used by states for transportation projects. Further, a Recovery Act provision that temporarily exempted Private Activity Bonds (PABs) from the Alternative Minimum Tax (AMT) enabled airports across the country to access credit at affordable rates. The Federal Aviation Administration estimated that 24 U.S. airports issued $12.7 billion in bonds under the Recovery Act AMT exemption, realizing $1.06 billion of present value savings ($1.8 billion in gross savings) through early November 2010.

With these funds, shovels went in on more than 15,000 transportation projects across the Nation. The Department of Transportation estimates that these projects will improve nearly 42,000 miles of road, mend or replace over 2,700 bridges, and provide funds for over 12,220 transit vehicles. The Recovery Act also made the largest-ever investments in American high-speed rail, constructing or improving approximately 6,000 miles of high-performance passenger rail corridors and procurement of 120 next-generation rail cars or locomotives.

Finally, the Recovery Act initiated the Transportation Investment Generating Economic Recovery (TIGER) grant program, which allowed the Department of Transportation to invest in critical projects that were difficult to fund through traditional means. The TIGER program included a competitive process that encouraged innovation and regional collaboration. The program made extensive use of benefit-cost analysis to evaluate project applications, and required grant recipients to track the performance of their projects once launched to ensure that they achieve the promised benefits. The program also allowed many cities, counties, and other government entities to access direct Federal funds for the first time. The initial $1.5 billion TIGER program was deemed so successful that it was extended five additional times and is currently in effect through September 2014.

The Recovery Act also invested in restoring or otherwise improving infrastructure to allow Americans to safely and easily access public lands and waters. Investments included about $1 billion to the National Park Service, Fish and Wildlife Service, and Forest Service for deferred maintenance of facilities and trails and for other critical repair and rehabilitation projects. These projects help support the infrastructure needed to sustain the outdoor recreation economy and contribute to the enjoyment of public lands.

The Recovery Act included funding for programs administered by the Environmental Protection Agency (EPA) to protect and promote both a healthier environment and jobs. These investments have generated substantial environmental benefits, such as cleaning up contaminated land and putting that land back to economic use, reducing air pollution from diesel engines, and reducing contaminants in both surface water and drinking water. EPA's Brownfields program used $100 million in Recovery Act funds to leverage additional funds and cleaned up 1,566 acres of properties that are now ready for reuse, far exceeding the original target of 500 acres. The Act's funding led to 30,900 old diesel engines being retrofitted, replaced, or retired, which has

reduced lifetime emissions of carbon dioxide by 840,300 tons and particulate matter by 3,900 tons.[23] More than 3,000 water quality infrastructure projects and Clean Water projects are improving or maintaining sewage treatment infrastructure for over 78 million people nationwide, as another Act investment. The Recovery Act funds have also enabled 693 drinking water systems, serving over 48 million Americans, to return to compliance with Safe Drinking Water Act standards.[24]

B. Protecting and Expanding Investments in Human Capital

The Recovery Act was also aimed at protecting and expanding human capital. Saving and creating jobs helps protect human capital, in part, by preventing the loss of skills—including job search skills—that can come from prolonged periods of unemployment. The evidence shows that protracted unemployment in Europe in the 1980s and 1990s resulted in sustained loss of human capital (Blanchard and Summers 1986, Ljungqvist and Sargent 1998). Helping workers better connect with jobs, whether through unemployment insurance reforms or job subsidies in the TANF emergency fund, all helped protect human capital.

Significant investments and reforms in education were critical to actually expanding human capital. State and local governments typically provide more than 90 percent of the funding for elementary and secondary education and about 40 percent of the funding for public institutions of higher education in the United States. As the economy slowed in 2008, State revenues declined, putting pressure on education budgets.

The Recovery Act dramatically increased funding for education through Title I grants to local education agencies (LEAs), School Improvement Grants, and grants for special education. In addition, the Act increased student aid and support for post-secondary institutions to invest in new buildings and research in innovative health and energy technologies. In response to these grants, recipients reported that more than 800,000 education job-years were saved or created, keeping teachers, principals, librarians, and counselors as well as university faculty and staff on the job.

States also reported that they used State Fiscal Stabilization Funds from the Recovery Act to restore sizable shares of K-12 education funding. For example, the Recovery Act restored 9 percent of K-12 education funding in California, Indiana, Alabama and Oregon; 12 percent of such funding in Florida, Wisconsin and South Carolina; and 23 percent of K-12 education funding in Illinois in fiscal year 2009. In at least 31 states, Recovery Act funds prevented or lessened tuition increases at public universities, including universities in Massachusetts, Minnesota, and Virginia. Without this influx of State Fiscal Stabilization Funds, these states would have endured drastic cuts in education funding.

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[23] See Environmental Protection Agency (2013).
[24] See http://www.epa.gov/recovery/accomplishments.html

The Recovery Act launched the innovative Race to the Top Program with $4.35 billion. Race to the Top is a competitive grant program designed to encourage and reward States to implement critical reforms designed to help close the achievement gap and improve student outcomes, including better student assessments; better data systems to provide teachers and parents with information about student progress; new steps to develop and support effective teachers; and efforts to turn around low-achieving schools. Encouraged by the incentives included in Race to the Top, states across the country chose to adopt more rigorous academic standards aligned to higher expectations for college and career readiness. To date, 19 states, representing 45 percent of all K-12 students, have received Race to the Top funds; and to compete for funds, 34 states modified state education laws and policies in ways known to improve education.

The Recovery Act also expanded the Pell Grant program, raising the maximum grant from $4,731 to $5,550, and it created the American Opportunity Tax Credit to modify and replace the Hope higher education credit (this policy was later extended by the Tax Relief, Unemployment Insurance Reauthorization and Job Creation Act of 2010 and the American Taxpayer Relief Act of 2012). The passage of the Health Care and Education Reconciliation Act of 2010 enabled further expansion of the Pell Grant award. Together, these efforts to expand higher education opportunity helped individuals who chose to return to school or remain in school to bolster their skills in a demanding job market. As a result, the Pell Grant program offered $36.5 billion in aid to more than 8.8 million undergraduate students in fiscal year 2010, compared to roughly half as much aid, $18.3 billion, for 6.2 million students in fiscal year 2008 (U.S. Department of Education, 2011). The largest growth in Pell Grant applications came from students in the lowest-income categories. For tax year 2009, 8.3 million tax returns claimed $14.4 billion in American Opportunity Tax Credits. This level of education credits (including the lifetime learning credit) was a nearly $10 billion increase from the prior year (U.S. Department of the Treasury, 2010b).

