

Activist Fiscal Policy

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During and after the “Great Recession” that began in December 2007 (according to the Business Cycle Dating Committee at the National Bureau of Economic Research), the U.S. federal government enacted several rounds of activist fiscal policy. These began early in the recession with temporary tax cuts enacted in February 2008, followed by a tax credit for first-time homebuyers enacted in July 2008. They reached a crescendo in February 2009 with the American Recovery and Reinvestment Tax Act (ARRA): a combination of tax cuts, transfers to individuals and states, and government purchases estimated to increase budget deficits by a cumulative amount equal to 5.5 percent of one year’s GDP. The fiscal stimulus continued thereafter with more targeted measures, notably the temporary “cash for clunkers” program in summer 2009 aimed at stimulating the replacement of old cars with new ones, and an extension and expansion of the First-Time Homebuyer Credit in November 2009 and July 2010. Accompanying these fiscal efforts were the Troubled Asset Relief Program, enacted in fall 2008 to address the financial crisis, and a continuing array of interventions by the Federal Reserve Board that aimed to stabilize credit markets and stimulate the economy.

Around the world, other countries caught in the grip of recession also pursued a variety of active fiscal strategies, ranging from temporary consumption tax rebates (for example, in the United Kingdom) to large public works projects (notably in

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China). The prevalence of fiscal policy interventions in this period reflects both the severity of the recession and a revealed optimism with regard to the potential effectiveness of activist fiscal policy. Yet the variety of policies adopted also suggests uncertainty about which approaches might have been most effective.

In this paper, we review the recent evolution of thinking and evidence regarding the effectiveness of activist fiscal policy. Although fiscal interventions aimed at stimulating and stabilizing the economy have returned to common use, their efficacy remains controversial. We review the debate about the traditional types of fiscal policy interventions, such as broad-based tax cuts and spending increases, as well as more targeted policies. We conclude that while there have certainly been some improvements in estimates of the effects of broad-based policies, much of what has been learned recently concerns how such multipliers might vary with respect to economic conditions, such as the credit market disruptions and very low interest rates that were central features of the Great Recession. The eclectic and innovative interventions by the Federal Reserve and other central banks during this period highlight the imprecise divisions between monetary and fiscal policy and the many channels through which fiscal policies can be implemented.

The Fall and Rise of Activist Fiscal Policy

Until very recently, a typical student of macroeconomics would likely be introduced to discretionary fiscal policy through a cautionary tale of the hubris of attempts at “fine tuning” in earlier decades. The student would start with a group of well-rehearsed arguments, beginning with the lags in the making of economic policy and further lags in the implementation and effects after the policy is enacted, which make it difficult for policymakers to time fiscal policy actions to stabilize the economy. Indeed, a recession could end even before the need for action was recognized, with government officials still focused, as they were in 1975, on the need to “Whip Inflation Now.” The student would also learn that uncertainty about policy multipliers made weaker intervention desirable (Brainard, 1967). The student would learn the Lucas (1976) critique, which implies that a policy’s stabilizing effects can be undercut by the expectations and actions of rational agents who observe the government’s policy process. For example, one reason that investment might drop during a recession is the anticipation that a countercyclical investment incentive will be enacted in the near future. Consumption might not respond much to a countercyclical reduction in income taxes, because the wealth effects of such tax reductions are small when the reductions are seen as temporary. The intriguing notion of Ricardian equivalence (Barro, 1974) would promote further skepticism about the effectiveness of fiscal policy. Finally, the student would be reminded of the alternative tools of stabilization policy, notably the interest-rate interventions of independent central banks and the automatic stabilizers already built into the government’s tax and transfer systems. Indeed, prior to 2008, the student would probably learn that,

through such alternative interventions, a “Great Moderation” in postwar economic performance had been achieved.¹

This array of arguments against activist fiscal policy clearly met its match during the Great Recession, when those policymakers not already imbued with the Keynesian doctrine rediscovered the old-time religion in their foxholes. But it is not accurate to say that activist fiscal policy was totally discredited or unpracticed in the period just before. In the United States, a resurgence in fiscal policy intervention is clearly detectable in the last decade. As shown in Auerbach and Gale (2009a), simple policy reaction functions, measuring the legislated responses of federal taxes and spending to the state of the economy and the budget, show evidence of much stronger responses to both factors, particularly to the economy, in the period from the start of the George W. Bush administration through the 2007 turning point relative to the three previous presidential administrations.

This recent increased countercyclical policy activism is nicely highlighted by the very different policy responses during the two recessions before the most recent two. In August 1982, after a year of deep recession that still had several months left to run, Congress passed the Tax Equity and Fiscal Responsibility Act (TEFRA), scaling back the large Reagan tax cuts that had been enacted just over one year earlier. Legislation over the same period cut near-term federal spending. During the next U.S. recession, in October 1990, a budget summit meeting of President Bush and Congressional leaders produced legislation aimed at reducing the deficit. Thus, in 1982 and 1990, policymakers chose to impose fiscal discipline during a recession.

This pattern changed in the 2000s. In 2001, as concerns about a recession developed, Congress added a set of cash rebates to the original set of proposed Bush tax cuts in order to help stimulate the economy in the short run. In early 2002, in response to the 2001 recession that was not then known to have ended, Congress introduced “bonus depreciation,” the first use of countercyclical investment incentives since the 1970s. In 2003, further individual tax rebates were enacted, as part of a package that focused mainly on other changes. Early 2008 saw the first round of fiscal stimulus during the Great Recession, adopted just two months after the expansion was later determined to have ended and at a time when few economic forecasts predicted a deep recession. For example, the Congressional Budget Office (2008b) economic outlook for 2008 and 2009—released in March 2008—forecasted real GDP growth rates of 1.9 percent and 2.3 percent and unemployment rates of 5.2 and 5.5 percent, respectively. While some of the explanation for this quicker and more sustained resort to fiscal policies may lie in the relaxation of budget rules, which made countercyclical fiscal interventions easier (Auerbach, 2008) and some

¹ Stock and Watson (2002) argue that the decline in economic volatility can be attributed to a mix of a more aggressive Federal Reserve policy towards inflation, less volatile productivity and commodity price shocks, and certain unknown factors. Kahn, McConnell, and Perez-Quiros (2002) and Davis and Kahn (2008) attribute decreased volatility to improved inventory management, especially in the durable goods sector; Davis and Kahn (2008) find no corresponding decline in wage, income, and household consumption volatility.

may lie in the politics of tax cuts and their support by the Bush administration, developments in economic theory and evidence had also provided a stronger foundation for at least some discretionary policy interventions.

Fiscal Models and Fiscal Multipliers

Besides the timing of fiscal changes, discussed above, the strength of activist fiscal policy is a central issue regarding such interventions. The effect of policy is typically measured via a multiplier. The multiplier is the ratio of the rise in GDP relative to the size of the policy intervention (the reduction in taxes and/or increase in government purchases), with both terms defined more carefully below. A multiplier of 1 means that GDP rises by the size of the fiscal intervention. A multiplier greater than 1 means the economy grows by more than the stimulus. A multiplier between 0 and 1 indicates that the economy grows, but by less than the actual stimulus. While a larger multiplier is, of course, a better outcome when a policy is aimed at increasing economic activity, a positive multiplier of any size indicates that the policy raises GDP. For a tax cut or an increase in transfer payments (which do not alter GDP directly), the multiplier represents the increase in both the aggregate economy and private sector activity. For government purchases, the increase in private sector activity per dollar of government purchases equals the multiplier minus one. Thus, a multiplier of less than 1 for an increase in purchases would indicate that some private sector activity is being “crowded out.”²

In any analysis, it is important to clarify the definition of the multiplier employed, since both the size of the policy intervention and the effect on GDP vary over time for most policies. Some studies relate the cumulative change in GDP to the cumulative change in taxes or spending over some relevant term, typically five years or less, while others relate the peak change in GDP to the peak change in the policy variable, with the most natural definition somewhat dependent on the timing and duration of the policy intervention. There is no single “right” way to perform the calculation, and qualitative comparisons across policies and studies sometimes fail to specify the exact multiplier concept used.

The effects of fiscal policy can usefully be divided into direct effects and economywide effects. For some policies, such as the rebates introduced earlier in the decade, data at the individual level can be used to estimate responses. Similar approaches can be used to estimate the effect of tax incentives on investment, although this line of research has proved challenging for several reasons. We review some estimates from both of these literatures in some detail below. These approaches, however, only estimate the direct responses to tax changes and not the

² The discussion above refers to tax cuts or spending increases, in which case a positive multiplier indicates a positive effect on GDP. As discussed later in the paper, there is a possibility that fiscal consolidation—that is, a cut in government purchases or an increase in taxes—could boost GDP, in which case the resulting multiplier would be negative.

effects on economywide activity, which could be smaller or larger than the direct effects. As a result, we review a variety of models that take account of the various additional channels through which tax cuts, transfers to individuals and states, and increases in government purchases affect GDP and its components.

Direct Effects

Tax cuts to stimulate consumption have a long history. These policy efforts have generated a substantial literature, reviewed in greater detail in Auerbach and Gale (2009a), that offers several fairly robust results about the marginal propensity to consume (MPC) out of tax cuts.

First, consistent with standard life-cycle and permanent-income models, most of the evidence suggests that household consumption responds more vigorously to tax changes that are plausibly expected to be longer-lasting than to changes that are expected to be shorter-lasting, with estimates of a MPC of 0.9 for long-lived policies. Second, household responses to a given tax cut are heterogeneous. As theory predicts, borrowing-constrained households tend to have a larger MPC out of tax cuts than do other households, and low- and middle-income households are more likely to be borrowing-constrained than upper-income households. Third, the effect of tax changes on consumer spending tends to occur when the policy change is implemented, not when it is enacted or credibly announced.³

While these three findings are generally consistent with standard optimizing behavior in a setting where some households face borrowing constraints, other results suggest the importance of an additional set of factors—namely, the way tax cuts are described and delivered. These results are consistent with a growing literature indicating that framing, presentation, and other factors, such as default specifications, have a significant influence on saving behavior, and therefore are relevant because saving and consumption choices are closely linked. For example, some evidence from survey data suggests that adjustments to tax withholding that do *not* represent tax cuts can nevertheless affect consumption (Shapiro and Slemrod, 1995). Households appear to adhere more closely to standard model predictions when the policy-induced changes in income are large (Hsieh, 2003).

Comparing estimated marginal propensities to consume for the 2001 and 2008 tax cuts provides interesting perspectives on two issues noted above—the role of tax cut permanence and of heterogeneous responses. The 2001 rebate was clearly—even at the time of enactment—part of a longer-lasting tax cut, whereas the 2008 rebate was explicitly a one-time event. On the other hand, the 2001 rebate

³For evidence on the marginal propensity to consume from short-lived policies, see for example Blinder (1981), Blinder and Deaton (1985), and Poterba (1988); for corresponding evidence on the marginal propensity to consume from longer-lived policies, see Souleles (2002) and Johnson, Parker, and Souleles (2006). For evidence on the links between borrowing constraints and a higher marginal propensity to consume, see for example Johnson, Parker, and Souleles (2006), Broda and Parker (2008), Agarwal, Liu, and Souleles (2007), and Bertrand and Morse (2009). For evidence that the policy effects occur after implementation, see for example Campbell and Mankiw (1989), Wilcox (1989), Parker (1999), Souleles (1999, 2002), Poterba (1988), Blinder and Deaton (1985), Johnson, Parker, and Souleles (2006), Broda and Parker (2008), and Watanabe, Watanabe, and Watanabe (2001).

went to all income groups and was not refundable, whereas the 2008 rebate was limited to low- and middle-income households and was refundable. (A refundable tax rebate is available in full even to individuals who owe no taxes or whose liability is smaller than their refund amount.) The first difference should raise the MPC out of the 2001 rebate relative to 2008; the second difference should reduce it. In fact, estimated MPCs are not significantly different for the two tax cuts. For example, Broda and Parker (2008) examine micro data on household purchases and find that households consumed about 20 percent of the rebate in the first month after receiving it, a rate of consumption that is consistent with the MPC out of the 2001 tax cuts reported in Johnson, Parker, and Souleles (2006). Shapiro and Slemrod (2003, 2009) report the results of asking respondents in phone surveys how they intended to use the 2001 and 2008 tax cuts, respectively, and report a remarkable similarity in overall responses for the two tax cuts. For example, 21.8 percent of households said they would mostly spend the 2001 tax cut, compared to 19.9 percent for the 2008 tax cut.

The literature on the effect of federal transfers on consumption is not as extensive as analysis of tax cuts, but it shows clearly that transfer payments do affect household consumption. Gruber (1996, 1997) demonstrates strong effects on contemporaneous consumption from increases in welfare payments and unemployment insurance benefits, respectively. Edwards (2004) estimates a marginal propensity to consume out of Earned Income Tax Credit payments of approximately 0.7. Barrow and McGranahan (2000) also find strong effects of EITC receipts on spending.