C. Investments in Technology and Innovation

Some of the highest returns to investment are in the area of innovation. Often, innovation produces large returns for the economy as a whole, but since businesses do not capture all these society-wide returns, they tend to underinvest in innovation. For example, firms may not undertake research and development even though it would benefit the rest of their industry, other industries, and their regional economies. In general, looking across a range of industries, economists have estimated that the divergence between private and social returns to investment may be as great as two-to-one (for instance, Hall et al. 2009). This is especially true when investments can result in externalities that are not captured by the entity making the investment. For instance, in the energy sector, there are substantial climate and national security benefits to cleaner energy that are not fully internalized in the form of financial rewards for individual firms. The Recovery Act made a significant impact on innovation—complementing the other measures this Administration has taken to encourage innovation.

Scientific Research. The Recovery Act provided a one-time supplemental appropriation of over $3 billion for the National Science Foundation and $1 billion for the National Aeronautics and Space Administration (NASA). It also increased support for the National

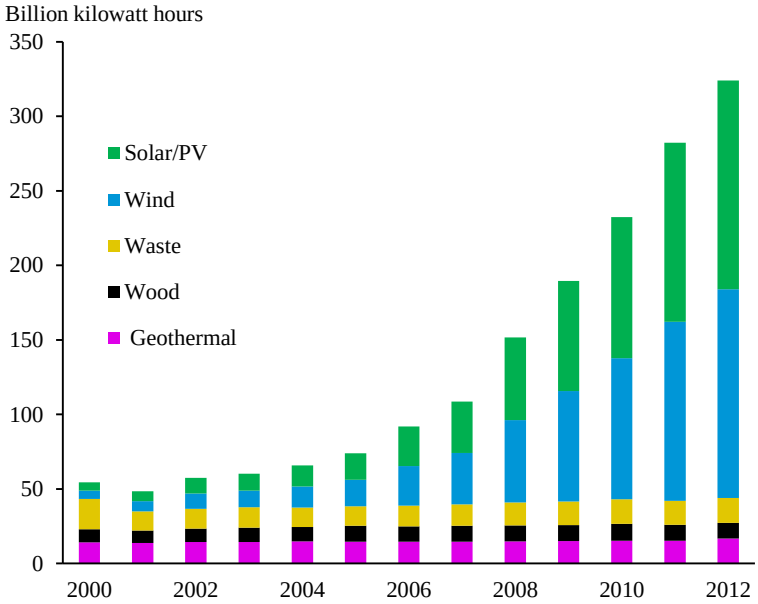
Institute of Standards and Technology (NIST) and provided the Advanced Research Projects Agency-Energy (ARPA-E) with funding of $400 million. The ARPA-E is charged with researching transformative energy technologies. So far it has pioneered research into so-called second-generation biofuels, which utilize agricultural and municipal waste, as well as more efficient batteries, superconducting wires, and vehicles powered by natural gas.

Clean energy. Clean energy was the focus of more than $90 billion in government investment and tax incentives in the Recovery Act. The purpose of these investments was to help create new jobs, reduce dependence on foreign oil, enhance national security, and improve the environment by countering climate change. Key targets included energy efficiency (with programs such as the weatherization assistance program), renewable generation (with investments in wind turbines, solar panels, and other renewable energy sources), and grid modernization. Many of these clean energy programs were administered though the $38 billion Recovery Act portfolio of the Department of Energy.

Using the multiplier model described earlier in the report, the CEA estimated that clean energy investment created or saved about 650,000 job-years, directly or indirectly, through 2012.[25] These investments have started to drive changes in energy production, as highlighted, for instance, by Aldy (2013). Owing in large part to these clean energy incentives and investments, renewable wind, solar, and geothermal energy have increased their contributions to U.S. energy supply each year since 2008. For instance, wind electricity net generation nationwide grew by 145 percent from 2008 to 2012. Solar thermal and photovoltaic electricity net generation more than quadrupled during the same period. Meanwhile, carbon dioxide emissions from the electric power sector fell approximately 14 percent over the period, even though total power generation declined by only about 2 percent.

[25] See CEA's (2010a) second report on the Recovery Act of 2009 for a detailed discussion on the macroeconomic effects of clean energy investment. The latest estimates are presented in CEA's (2010c) fourth quarterly report.

Figure 13
Advanced Renewable Electric Power Net Generation



Source: Energy Information Administration, Monthly Energy Review.

Many of the clean energy provisions of the Recovery Act were designed to bring in private funds through co-investment. For example, through Energy Cash Assistance, individuals and businesses that installed certain types of renewable energy generation received a grant equal to 30 percent of the project's cost.

Of course, not every investment in clean energy will ultimately result in a transformative technology. Because funding is often directed to projects based on ideas that are at the frontier of scientific research, there is a certain degree of risk involved. But given the grave economic, environmental, and national security consequences of climate change, these types of investments must continue. An independent review released in 2012 found that, on the whole, the Department of Energy loan guarantee programs are expected to perform well and hold even less risk than initially envisioned by Congress.

Health Care Information Systems. The Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as a part of the Recovery Act, encouraged adoption and use of health information technology. The core of the HITECH Act is a set of financial incentives to health care providers to adopt and make "meaningful use" of electronic health records. The HITECH Act also provided $2 billion to the Department of Health and Human Services to fund activities to encourage the diffusion of health information technology, such as investing in infrastructure and disseminating best practices. The Act also made a variety of other changes, including provisions to facilitate data sharing across health care providers to support coordinated care and protect patient privacy.

Fully integrated electronic health record systems allow immediate and complete access to all relevant patient information. These innovations have the potential to greatly improve coordination of care – for example by limiting the unnecessary duplication of tests and

procedures – and also to reduce medical errors, thereby lowering health care costs. EHR systems can also provide automatic alerts when treatments are inconsistent with each other or when a scheduled test has been missed. The systems can also be used to improve quality more broadly by allowing hospitals and other providers to keep better track of outcomes and to identify problem areas.

The share of medical providers using electronic health records has risen dramatically in recent years. For example, data from the National Ambulatory Medical Care Survey show that the share of office-based physicians using an advanced EHR system (which are generally more sophisticated than those required meet the early-stage "meaningful use" criteria) rose from 17 percent in 2008 to 40 percent in 2012 (Hsiao and Hing 2014), and data from the American Hospital Association's annual survey of hospitals show that the share of hospitals that had adopted such a system rose from 9 percent to 44 percent over the same period (Charles et al., 2013). Consistent with this rapid progress for advanced systems, the Department of Health and Human Services has estimated that, as of the end of April 2013, over half of eligible physicians and more than 80 percent of eligible hospitals have adopted an EHR system and met the criteria for meaningful use (HHS 2013).

Broadband. The Recovery Act helped increase access to broadband and drive its adoption across the country, both directly through grants, and indirectly through tax incentives such as increased expensing of investment costs. [26] It provided $4.4 billion through the Department of Commerce's National Telecommunications and Information Administration to deploy broadband infrastructure (for instance, laying new fiber-optic cables or upgrading wireless towers, and connecting key institutions such as schools, libraries, hospitals, and public safety facilities) and support public computer centers (establishing new public computer facilities to provide broadband access to the general public or specific vulnerable and underserved populations). The funding also encouraged sustainable adoption of broadband (for instance, through digital literacy training and outreach campaigns), led to the publication of the National Broadband Map (www.broadbandmap.gov), and supported state broadband leadership and capacity building activities (through, for example, local broadband planning teams and information technology assistance provided to small businesses, schools, libraries, and local governments). The Recovery Act also provided $2.5 billion through the Department of Agriculture Rural Utilities Service to expand broadband access in rural areas.

Because of these grants, over 110,000 miles of broadband infrastructure have been added or improved, and high-speed connection has been made available to about 20,000 community institutions. These projects have also delivered about 16 million hours of technology training to more than four million users.

In part as a result of the Recovery Act and related policies, broadband access has risen substantially in recent years.

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[26] See the Office of Science and Technology Policy and the National Economic Council report *Four years of broadband growth* (2013).

D. Fiscal Sustainability and the Recovery Act

The Recovery Act and subsequent fiscal measures were part of an overall fiscally responsible economic strategy that cut the deficit in the medium and long run. Moreover, given the economic context in which the jobs measures were passed, these measures alone had little if any impact on long-run fiscal sustainability.

The Recovery Act is entirely temporary—it cost $763 billion over the first decade (not counting the extension of the AMT patch) and it has no long-term impact on non-interest outlays or revenues. Overall, assuming the CBO score, the Act at most added less than 0.1 percentage point to the 75-year fiscal gap.

These estimates are small but may nevertheless overstate the true cost of the Recovery Act. To the degree that the Act successfully expanded output and boosted employment, those gains would result in additional revenue and less spending on countercyclical programs than would otherwise have occurred. Taking the estimates presented in this report for the increase in GDP over the 2009-12 period—and assuming these increases led to additional tax revenue at 18 percent of GDP, roughly the recent historical average—then the resulting increase in revenue would alone be enough to offset roughly one quarter of the Act's cost.

Moreover, to the degree that effects on output are persistent—a factor that is not captured in the estimates in this report but is assumed by the IMF (2009) and Reifschneider, Wascher, and Wilcox (2013), then the positive fiscal feedback effects could be even larger. DeLong and Summers (2012) have shown, for example, that with plausible multipliers and persistence in output effects, it is possible that the additional output associated with the Recovery Act, and associated additions to revenue and reductions to debt, could result in a *reduced* debt-to-GDP ratio by the end of the decade.

These estimates do not reflect the potential benefits for long-term growth of the productivity-enhancing investments in the Recovery Act. For example, if an infrastructure project has a total rate of return of 10 percent then if overall revenues are about 18 percent of GDP then it would have a rate of return to the Federal taxpayer of about 2 percent. Given the Federal borrowing costs at the time of the Recovery Act, the investment would conceivably pay for itself over time and reduce Federal debt as a share of GDP, as the investment produces returns.

None of these estimates should be taken as conclusive or as a suggestion that official budget scoring should take these feedback effects into account. When the economy is operating at full employment, and monetary policy is not constrained by the zero lower bound, many of these macroeconomic feedback effects would be less relevant or even operative at all. Moreover, if fiscal policy actions raised the specter of substantially larger and less sustainable future deficits and debt, that could reduce confidence and raise interest rates, undermining any beneficial economic feedback. But in this case, these measures were passed at the same time that the Administration was also laying out steps for longer-term deficit reduction and reducing the fiscal

gap by passing major deficit-reduction measures, including the Affordable Care Act and the Budget Control Act.

As a result, given the overall context of highly insufficient aggregate demand, monetary policy operating at the zero lower bound, and other measures for medium- and long-term deficit reduction, fiscal measures to support jobs have the potential for even larger impacts on output and thus greater associated revenue feedbacks and a much lower long-run fiscal cost, if they have any long-run fiscal cost at all.

VII. CONCLUSION

The Recovery Act and subsequent jobs measures were designed to help propel the economy out of the worst contraction since the Great Depression and to set the stage for stronger future growth. Considerable evidence suggests the Federal Government's efforts to jump-start the economy were successful. The CEA estimates that the Recovery Act provided an important and timely boost to GDP in 2009 and 2010, and led to the creation of about 6.4 million additional job-years through 2013—estimates that are in line with those of CBO and of other forecasting groups. Other fiscal efforts enacted subsequent to the Recovery Act brought the total to 8.8 million job-years.