Several studies examine the responsiveness of business fixed investment to changed investment incentives. But estimating investment responses is a considerably more challenging exercise, for at least two reasons. First, there are relatively few natural experiments providing changes in investment incentives; there were essentially no changes in the tax treatment of investment between 1986 and 2002. Second, investment decisions are more difficult to model, in part because of the interaction of different tax provisions (notably those that affect a firm's financial policy and that limit the ability of firms to utilize tax deductions).

A series of studies has focused on the effects of tax changes on the composition of business fixed investment, primarily using panel data on firms, industries, or asset categories (for example, Auerbach and Hassett, 1991; Cummins, Hassett, and Hubbard, 1994; Hassett and Hubbard, 2002). These studies provide ample evidence that changes in the user cost of capital—as first defined by Dale Jorgenson as the implicit rental cost of a capital investment that establishes its break-even marginal product—do influence the mix of investment, with the elasticity of equipment investment with respect to the user cost of capital falling in a range between -0.5 and -1.0 . Using a related methodology, House and Shapiro (2008) estimate investment responses to the bonus depreciation incentives of 2002–2004, finding that the composition of investment did shift from nonqualifying investment to qualifying investment. One interesting result in the House–Shapiro analysis is that investment responses to the 2002 introduction of bonus depreciation appeared to begin during the last quarter of 2001 and the first quarter of 2002, a period ultimately covered

retroactively by the 2002 legislation. Thus, firms may have expected that investment incentives would be enacted and that investment undertaken during this interval would be covered. This predictability of investment incentives should not be particularly surprising, given how well one can predict their timing using a relatively simple model (Auerbach and Gale, 2009a), but it can be a cause for concern, given that the effect of announcing a new future investment incentive will tend to reduce current investment, at least if retroactive application of the incentive is not also anticipated.

In summary, tax incentives affect investment, with the compositional effects more easily identified than the aggregate effects. But relatively little attention has been given to the announcement effects of policy. Also, it is worth keeping in mind that the conditions governing investment in a recession, such as cash-flow constraints and business losses for tax purposes, may produce quite different investment responses to temporary tax cuts than would be predicted using models based on responses to long-term tax reforms adopted under more normal circumstances.

Besides cutting taxes or transferring funds to households and businesses, federal policy can also influence aggregate activity by altering state and local spending and tax policy. This is, in principle at least, a potentially powerful avenue for stimulus, given the magnitude of state and local spending and taxes (more than 12 percent of GDP in 2009) and the fact that almost all states have balanced budget rules. When revenues fall during a recession, states can either draw down their “rainy day” funds, raise taxes, or cut spending—and the latter two options are likely to act as procyclical policies that could exacerbate the downturn. Poterba (1994), for example, finds strong evidence that states contract spending and raise taxes when faced with a negative fiscal shock. In such cases, federal transfers could ease the constraint and reduce the need for contractionary state responses.

While the argument for transfers to states being stimulative is plausible, there is surprisingly little evidence on the countercyclical effects of federal transfers to states. Gramlich (1978, 1979) and Reischauer (1978) evaluate the effects of three federal grant programs undertaken in response to the 1974–75 recession. One program offered countercyclical revenues to the states in the form of block grants, another paid the salaries of state and local government workers, and a third contributed funding for capital improvements. The general finding was that the short-run response by states to federal aid was primarily to bolster state rainy-day funds, with only modest increases in outlays and reductions in taxes in the short run. The long-run response—particularly in the form of decreased income tax revenue—was substantial, but materialized after the recession had ended. It is unclear how relevant these findings are to the current economic downturn, however, given the dated nature of the evidence, the differences in the states’ economic situations now (when they have been hurt by both the recession and the housing crisis, which heightened the need for state transfers to local governments due to reduced municipal property tax revenues) and differences between the 1975 economy and the current one.

Although the effects of fiscal policy on individual components of output are of interest, and show the responsiveness of particular sectors to fiscal interventions,

they do not capture the effects on overall output, since they omit the indirect, economywide responses.

Economywide Estimates

Generally, three types of models have been used to examine the overall economic effects, with differing strengths and weaknesses: large-scale macroeconomic models, structural vector autoregressions, and dynamic stochastic general equilibrium models.

Large-scale macroeconomic models account for relevant prices and quantities in different sectors of the economy, and relate these prices and quantities to each other and to government policy variables. While large-scale models provide considerable detail regarding the channels through which policy can operate, and are commonly used by government forecasters, their theoretical grounding has been challenged based on the argument that the structural equations describing the behavior of households and firms lack adequate microfoundations (Lucas, 1976). Of the three types of models, large-scale macro models often produce the largest multipliers. We discuss results from several large-scale models in subsequent sections when we address the effects of the American Recovery and Restoration Act of 2009.

The two remaining types of models, which we now consider in turn, have been the mainstays of the recent academic literature. They represent alternative responses to the criticisms of large-scale models. One approach—dynamic stochastic general equilibrium (DSGE) models—hews more closely to micro-foundations; the other—structural vector autogression (SVAR) models—moves away from attempts to establish strong structural restrictions and relies to a greater extent on time series methods.

In a standard vector autoregression, a vector of variables—say, output, taxes, and government purchases—is regressed on lagged values of the same variables. Because there is no specification of the channels through which policies affect output, it is not possible to separate the response of output to policy from the response of policy to output. In a *structural* vector autoregression, a limited structure is provided in the form of assumptions about the order in which shocks to policies and output occur (in more formal terms, assumptions about the recursive structure of the error matrix). These assumptions make it possible to identify the changes in current policy variables that are attributable to actual changes in policy rather than to endogenous responses to economic conditions. The key issue in this literature is the method used to identify “true” policy changes in attempting to obtain persuasive multiplier estimates.

An important early contribution in the structural vector autoregression literature, by Blanchard and Perotti (2002), provides estimates of multipliers for both government purchases and taxes using the identifying assumption that these variables could respond to output within a quarter (the period of observation) only through automatic provisions, not discretionary policy. Thus, controlling for such automatic response, which could be estimated directly, the fiscal shocks within a period could be treated as exogenous. Based on such a methodology, Blanchard and Perotti estimate a GDP multiplier for government purchases of about 0.5 after

one year, with longer-term multipliers depending on model specification due to differences in the estimated permanence of policies. That is, the short-term multipliers imply a net crowding-out of components of GDP other than the government purchases themselves. Estimates of tax cut multipliers are slightly larger, closer to 1.0 after one year.