The Administration's actions have been guided by the notion that fiscal support measures would only be needed for a temporary period, and this view is being borne out. Most temporary measures to support the economy expired in 2013, most notably the payroll tax cut. Businesses and households are now in far better shape as a result of several years of deleveraging, and private-sector growth has led the way since 2010. Although many challenges linger, and supportive measures like emergency unemployment insurance remain necessary given the unacceptably high rate of long-term unemployment, the economy has the potential for even stronger growth in 2014.

Public policy, in particular public investment in areas like research, infrastructure, and innovation, will continue to play an important role in the economy. The President is proposing additional investments and reforms in all of these areas. But, in these cases, investments are part of a longer-term, sustained commitment to expanding the productive capacity of the economy without the same need for immediate countercyclical support.

Overall, the Recovery Act and subsequent measures are one of the main reasons why the U.S. economy was able to return to record levels of per working-age population GDP within just over four years of the onset of the recession and to bring the unemployment rate down by 0.8 percentage point per year—when many other countries with systemic financial crises have not seen their GDP per working-age population fully recover or their unemployment rates start a sustained fall. In the longer run, the benefits of all of these efforts will be more difficult to isolate from other simultaneous changes, but they will be no less profound in terms of their cumulative impact on the economic well-being of the Nation.

APPENDIX A: COMPONENTS OF THE RECOVERY ACT AND SUBSEQUENT FISCAL MEASURES

Table 9 reports the actual budgetary impact of the Recovery Act from its inception through the latest data available (the end of fiscal year 2013).

Table 9

Recovery Act Outlays, Obligations, and Tax Reductions

Through the end of[a]	Outlays	Obligations	Tax Reductions	Sum of Outlays and Tax Reductions[b]
2009:Q1	8.6	30.5	2.4	11.0
2009:Q2	47.7	127.3	35.6	83.3
2009:Q3	54.4	98.5	31.8	86.2
2009:Q4	53.5	57.6	30.2	83.7
2010:Q1	46.7	48.2	64.9	111.6
2010:Q2	46.4	41.7	77.3	123.6
2010:Q3	50.6	48.6	16.4	66.9
2010:Q4	40.7	20.8	8.4	49.1
2011:Q1	25.0	6.2	31.9	56.9
2011:Q2	25.1	5.0	-5.1	20.0
2011:Q3	21.9	9.2	2.1	23.9
2011:Q4	17.7	5.7	2.0	19.6
2012:Q1	14.3	5.2	-4.0	10.4
2012:Q2	12.8	6.5	-3.0	9.8
2012:Q3	12.0	4.4	-0.5	11.6
2012:Q4	11.2	5.8	0.5	11.7
2013:Q1	11.0	6.2	0.7	11.7
2013:Q2	7.2	4.0	0.4	7.7
2013:Q3	5.6	2.5	0.4	5.9
Total Through 2013:Q3[b]	512.4	533.8	292.2	804.6

Notes: a. Data on outlays and obligations are for the last day of each calendar quarter.

Source: Office of Management and Budget, Agency Financial and Activity Reports; Department of the Treasury, Office of Tax Analysis based on the FY2013 Mid-Session Review.

Table 10 reports the budgetary impact classified into the six broad functional categories shown also in Figure 1: individual tax cuts, Alternative Minimum Tax relief, business tax incentives, State fiscal relief, aid to directly impacted individuals, and public investments. The following sections of this appendix will discuss each of these categories in more detail.

Table 10

Recovery Act Fiscal Stimulus by Functional Category

Through the end of[a]	Individual Tax Cuts	AMT Relief	Business Tax Incentives	State Fiscal Relief	Aid to Directly Impacted Individuals	Public Investment Outlays	Total[b]
2009:Q1	2.3	0.0	0.1	8.5	0.0	0.0	11.0
2009:Q2	26.3	7.8	12.5	19.6	9.6	7.4	83.3
2009:Q3	14.3	6.0	10.5	15.6	22.2	17.6	86.2
2009:Q4	15.8	3.5	9.0	15.5	23.4	16.5	83.7
2010:Q1	43.3	11.4	6.9	16.2	16.1	17.7	111.6
2010:Q2	22.4	47.5	4.9	16.6	5.2	27.0	123.6
2010:Q3	9.8	7.2	- 2.6	15.0	4.7	32.8	66.9
2010:Q4	8.6	0.0	- 1.5	14.6	4.7	22.6	49.1
2011:Q1	25.5	4.6	- 1.5	4.4	3.5	20.4	56.9
2011:Q2	12.2	- 19.0	- 1.5	4.7	3.3	20.3	20.0
2011:Q3	0.3	0.0	- 1.5	2.3	4.1	18.7	23.9
2011:Q4	0.1	0.0	- 0.9	1.9	2.4	16.2	19.6
2012:Q1	0.3	0.0	- 0.9	1.7	2.2	7.1	10.4
2012:Q2	0.0	0.0	- 0.9	1.2	2.2	7.3	9.8
2012:Q3	0.0	0.0	- 0.9	1.2	2.0	9.3	11.6
2012:Q4	0.1	0.0	- 0.7	0.9	1.6	9.9	11.7
2013:Q1	0.3	0.0	- 0.7	1.3	1.6	9.2	11.7
2013:Q2	0.0	0.0	- 0.7	1.2	1.6	5.5	7.7
2013:Q3	0.0	0.0	- 0.7	0.6	1.1	5.0	5.9
Total Through 2013:Q3[b]	181.7	69.0	28.8	143.0	111.5	270.5	804.6

Notes: a. Data on outlays and obligations are for the last day of each calendar quarter.

b. Items may not add to total due to rounding.

Source: Office of Management and Budget, Agency Financial and Activity Reports; Department of the Treasury, Office of Tax Analysis based on the FY2013 Mid-Session Review.