As noted, a central concern with the structural vector autoregression approach is the identification of policy shocks. A change in taxes or spending identified by the Blanchard and Perotti (2002) methodology as a policy shock might have been anticipated by individuals (even if not by the econometric model) or it might not have been a policy change at all (for example, it might be due to other factors such as a change in the income distribution). Thus, one line of research extending this approach has been to identify policy changes through a narrative approach, applying additional information on policy decisions to help identify exogenous policy changes, rather than treating as exogenous surprises those changes not predicted by the structural vector autoregression itself.

Using military spending build-ups as an important source of variation in government purchases that is exogenous with respect to economic activity, Ramey and Shapiro (1997) estimate the effect of these build-ups on GDP and its other components. More recently, Ramey (2009) provides a more complete set of data on such shocks and emphasizes the importance of distinguishing the announcement dates of policy changes from their dates of implementation. Using such a series based on actual policy announcements, she estimates an output multiplier after four quarters of about 0.7. As noted above, one implication of a multiplier below 1.0 for government purchases is that other components of GDP fall in response to the increase in government purchases.

On the tax side, the narrative approach to identifying policy shocks has been introduced by Romer and Romer (2007), who used the same approach in earlier analysis identifying monetary policy shocks. They argue that the multipliers of tax changes estimated using other approaches are likely to underestimate tax policy multipliers by treating as exogenous many policy changes that were actually responding to economic conditions or government purchases. Using their narrative approach to identify policy changes that were arguably independent of such other factors, they find a GDP tax-cut multiplier of about 1.0 after four quarters, rising to 3.0 after 10 quarters. This very large multiplier is associated with an enormous impact on investment. The result is striking: indeed, so striking that it merits further investigation.⁴

Although the narrative approach may yield better estimates of true policy surprises than the standard structural vector autoregression approach, both approaches are limited in certain critical respects stemming from the reduced-form

⁴ For example, Favero and Giavazzi (2009) suggest that the multipliers for the tax shocks identified by Romer and Romer are considerably smaller if one models the shocks as explanatory variables in a multivariate model rather than simply regressing output on the tax shocks. The source of this difference is not clear, although the authors suggest that their results reject the assumptions by Romer and Romer that such shocks are independent of other explanatory variables.

nature of these models. First, the models cannot be used to examine the economy's responses to automatic stabilizers or to any already-operating rules that relate activist fiscal policy to economic conditions, because effects of both types are already incorporated in the model's estimated impulse responses. Second, these models can measure only the multipliers of policies that deviated from standard policy responses to economic conditions within the sample period and can only estimate the effects of those policies as they were actually adopted. For example, if shocks to government purchases or taxes tended to be short-lived, then we cannot draw direct inferences about the effects of more permanent shocks. New tax changes differing in composition from those examined in-sample could well have different multipliers than those estimated. This concern is especially important under the narrative approach, in the light of the fact that most of the estimates of the effects of government purchases actually relate to defense spending and are based heavily—almost exclusively—on the experience during World War II or the Korean War (Hall, 2009). Third, these models can only estimate the effects of policy interventions under the economic conditions prevailing within the sample, and the multiplier effects of different policies could vary substantially with economic conditions. Investment incentives that might be strong in a boom might be ineffectual in a period of tight credit and net operating losses. Tax cuts for households might have a larger effect during periods in which liquidity constraints bind more tightly. Government spending might have larger multipliers during periods, like recent times, when the zero-interest-rate bound is binding.

As a consequence, much of the recent discussion and debate surrounding the potential effects of policy intervention have been based on the analysis of the third approach alluded to above: dynamic stochastic general equilibrium models. These models typically feature a relatively small number of equations based tightly on microeconomic theory, with some parameters derived from empirical estimates and others calibrated to make the model consistent with observed macroeconomic relationships. Because these models specify a full economic structure, they can be used to analyze policies and policy environments in a way that is not limited by historical experience. For example, they can explore interactions between monetary and fiscal policy, the role of long-term fiscal shortfalls on the effect of current stimulus packages, the role of different degrees of “openness” in the economy, the role of anticipations of fiscal policy actions, and so on.

But to do these things, the dynamic stochastic general equilibrium approach leans heavily on modeling assumptions that may or may not be valid: for example, assumptions regarding the stickiness of wages and prices, the prevalence of liquidity constraints, the rationality of agents, the structure of markets, and so forth. Indeed, some of the recent disputes regarding the potential effects of fiscal policies can be traced to differences in the assumptions in dynamic stochastic general equilibrium models as well as to assumptions about the nature and timing of the policies themselves.

In a recent review of the dynamic stochastic general equilibrium literature and using his own model of this type, Hall (2009) concludes that plausible dynamic

stochastic general equilibrium models of the “new Keynesian” variety (that is, incorporating certain nominal rigidities in wages and prices) generate government spending multipliers that are consistent with those found using time series methods—well above zero, but below 1.0. However, as Hall notes, it appears that in the dynamic stochastic general equilibrium approach, relatively small changes in parameter specification—within empirically plausible ranges—are capable of producing substantial shifts in estimated multipliers. For example, several recent analyses using dynamic stochastic general equilibrium models, notably papers by Eggertsson (2008) and Christiano, Eichenbaum, and Rebelo (2009), have argued that when nominal interest rates are close to zero, the government spending multiplier can be substantially larger, with estimates in the range of 3 to 4.⁵

One apparent explanation for the larger multiplier under the zero bound is that monetary policy responses are no longer active. The typical dynamic stochastic general equilibrium model includes a Taylor (1993) rule for monetary policy: that is, a rule in which interest rates respond to the output gap and the inflation rate. In normal circumstances, a government spending increase would stimulate output and inflation, which in turn would lead to an increase in interest rates, which would reduce current consumption and investment demand. However, when nominal interest rates fall to the zero bound, this response would be absent, and the output response therefore would be larger, because the monetary authority would still wish for the nominal interest rate to be even lower.

This intuition is apparently too simple, though, because some other dynamic stochastic general equilibrium analyses assuming constant interest rates deliver much smaller government spending multipliers. In particular, Cogan, Cwik, Taylor, and Wieland (2009) estimate the response to a permanent increase in government spending, assuming that interest rates stay equal to zero for the first two years of the experiment and follow a “Taylor rule” of reacting to unemployment and inflation thereafter. They find an original multiplier around 1, but that by the end of the two-year period, the effect on output is only 0.4. They attribute this difference from papers finding larger multipliers to a shorter zero-bound period. This finding is consistent with the analysis presented by Woodford (2010) that multipliers are reduced to the extent that the increase in government spending extends beyond the end of the zero-bound period. Thus, the multiplier for government purchases would be largest for a temporary spending increase that extended only for the period in which the interest rate was near the zero lower bound.