A. Tax Relief

Within the first three categories of tax cuts, major programs included the Making Work Pay tax credit, which provided a 6.2 percent credit on earnings up to a maximum value of $400 for individuals and $800 for couples, phasing out starting at income above $75,000 and $150,000, respectively (estimated to cost about $116 billion between 2009 and 2011). The credit was administered through reducing tax withholdings and the Internal Revenue Service required that companies reduce withholding by April 1, 2009. In addition, the legislation made $250 one-time payments to seniors, veterans, and people with disabilities. The Recovery Act included the Making Work Pay tax credit for 2009 and 2010. In December of 2011 Congress enacted a 2 percentage point reduction of the Social Security payroll tax for 2011 that was extended through 2012 and expired at the start of 2013.

Additionally, the Recovery Act provided tax credits for families, such as an expansion of the child tax credit, including making it refundable for more low-income families (at a total

estimated cost of $15 billion), expansions of the earned income tax credit for married couples and families with more than three children ($5 billion), and the American Opportunity Tax Credit to help make college more affordable. All of these measures have since been extended through 2017, and the President's Budget for 2014 proposes to make them permanent—rendering them among the only items from the Recovery Act intended to be permanent.

The Recovery Act also raised the exemption amount for the AMT to $46,700 for individual taxpayers and $70,950 for joint filers, at an estimated cost of $70 billion. Because this was a widely expected continuation of previous AMT patches, this component of the Recovery Act did not represent a net new fiscal impetus for the economy and is not included in CEA's macroeconomic estimates.

For businesses, the legislation provided cost-effective incentives to expand investment by allowing businesses to immediately deduct half of the cost of their investments (bonus depreciation) and also to extend the period over which small firms (except those receiving TARP funds) could claim losses and expense capital purchases. Businesses buying back or exchanging their own debt at a discount were also allowed to defer any resulting income. All of these measures were designed to improve the cash flow for firms that might be facing credit constraints and to increase incentives to invest. Long-run costs to the Federal Government were limited because the measures largely advanced tax benefits that companies would receive anyway. The 50 percent bonus depreciation was subsequently extended and expanded to 100 percent expensing, and the net operating loss carryback was extended to larger firms. In addition, the Recovery Act included incentives for investments in renewables and advanced energy manufacturing, and in areas undergoing significant distress through State and local government-issued Recovery Zone Bonds. The Recovery Act also increased funding for the New Markets Tax Credit and provided incentives to hire unemployed veterans and disconnected youth.

B. Aid to Affected Individuals

An expansion in unemployment benefits offered significant aid to individuals.[27] Typically, American workers who have lost their jobs are entitled to 26 weeks of benefits under the unemployment insurance (UI) program, which tends to replace about half of lost earnings and is paid for entirely by the states through payroll taxes levied on employers. In June 2008, Congress created the Emergency Unemployment Compensation (EUC) program, which provided an additional 13 weeks of federally financed compensation in all states to eligible individuals who had exhausted their UI benefits. The Recovery Act extended and expanded the EUC program to reflect that fact that with jobs increasingly scarce the optimal balance of unemployment insurance shifted towards covering people for a longer period of time. It also provided 100 percent Federal funding of the pre-existing Extended Benefit (EB) program, which provides an additional 13 or 26 weeks of benefits in states where unemployment is exceptionally

[27] For a comprehensive discussion of the various employment benefits programs implemented in recent years, see the Council of Economic Advisers and the Department of Labor report *The economic benefits of extending unemployment insurance* (2014).

high and rising. (EB costs are usually borne half by the Federal Government and half by the States.)

The Recovery Act also added $25 a week to benefits and exempted the first $2,400 in yearly unemployment benefits from taxes. The CBO (2009a) estimated the total costs of these changes to the unemployment compensation system at $39 billion. In addition, the Federal government offered states incentives to modernize their UI programs, picking up the cost of new provisions allowing workers to become eligible based on recent earnings (rather than those from the previous calendar year) and extending benefits to part-time job seekers.

The Recovery Act provided a 13 percent increase in food stamp payments and lifted several restrictions governing the length of time that individuals could collect food stamps, at an estimated cost of $20 billion. For the first time, the Federal Government agreed to temporarily pay 65 percent of health insurance premiums for laid off workers who wanted to continue with their employer-sponsored health insurance. Other aid to individuals included funds for job training and improving skills of the hard to employ and young workers.

The Recovery Act devoted substantially more resources compared with previous antirecessionary policies to investments in education and research and development. The legislation increased the Pell Grant maximum by $500 to $5,350, at an estimated cost of $17 billion over ten years. The Recovery Act also boosted Title I aid and other programs for disadvantaged children ($13 billion) and funds for special education ($12 billion).

C. State Fiscal Relief

The Recovery Act provided unprecedented support for State and local governments, which often face budget challenges in a recession because their revenues rise and fall with the economy, while pressures on spending, especially on programs targeted to the disadvantaged, tend to move in the opposite direction. The result can be budget shortfalls, or gaps between expected revenues and expenditures. These gaps pose problems for state residents already affected by the downturn, and for the larger economy because most State and local governments are generally bound by constitutional or statutory requirements to balance their operating budgets each year. As shown by Poterba (1994), states and localities have to raise taxes or cut spending, precisely when doing so can most harm recovery.

To dampen such counterproductive tax increases or budget cuts, the Recovery Act boosted Federal Medicaid payments by $87 billion, including a 6.2 percent across-the-board increase in the Federal matching rate, plus delays of a planned reimbursement cut for some states (based on income growth before the recession) and an increment of aid linked to local unemployment conditions. It also established a $53.6 billion State Fiscal Stabilization Fund to be administered by the Department of Education, but with some funds available for other "high priority needs" such as public safety. Unlike most previous increases in Federal grants to States and localities during a recession, these transfers were available for general fiscal relief or left to local discretion to use, as long as recipients met basic maintenance of effort or minimal spending requirements.