Another factor that might influence fiscal multipliers is the government’s long-term fiscal position. There are many reasons to think fiscal policies would have different effects if they are adopted during a period of fiscal stress than they would otherwise. An extensive theoretical and empirical literature argues that

⁵ Although these models are more sophisticated, they echo the logic of simpler Keynesian models regarding the effectiveness of expansionary fiscal policy in a liquidity trap. Eggertsson (2008) also argues that a tax cut would be less expansionary in the zero-bound case, in fact having a negative effect on output, because its positive supply-side effects could have deflationary consequences. But this conclusion would only apply to tax cuts that affected marginal tax rates.

contractionary fiscal policy adopted during periods of budget stress can even have an expansionary effect on output, essentially by shifting the economy's trajectory away from one that could be very constraining for productive activity because of high marginal tax rates or economic disruptions (Giavazzi and Pagano, 1990; Alesina and Ardagna, 1998; Alesina, Perotti, and Tavares, 1998). The empirical evidence, based on panel data for OECD countries, does suggest that fiscal consolidation has a less-contractionary effect when adopted under fiscal stress, as measured by high debt and projected government spending relative to GDP (Perotti, 1999). Analysis based on OECD data also indicates that fiscal contractions are more expansionary when implemented through cuts in government spending, as one might expect given the potential damage from reliance on higher marginal tax rates (Ardagna, 2004). One channel through which the differing effects of fiscal policy under different initial conditions may occur is through expectations of how the deficit resulting from a stimulus will be closed in the future. Several recent papers utilizing the dynamic stochastic general equilibrium modeling approach address this issue with mixed results (Corsetti, Meier, and Muller, 2009; Davig and Leeper, 2009; Leeper, Walker, and Yang, 2009).

In summary, while the different approaches used to model and analyze the direct and indirect effects of economic stimulus options have improved significantly in recent years, the literature nevertheless shows a substantial amount of variation in key results. Coenen et al. (2010) represents a noteworthy effort to systematize and understand these quantitative differences, using dynamic stochastic general equilibrium models that are employed at the Federal Reserve Board, the European Commission, the International Monetary Fund, the Bank of Canada, the European Central Bank, and the OECD.

The American Recovery and Restoration Act of 2009

The American Recovery and Restoration Act of 2009 (ARRA, Public Law 111-5) can be viewed as the continuation of a series of activist fiscal policy interventions dating back to 2001. But ARRA was of a different scale than previous efforts. The direct cost of the bill (excluding interest payments on accumulated debt) was originally estimated to be \$787 billion over 10 years (Joint Committee on Taxation, 2009) and later revised to \$862 billion (CBO, 2010).⁶ The policies were to be phased in over time, with \$200 billion occurring in fiscal year 2009, \$404 billion occurring in fiscal year 2010, and the remainder occurring in fiscal year 2011 or afterwards.

Table 1 summarizes the major provisions of the bill and CBO's (2009a) range of estimates of the multipliers associated with each item. In broad terms,

⁶ Most of the \$75 billion increase in the estimated cost of the bill in CBO (2009a) was attributed to higher projected outlays, including an additional \$21 billion for unemployment insurance, \$34 billion more for the Supplemental Nutrition Assistance Program, and an extra \$26 billion for the Build America Bond program; relatively small changes in the projected cost of other initiatives account for the remainder of the difference (CBO, 2010).

Table 1
Estimated Impact of the American Recovery and Reinvestment Act of 2009 on Output and the Budget, 2009–2019

Category	Estimated policy multiplier		11-year budgetary cost of provisions (billions of dollars)
	High	Low	
Federal government purchases of goods and services	2.5	1.0	88
Transfers to state and local governments for infrastructure	2.5	1.0	44
Transfers to state and local governments not for infrastructure	1.9	0.7	215
Transfers to individuals	2.2	0.8	100
One-time payments to retirees	1.2	0.2	18
Two-year tax cuts for lower- and middle-income individuals	1.7	0.5	168
One-year tax cuts for higher-income individuals	0.5	0.1	70
Extension of first-time homebuyer credit	1.0	0.2	7
Business tax provisions	0.4	0.0	21

Source: Congressional Budget Office (2009a).

Notes: As reported by the CBO, the policy multiplier is the cumulative impact on GDP over several quarters of various policy options. This table includes provisions scored by the CBO or the Joint Committee on Taxation as totaling \$5 billion or more in budgetary costs over the 2009–2019 period. Selected provisions with lower total budgetary costs were included if the cost in the 2009–2011 period was large. Costs do not add up to the total budgetary cost of \$787 billion presented in CBO’s cost estimate because several provisions are excluded (because CBO’s analysis of those provisions cannot easily be summarized by a single multiplier) and because the costs listed are translations of the budgetary costs to categories of the national income and product accounts.

the provisions can be divided into tax cuts, assistance to states and individuals, and investments. The two largest tax cuts were the Making Work Pay Credit and the one-year extension of the higher Alternative Minimum Tax deduction. The Making Work Pay Credit is a refundable tax credit of up to \$400 per taxpayer (\$800 for couples), equal to 6.2 percent of earned income for 2009 and 2010, with the value of the credit phasing-out for individuals with higher incomes. The stimulus package also expanded the eligibility criteria and raised the maximum value of the Earned Income Tax Credit, expanded the refundability of the Child Tax Credit, and created the American Opportunity Tax Credit—which replaced the Hope Credit and expanded tax incentives for higher education. Smaller provisions in the stimulus package included a revised tax credit for the purchase of a new home, suspension of the taxation of unemployment benefits, and a deduction for sales tax paid on the purchase of a new car.

Tax cuts for businesses were small relative to tax cuts for individuals, but include an extension from two years to five years in the amount of time that small businesses

could “carry back” net operating losses to offset taxable income. The American Recovery and Restoration Act also increased the amount of subsidized bonds that local governments can issue for private activity in economically-distressed areas. Altshuler et al. (2009) describe and evaluate the tax provisions contained in the stimulus package.

A substantial portion of the American Recovery and Restoration Act provided aid to individuals and transfers to states, mainly through Medicaid and other programs administered by the Department of Health and Human Services, unemployment compensation, and food stamps. Transfers to the State Fiscal Stabilization Fund, a mechanism for providing education funding to states, were also significant, as were one-time economic recovery payments to Social Security beneficiaries, veterans, and individuals receiving Supplemental Security Income.

A primary objective of the stimulus package was to increase funding for public infrastructure programs. The major investments revolved around renewable energy, health care research, health information technology, subsidized infrastructure financing, and education programs such as Pell Grants.

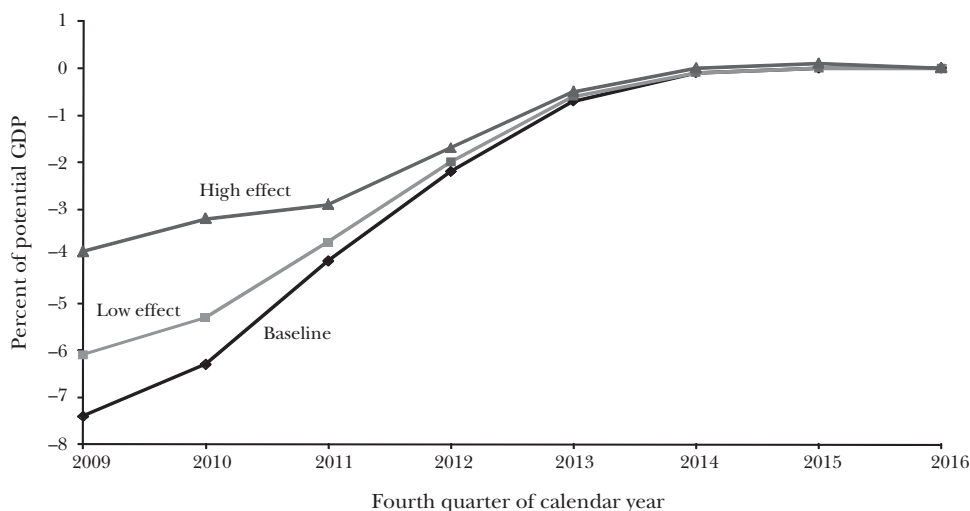
Amounting to 5.5 percent of current-year GDP, albeit spread over several years, the American Recovery and Restoration Act was the largest stimulus package in modern U.S. economic history. Romer (2009) notes that the largest stimulus provision during the Great Depression amounted to 1.5 percent of GDP and was followed one year later by deficit reduction policies.

By way of comparison, almost all OECD countries have introduced stimulus measures, with the packages averaging 2.5 percent of GDP. Automatic stabilizers, however, are substantially smaller in the United States than in most other OECD countries. As a result, while the United States had the largest discretionary stimulus package, the combined effects of its automatic and discretionary policies on the government’s budget for 2008–10 were the sixth largest as a share of GDP in the OECD (OECD, 2009).

Although the 2009 stimulus package was adopted during a period of very weak economic performance, it encountered criticism on several fronts. The criticisms can largely be summarized by asking whether the package was—in a phrase used by Lawrence Summers (2007)—sufficiently “timely, targeted, and temporary.”

First, there was concern that the policies, although signed into law in February 2009, would be implemented only gradually, with much of the effect coming after the recession was over and the recovery underway. Of course, this concern about policy lags is one of the standard criticisms of countercyclical fiscal policy. However, it seems somewhat less relevant in the present context, if projections of a long and slow recovery are to be believed. Figure 1 shows the path for GDP relative to potential as projected in March 2009 by the Congressional Budget Office, for the baseline without the February 2009 stimulus package and for two scenarios with the fiscal package, corresponding to CBO’s perceived range of multiplier estimates for the package’s different components. (These multipliers are detailed in Table 1.) Under these projections, the economy would not reach its potential GDP until 2014, and the stimulus package—with three-quarters of its effects taking place in the

Figure 1

Estimated Impact of 2009 Fiscal Stimulus

Source: Congressional Budget Office (2009a).

Note: Figure 1 shows the path for GDP relative to potential as projected in March 2009 by the Congressional Budget Office for the baseline without the February 2009 stimulus package and for two scenarios with the fiscal package, corresponding to CBO's perceived range of multiplier estimates for the package's different components.

first 18 months—would speed the rate of approach. Thus, while more rapid implementation might have been preferred, the biggest avoidable delay was probably at the enactment stage—that is, the time period late in 2008 in which a lame-duck President Bush and the outgoing Congress deferred actions for months even after the likelihood of intervention became high. The risk of destabilizing the economy by injecting fiscal stimulus into an overheating economy seems to be less of an issue.

The desire to keep the package temporary is motivated by concerns about the long-term budget outlook. However, the stimulus package contributed less to the current-year deficit than did the recession itself, through automatic stabilizers working primarily on the tax side. As we have discussed elsewhere, the contribution of the stimulus package to the long-term U.S. fiscal problem is minimal, if one assumes that the provisions of the stimulus are temporary as enacted (Auerbach and Gale, 2009b).

The inclusion in the stimulus package of a number of provisions designed originally without the recession in mind—including some of the investments described above—highlights the third set of concerns: that the package may not have been well-targeted to provide the strongest fiscal stimulus per dollar of revenue loss or spending increase. Some critics focused on the composition of the package, questioning whether projects that were “shovel-ready” were likely to be of high value to society and whether the particular tax cuts adopted were the right ones from

a longer-term perspective. While the stimulus package was certainly not as well-targeted as it could have been, there was some logic to its structure. As noted, the package contained substantial tax cuts, aid to states and individuals, and government investments. The tax cuts should stimulate aggregate demand, but could have been designed more effectively. The aid to individuals was based on humanitarian needs. The aid to states was based on the notion, noted above, that because essentially all states adhere to some form of balanced-budget rule, economic declines that reduce state revenues force cuts in state spending. From the perspective of macroeconomic stabilization, reducing public spending during a sharp downturn is counterproductive. The aid provided should offset some of the state and local spending cuts that would otherwise have occurred. The fact that state and local government spending and employment rose in the second quarter of 2009 is consistent with the view that the transfers supported and stabilized state budgets. In addition, because much of the aid to states was based on criteria such as Medicaid eligibility—which is a means-tested program—and state unemployment rates, the transfers to states were somewhat targeted to regions most in need of stimulus. Government investments were part of a longer-term Obama administration agenda and are probably not best evaluated as stimulus measures.