Beyond direct spending, the Recovery Act made new types of borrowing available for State and local governments. Build America Bonds (BABs) allowed State and local governments to access non-traditional markets, including pension funds and international investors who would not normally purchase U.S. municipal bonds because they do not owe U.S. income taxes and therefore do not benefit from these bonds' tax-exempt status. Under BABs, State and local issuers could offer higher taxable interest rates on bonds and choose to make a Federal income tax credit available to buyers or to take a direct subsidy offsetting 35 percent of their borrowing costs. State and local governments issued $181 billion of Build America Bonds before the program expired at the end of 2010. The Treasury Department has estimated that this action saved issuers $20 billion in present value of borrowing costs as well as alleviating supply pressures in the tax-exempt market (Department of the Treasury 2011).

D. Investments

The Recovery Act made numerous investments in human capital, clean energy, health information technology, roads, and the skills of U.S. workers.[28] For example, the Recovery Act provided an additional $27.5 billion for highway construction, $18 billion for public transit and intercity passenger rail, $10 billion for water infrastructure, and $18 billion for government facilities. It also made available $57 billion for investment in smarter grid technology, renewable energy, and energy efficiency improvements through a combination of grants, loans, and pilot programs, including $5 billion to help low-income households weatherize their homes. Scientific projects from the National Science Foundation, National Institutes of Health, NASA, the Department of Energy, and others received over $15 billion for scientific facilities, research, and instrumentation. Additionally, the Recovery Act provided $7 billion to expand broadband Internet access in underserved areas of the country. The Recovery Act also provided several investments in health care and health information technology, including an $18 billion measure to encourage hospitals and physicians to computerize medical records, $2 billion for Community Health Centers, $1 billion for fighting preventable chronic diseases, and $1 billion for researching the effectiveness of various medical treatments. In total, more than $100 billion of the investments—including some tax incentives—were explicitly targeted at innovation.[29]

E. Subsequent Fiscal Measures

Table 11 shows the total fiscal support provided by the Administration, by fiscal year, with a brief description of the main programs for each measure. (These data were summarized in Table 4.) All measures use prospective CBO cost estimates. These totals only include measures

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[28] CEA counts as public investment any Recovery Act expenditure or tax program that directly results in activity that increases the capital stock of the Federal government, State and local governments, or private firms. We also count provisions that affect the Nation's human capital and knowledge capital, areas not measured in the national income accounts but which economists have identified as crucial to generating long-run economic growth. Note that tax programs are included if they function similarly to direct spending. In other words, entities can claim tax benefits only when associated spending occurs (e.g., the Advanced Energy Manufacturing Tax Credit).

[29] Executive Office of the President and Office of the Vice President, *The Recovery Act: Transforming the American Economy through Innovation*, August 2010.

explicitly designed to address job creation and provide relief and do not include routine extensions, like so-called "tax extenders" or the fix to Medicare's Sustainable Growth Rate formula.

Table 11
Fiscal Support for the Economy Enacted After the Recovery Act

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2009-12	2009-19	Description
Worker, Homeownership, and Business Assistance Act (HR 3548)	0	46	-3	-6	-4	-3	-2	-1	-1	-1	0	35	24	Expanded weeks in UI (by 20 weeks) Extended first time homebuyers tax credt
Supplemental Appropriations Act of 2009 (HR 2346)	1	2	0	0	0	0	0	0	0	0	0	3	3	Cash for Clunkers
Defense Appropriations Act of 2010 (HR 3326)	0	16	2	0	0	0	0	0	0	0	0	18	18	Extended UI/COBRA 2 months
Temporary Extension Act of 2010 (HR 4691)	0	7	1	0	0	0	0	0	0	0	0	9	9	Extended UI/COBRA 1 month
Hiring Incentives to Restore Employment Act (HR 2847)	0	4	6	3	1	1	0	0	0	0	0	13	15	Hiring tax credit Subsidized bonds for school construction and renewable energy
Continuing Extension Act of 2010 (HR 4851)	0	13	2	0	0	0	0	0	0	0	0	16	16	Extended UI/COBRA 2 months
Unemployment Compensation Act of 2010 (HR 4213)	0	9	25	0	0	0	0	0	0	0	0	33	34	Extended UI 6 months Extended first time homebuyers tax credit
FAA Safety Improvement Act (HR 1586)	0	0	23	2	0	-3	-5	-3	-2	-1	0	26	12	Education Jobs Fund Extension of FMAP relief
Small Business Jobs Act (HR 5297)	0	0	80	-9	-12	-10	-22	-12	-4	-2	-1	68	10	Small business lending fund Small business tax cut and bonus depreciation for all businesses
Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act (HR 4853)	0	0	158	145	22	-27	-21	-16	-12	-7	-5	309	237	Payroll tax cut for 2011 Extended UI through 2011 Extension of expanded AOTC, EITC, and CTC
Temporary Payroll Tax Cut Continuation Act (HR 3765)	0	0	0	27	2	0	0	0	0	0	0	28	29	Payroll tax and UI through February 2012
VOW to Hire Heroes Act (HR 674)	0	0	0	0	1	0	0	-1	0	0	0	0	0	Returning Heroes and Wounded Warrior tax credits
Middle Class Tax Relief and Job Creation Act of 2012 (HR 3630)	0	0	0	90	33	0	0	0	0	0	0	98	123	Payroll tax and UI through end of 2012
American Taxpayer Relief Act of 2012 (HR 8)	0	0	0	0	68	55	9	15	18	17	-4	17	178	Extended UI through 2013 Extension of expanded AOTC, EITC, and CTC Extension of small business tax cut and bonus depreciation
Total	1	98	294	253	113	13	-40	-18	0	6	-11	674	709	

Note: All measures use prospective CBO cost estimates for 2009-19. Routine tax extenders have been removed from the cost estimates. Columns for individual years contain data in fiscal year terms. The column for 2009-2012 total contains data through the end of calendar year 2012, while the column for 2009-2019 contains data through the end of fiscal year 2019.

Source: Congressional Budget Office; Joint Committee on Taxation.

APPENDIX B: FISCAL MULTIPLIERS: THEORY AND EMPIRICAL EVIDENCE

Although the multiplier described in the text is simple and intuitive, it relies on several unrealistic assumptions, and much research in macroeconomic theory over the past four decades has focused on overcoming those conceptual problems. For example, because deficit spending in a recession could be offset by higher taxes in a boom, Barro (1974) argued that forward-looking individuals might save much or all of a tax cut in anticipation of higher taxes later. Although the extreme version of this argument requires consumers who are unrealistically liquid and prescient, in general introducing forward-looking behavior by consumers and firms planning for the future changes the dynamics and magnitude of Keynesian multipliers.

A. Forward-Looking Models with Rigidities

Many modern macroeconomic models combine forward-looking behavior with some form of slow-moving prices or wages, sometimes called "New Keynesian" models. In normal times, when monetary policy is unconstrained and interest rates can vary, these models tend to imply fiscal expenditure multipliers that are positive but smaller than one, as shown for instance by Cogan et al. (2010) and Coenen et al. (2012), in part because of increases in the interest rate from monetary policy which partially offsets the fiscal expansion.

The onset of low interest rates has spurred considerable interest in how these models perform when monetary policy is constrained by the zero lower bound, that is, when the nominal federal funds rate falls to zero, as in the recent recession. For instance, Eggertson (2001), Christiano, Eichenbaum, and Rebelo (2011) and Woodford (2011) have shown that when nominal interest rates are near zero, government spending can be particularly effective and generate spending multipliers that are greater than one; at the zero lower bound, expansionary fiscal policies can increase inflation expectations and thereby reduce real interest rates, which spurs investment and consumption, and monetary policy does not counteract fiscal policy. Coenen et al. (2012) simulate the effect of the Recovery Act spending in some forward-looking models with rigidities, both conventional models (such as Smets and Wouters (2007)) and models augmented by the zero lower-bound effects. Their results show that the standard models imply a notable increase in output for several years, but with multipliers smaller than one, while the models augmented by zero-lower-bound effects imply multipliers that are much larger than one over the first few years.

The 2007-09 recession was unusual both because the Federal Reserve was at the zero lower bound and because of its severity. This severity raises the specter of high unemployment and—because the path to recovery from a deep shock is long—unusually long spells of unemployment. Long-term unemployment can lead to deterioration of skills and to stigmatization, which makes finding employment even more difficult. For these and other reasons, the longer the spell of unemployment, the less likely is an individual to find a job in any given month, and the more likely he or she is to remain unemployed or stop looking for a job altogether. This can lead to a vicious circle: persistent slack demand means many people out of work and long spells of unemployment, which in turn reduces the chances of the unemployed finding a job, which perpetuates slack and further lengthens spells. Because the resulting

unemployment dynamics depend on the path of unemployment, not just on its current level, this phenomenon is often referred to as "hysteresis" in the rate of unemployment.

The potential for hysteresis in unemployment—the economy getting stuck at high rates of unemployment for an extended period—provides a further argument for activist fiscal policy, and models that build in hysteresis effects can have large and sustained multipliers (see for example Phelps 1972, Blanchard and Summers 1986, Ball 2009, and DeLong and Summers 2012). Reifschneider, Wascher, and Wilcox (2013) stress the relevance of these channels to the current recovery. Their research shows that the financial crisis damaged the productive capacity of the economy, by causing a steep decline in capital accumulation, lower productivity growth, and structural damages to the labor market, and a large portion of this damage to the productive capacity stemmed from weak demand. These results suggest that under such conditions fiscal policy can continue to have a meaningful effect on output with a substantial lag.

This recent work has moved far beyond the basic multiplier. It shows that fiscal and monetary policy can influence each other in substantial ways. While fiscal multipliers might be less than the basic model suggests in mild recessions and when monetary policy is unconstrained, they can be large when monetary policy is at the zero lower bound. In addition, fiscal expansion in a deep recession can have additional long-term benefits, and therefore high multipliers, by shortening spells of unemployment, minimizing the erosion of human capital, and increasing future productivity.

B. Time Series Evidence

Evaluations of fiscal effects using the structural models described above reflect the economic theory used to construct the models. The reliability of the resulting estimates therefore depends on the reliability of the underlying macroeconomic theory. A complementary approach to evaluating the effects of fiscal policy is instead to use models that rely less on economic theory and more on historical empirical evidence.

The main challenge to credibly implementing this data-driven approach is using just enough theory, or finding enough independent variation in the data, to estimate the causal effect of fiscal policy on the economy: simply noting that two variables move together does not establish causality. For example, if Congress passed countercyclical fiscal policy whenever a recession loomed, a figure plotting the countercyclical policy variable and GDP growth would show that countercyclical policy occurred at the beginning of recessions. An analyst might conclude, incorrectly, that this policy caused the recession, when in fact the policy was itself caused by the recognized onset of the recession. Analysis based on this hypothetical figure suffers from two central problems in the estimation of causal effects from observational (as opposed to experimental) data: simultaneous causality (the looming recession spurred Congressional action *and* the fiscal policy potentially affected the course of the economy) and the presence of other omitted, confounding factors (perhaps the Federal Reserve moved countercyclically and it was those actions, not Congress's, that muted the recession). The latter

problem of omitted variables can be partially addressed using multiple regression methods, but the problem of simultaneous causality requires other approaches, and relying on simple plots or multiple regression can lead to misleading results.[30] Because such plots or regressions are uninformative, a vast literature developed over the past four decades uses more sophisticated methods to estimate causal effects in general and the effect of fiscal policy in particular.[31]

Evaluation of the effects of fiscal policy in general, and the Recovery Act in particular, faces several additional challenges. First, the effect of activist fiscal policy must be disentangled from the automatic stabilizers built into the tax and safety net system. Second, the effect of fiscal policy unfolds over time, so there is not a single causal effect but rather a sequence of dynamic causal effects, including long-lasting effects of investment on productivity that could last for many years. Third, different fiscal policy instruments (expenditures, taxes, transfers) will in general have different effects. Fourth, as discussed above, theory suggests that the effect of fiscal policy could depend on the economic environment, and in particular could depend both on the severity of the recession and on the reaction of monetary policy.