How well-targeted the package was and the size of the resulting policy multipliers remain an area of controversy.⁷ Even before the stimulus package was adopted in February 2009, the Obama administration released a document written by Bernstein and Romer (2009) estimating the effect of a potential stimulus plan on employment. These projections were based on estimates of multipliers for government purchases and tax cuts averaged over those from the Federal Reserve's FRB/US model and a private forecasting model. The resulting multiplier for a permanent change in government purchases was about 1.5, reached after about one year; the corresponding multiplier for tax cuts (other than investment incentives) was about 1.0, with about three-fourths of the impact reached after one year and the full effect reached after two years. These multipliers are consistent with those assumed by the Congressional Budget Office (2009a, Table 1) in making its projections, in that both the government-spending multiplier and the tax-cut multiplier fall roughly midway between the upper and lower bounds CBO lists for its high-multiplier and low-multiplier scenarios.

The similarity in multiplier assumptions by the Council of Economic Advisers and the Congressional Budget Office is reflected in similar estimates of the aggregate impact of the stimulus package. The Congressional Budget Office (2010) estimates that, in the first quarter of 2010, the stimulus package raised the level of GDP by between 1.7 percent and 4.2 percent and raised the level of employment by 1.2 million to 2.8 million. The CEA (2010) recently estimated that, by the second

⁷ This controversy was highlighted by a *Wall Street Journal* article describing a poll of professional forecasters. When asked about the net effect of the stimulus on economic growth and employment, 38 of the forecasters answered that ARRA had a positive effect, while six answered that the stimulus package had a negative effect (Izzo, 2010).

quarter of 2010, the package raised GDP by between 2.7 percent and 3.2 percent and raised employment by between 2.5 million and 3.6 million. A study by Blinder and Zandi (2010) using the Moody's Analytics model of the U. S. economy estimates that the fiscal stimulus raised GDP by 3.4 percent in 2010, creating upwards of 2.7 million jobs.⁸ All of these studies are based on large-scale macroeconomic models, which incorporate traditional Keynesian features that can generate relatively large multipliers when the economy is far from full employment, as was the case in 2009. As discussed above, such multipliers are less easily generated using alternative modeling techniques, and this difference underlies the criticism of the government studies by many economists outside of government (including Barro and Redlick, 2009; Cogan, Cwik, Taylor, and Wieland, 2009; and Leeper, Walker, and Yang, 2009). For example, Cogan, Cwik, Taylor, and Wieland (2009) estimate that, at its peak, the stimulus only raised GDP by 0.46 percent, resulting in an aggregate multiplier just over 0.6.⁹

President Obama's Council of Economic Advisers has offered two pieces of suggestive evidence drawn from recent experience that the higher levels of growth can reasonably be attributed to the American Recovery and Restoration Act. One piece of evidence lies in the role of transfers to state and local governments. While CEA doesn't explicitly model the counterfactual baseline for state and local government spending, the reports note that state and local government employment remained relatively stable during the second half of 2009, compared to the observed decline in several other sectors. Also, the CEA report cited the rapid acceleration in state and local government purchases in the second quarter of 2009, a situation that occurred despite ongoing fiscal crises in several state and local budgets.

The second piece of evidence involves measuring cross-country variation in stimulus legislation, and the subsequent changes in economic performance. Prasad and Sorkin (2009) describe various stimulus packages among G-20 countries in 2009. Measured as a share of 2008 GDP, the stimulus package introduced in the United States—equal to 5.9 percent of GDP—was the second largest among G-20 countries; only Saudi Arabia devoted more spending to stimulating the economy. Moreover, China and Spain were the only two other countries to enact stimulus packages in excess of 4 percent, although 10 countries implemented stimulus packages in excess of 2 percent of GDP. CEA (2009b) finds that across countries, large stimulus packages are correlated with more rapid economic growth in 2009. The central finding in the CEA analysis is that economic growth is approximately 2 percentage points higher for every 1 percent of GDP in stimulus funding.

⁸Blinder and Zandi (2010) also provide what to our knowledge is the only estimate of the effects of all of the fiscal, monetary, and financial interventions undertaken by the government over the past few years (including the Troubled Asset Relief Program and the Federal Reserve Board's multifaceted policies). They estimate that in the absence of these programs, in 2010 GDP would be lower by 11.5 percent and employment would be lower by 8.5 million had the policies not been undertaken.

⁹Even in cases where dynamic stochastic general equilibrium models can generate large multipliers, as discussed above, these results depend on the specific nature of the monetary policy mechanism when nominal interest rates are near zero, and do not generalize to all recessionary conditions.

With these predictions and findings in place, what can be said about the American Recovery and Restoration Act of 2009? If a fiscal stimulus were ever to be considered appropriate, the beginning of 2009 was such a time. By the time the package was enacted, the U.S. economy was more than a year into the longest recession since the Great Depression, with several millions of jobs lost, nominal interest rates at zero, fears of deflation, and no signs of life in the major components of GDP. Moreover, much of the rest of the world was also in recession and thus not providing strong demand for U.S. exports. In these circumstances, our judgment is that a fiscal expansion carried much smaller risks than the lack of one would have. As to the structure of the package, its timing and its effects, there is more room for disagreement. One could argue that a large, diversified, phased-in stimulus was the right approach: large because the economy was in dire straits, diversified because there is uncertainty about the size of the multipliers attached to different parts of the package, phased-in because it is hard to implement everything at once and there is a long way to get back to full employment. But provisions could have been focused more effectively on options with high “bang for the buck,” and there remains considerable disagreement over the package’s ultimate effects on the economy.¹⁰

Aside from the particular provisions of the act, though, there is a more general manner in which the stimulus might have helped, although it is extremely hard to quantify. Specifically, when the economy was in “free fall” in late 2008 and early 2009, the Obama administration and the Federal Reserve Board offered clear and strong statements that they would not stand by idly while the economy collapsed. This concerted and consistent display of intention may have shifted expectations among households and firms, giving them more confidence to spend and invest than they otherwise would have.¹¹

Discussion

In response to the recent, sharp downturn in economic activity, the U.S. federal government—and other governments around the world—enacted substantial fiscal stimulus packages. These policies continue a recent pattern of activist federal fiscal interventions, at least in the United States, in which countercyclical fiscal policy has adjusted within a time frame that is relevant for stabilization purposes. There is robust evidence that well-designed tax cuts can boost consumption and investment in the short run, but models that examine the magnitude and timing of

¹⁰ CBO (2009b) evaluated the impact of 11 stimulus policies on GDP growth, and found substantial variation among policy options. Several of the strategies identified by CBO were included in the stimulus bills passed in 2008 and 2009. However, several of the high-impact options—such as reducing employers’ payroll taxes and aid to the unemployed—were either not included in the stimulus package or comprised a relatively small portion of the total cost.