A vast body of empirical literature now employs time-series data to estimate the macroeconomic effect of fiscal policy. Broadly speaking, this literature uses two different approaches to isolate (to "identify") the effect of fiscal policy. The first is to impose a minimal amount of structure on an otherwise unrestricted time series model, typically a so-called structural vector autoregression. In an influential contribution, Blanchard and Perotti (2002) assume that, because of implementation lags and limitations on the information considered by policymakers, fiscal policy does not respond immediately to other economic shocks. Under this assumption, any unpredicted movements in the fiscal variable (that is, movements that differ from what standard fiscal policy would have suggested) are unrelated to contemporaneous economic shocks, so the effect of fiscal policy can be estimated by tracing out the effect of those unpredicted movements on output and employment. Using this approach, Blanchard and Perotti (2002) estimate the government spending multiplier on GDP to be in the range 0.9 to 1.2. Ramey (2011b) reviews the large body of research that uses structural vector autoregressions to build on this approach to identifying the effects of fiscal shocks. The common theme of this work is using

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[30] The multiple regression analysis in Taylor (2011), which estimates the effect of fiscal policy in the 2000s, addresses in part the problem of omitted variables but not the problem of simultaneous causality. Taylor measures the direct impact of fiscal policy on income by the component of disposable income due to countercyclical fiscal policy from 2009-based on the 2001, 2008, and Recovery Act fiscal programs. The level of quarterly consumption is then regressed on contemporaneous values of on personal income, the fiscal policy measure, wealth, and oil prices. Thus this regression controls for the separate effects of oil price movements, in case they co-move with fiscal policy. As observed in the text, however, the sign and magnitude of the coefficient on fiscal policy is ambiguous *a-priori* because of simultaneous causality: it could be positive, zero, or negative. As it turns out, the coefficient is positive but small, a finding that is consistent with fiscal policy having a large positive effect which, in the regression, is offset by the fact that Congress passed it in a recession, or with fiscal policy having little effect. Because of simultaneous causality, this regression analysis, like its graphical equivalent, sheds little light on the question of the effect of fiscal policy.

[31] The field of the econometric estimation of causal effects has seen tremendous advances in both methods and applications; for a review see Angrist and Pischke (2010), Sims (2010), and Stock (2010). For additional methodological discussion of simultaneous causality, see Stock and Watson (2010, Chapters 9 and 12).

a component of fiscal policy—in Blanchard-Perotti (2002), the unpredictable component—which is "as-if random" in the sense that it is unrelated to other economic shocks.

A second approach to identifying the effect of fiscal policy is to exploit external information, such as institutional or historical knowledge, to find changes in fiscal policy that are in effect random (that is, independent of macroeconomic conditions), which can in turn be used to trace out the fiscal effect. Because this information falls outside the time series model being estimated, this approach is called the method of external instruments. In this vein, Ramey and Shapiro (1998) and Ramey (2011a) use expenditures on wars and military buildups, arguing that they are determined by international and political, not economic, considerations. These authors estimate GDP multipliers in the range of 0.6 and 1.2. Romer and Romer (2010), instead, use narrative evidence from Presidential and Congressional records and similar documents to identify tax changes that were not implemented in response to current or forecasted economic conditions. They find that the identified tax cuts have a sustained and large effect on output, with multipliers as high as 3. Mertens and Ravn (2012) use Romer and Romer's (2010) narrative to distinguish between the effects of anticipated and unanticipated tax changes and, surprisingly and in contrast to Ramey (2011a), find little difference in the two effects. Additional recent contributions include Favero and Giavazzi (2012) and Mertens and Ravn (2013). Estimates of fiscal policy effects obtained using this so-called method of external instruments are reviewed in Ramey (2011b) and Stock and Watson (2012).

The foregoing time series estimates are predicated upon fiscal multipliers having the same size in booms and in recessions. Recent work by Auerbach and Gorodnichenko (2012) suggests that while the spending multiplier can be relatively small during expansions, it can be much greater than one during recessions. These results are consistent with conventional models in recessions, but with neoclassical ones in booms, and suggest that multipliers obtained also using fiscal policy changes that happen in booms (such as the military buildup used by Ramey and Shapiro (1998) and Ramey (2011a) to identify fiscal shocks) could underestimate the effect of the policies in recessions.

Finally, a different approach is to use consumer-level microeconomic data on specific policy events, as highlighted by Parker (2011). For instance, looking at the 2001 and 2008 tax rebates, which reached recipients in different months, Johnson, Parker, and Souleles (2006) and Parker, Souleles, Johnson, and McClelland (2011) show that a sizable fraction of the rebate was spent, especially by lower income or liquidity constrained households. Their results indicate that income transfers can be an effective way to raise consumption in the short run. This approach has the advantage of directly estimating consumption effects, although it does not capture the full dynamic, indirect response of the economy to the fiscal shock.

C. Cross-Sectional Multipliers

In addition to the works on the Recovery Act cited in the cross-state evidence section, recent work has also exploited other sources of cross-sectional variation in government spending to estimate the size of the fiscal multiplier. For instance, looking at the effects of windfall returns on pension funds, Shoag (2013) estimated a local output multiplier of 2.1. Suarez, Serrato, and Wingender (2011) reached a similar conclusion using on changes in Federal transfers due to the

decennial census. Nakamura and Steinsson (2011) detected a 1.5 local multiplier based on regional differences in Federal defense spending.

Table 12 summarizes the fiscal multipliers implied by the economic literature on state-level effects of fiscal policies.

Table 12
Summary of Cross-Sectional Fiscal Multiplier Estimates

Study	Source of Variation	Regional Multiplier	Cost per Job
Chodorow-Reich et al. (2011)	Formulaic spending in American Recovery and Reinvestment Act of 2009	2.1	$26,000
Wilson (2011)	Formulaic spending in American Recovery and Reinvestment Act of 2009	--	$125,000
Suarez Serrato and Wingender (2011)	Impact of decennial census on Federal transfers	1.9	$30,000
Shoag (2010)	Windfall returns on pension investments	2.1	$35,000
Nakamura and Steinsson (2011)	Regional distribution of changes in defense spending	1.5	--

Source: Romer (2012).

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