¹¹ Some consumer and business confidence measures surged in the second quarter of 2009. For example, looking at data collected by the Conference Board, between the first and second quarters of 2009, the CEO Confidence Index increased from 30 to 50; between March 2009 and May 2009 the Consumer Confidence Index rose from 26.9 to 54.8 and the Expectations Index increased from 30.2 to 71.5.

the indirect effects, taking into account economywide reactions, expectations, and interactions provide a less-robust set of implications. Another potential source of information is examination of the fiscal policy experience in the Great Depression in the United States and the more recent “lost decade” in Japan. Unfortunately, sustained fiscal policy expansion was not actually attempted in either episode, as discussed more fully in Auerbach and Gale (2009a).

Here, we highlight several issues that should play a critical role in future research. The most critical task, of course, is understanding why multiplier estimates vary so dramatically and designing research that can reduce the variation in such estimates. This task is enormous: after all, it involves understanding the structure of the entire economy. Nevertheless, it is remarkable that, 80 years after the Great Depression and the onset of Keynesian economics, the range of mainstream estimates for multiplier effects is almost embarrassingly large. Several aspects of this challenge stand out. Multipliers will naturally depend on the state of the economy, the state of financial markets, and other public policies.¹² For example, the recent downturn was caused by a financial crisis and has hastened the onset of fiscal problems. Understanding the role of fiscal multipliers in an environment with dysfunctional financial markets is a key challenge posed by this episode, as is understanding the role of fiscal policy in the wake of a financial crisis. In 2009, the Federal Reserve extended more than \$1 trillion worth of credit at the same time that the U.S. Treasury borrowed about \$1.4 trillion, which highlights the potentially important interactions between monetary and fiscal policies. In addition, the expansion of Federal Reserve policy beyond its traditional role of lending only to member banks to include new policies that indirectly helped to maintain lending to small businesses, students, and homeowners shows the fine line separating monetary and fiscal policies, as previously existing federal programs already directly support lending to those groups.

A second area for research is the creative design of stimulus policies. Recent advances in behavioral economics offer a wealth of policy levers beyond simple income and substitution effects for encouraging people to change their behavior. For example, Epley, Mak, and Idson (2006) show how defining a tax cut as a “bonus” versus a “rebate” changes the way in which individuals recall how they spent the funds. Chambers and Spencer (2008) offer experimental evidence on how the size and timing of a tax cut can affect the marginal propensity to consume. Chetty, Looney, and Kroft (2009) and Finkelstein (2009) show how the consumption behavior is influenced by the salience of the tax. Congdon, Kling, and Mullainathan (2009) provide an overview of these issues as they apply to tax policy. This literature suggests the role that creative design can play in designing more effective stimulus policies.

¹² For one recent effort allowing multipliers to vary between recessions and expansions within the structural vector autoregression framework, see Auerbach and Gorodnichenko (2010), who find much larger government spending multipliers in recessions using postwar U.S. data.

A related issue is the use of price incentives, rather than changes in after-tax income, as a mechanism for providing stimulus. While price incentives in the form of investment tax credits and accelerated depreciation allowances have long been used to change firms' behavior, they have a shorter history in encouraging consumption. "Cash for Clunkers" and the recent First-Time Homebuyer Credit illustrate not just the potential, but also the problems with such programs: the homebuyers' credit has been extended beyond its original deadline multiple times. As consumers learn that such provisions may not be temporary, the effect on short-term spending will diminish; and, as they learn to anticipate such policies, the policies may actually be destabilizing, as discussed above in relation to the use of bonus depreciation to encourage business investment.

An additional area for research is designing policy to balance short-term stimulus and longer-term deficit reduction. The United States and numerous other countries face both weak current economies and looming long-term fiscal shortfalls. In the standard trade-off, cutting off fiscal stimulus too soon could plunge the economy into a new downturn, as happened to the United States in 1937 and Japan in 1997. However, letting stimulus run for too long could ignite investors' fears and create the "hard landing" scenario discussed by Ball and Mankiw (1995) and Rubin, Orszag, and Sinai (2004). Thus, it is worth noting that numerous countries have re-established fiscal discipline and created economic growth at the same time (IMF Fiscal Affairs Department, 2009). Indeed, between 1992 and 2000, the United States improved its primary fiscal balance by 5.7 percent of GDP while also exhibiting strong economic growth. Undoubtedly, a significant share of U.S. growth in the 1990s was due to factors other than fiscal policy. Still, the notion that fiscal strengthening and economic growth can move together is a point of optimism in the current situation.

Activist fiscal interventions seem likely to play an enhanced role in policy discussions and research activities in the future, given the last decade's increase in fiscal activism and continuing concerns about the state of the economy. Indeed, the recent practice of fiscal policy has proceeded at a pace that has at times overtaken our understanding of its effects.

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References

- Agarwal, Sumit, Chunlin Liu, and Nicholas S. Souleles. 2007. "Reaction of Consumer Spending and Debt to Tax Rebates—Evidence from Consumer Credit Data." *Journal of Political Economy*, 115(6): 986–1019.
- Alesina, Alberto, and Silvia Ardagna. 1998. "Tales of Fiscal Adjustments." *Economic Policy* 13(27): 487–545.
- Alesina Alberto, Roberto Perotti, and Jose Tavares. 1998. "The Political Economy of Fiscal

- Adjustments." *Brookings Papers on Economic Activity*, no. 1, pp. 197–266.
- Altshuler, Rosanne, Leonard Burman, Howard Gleckman, Dan Halperin, Benjamin H. Harris, Elaine Maag, Kim Rueben, Eric Toder, and Robertson Williams.** 2009. "Tax Stimulus Report Card: Conference Bill." Tax Policy Center Report.
- Ardagna, Silvia.** 2004. "Fiscal Stabilizations: When Do They Work and Why?" *European Economic Review*, 48(5): 1047–74.
- Auerbach, Alan J.** 2008. "Federal Budget Rules: The U.S. Experience." *Swedish Economic Policy Review*, 15(1): 57–82.
- Auerbach, Alan J., and William G. Gale.** 2009a. "Activist Fiscal Policy to Stabilize Economic Activity." Paper presented at the Federal Reserve Bank of Kansas City conference on Financial Stability and Macroeconomic Policy, held August 20–22, 2009. <http://www.kansascityfed.org/publicat/sympos/2009/papers/auerbach-gale.08.08.09.pdf>.
- Auerbach, Alan J., and William G. Gale.** 2009b. "Déjà Vu All Over Again: On the Dismal Prospects for the Federal Budget." *National Tax Journal*, 63(3): 543–60.
- Auerbach, Alan J., and Yuriy Gorodnichenko.** 2010. "Measuring the Output Responses to Fiscal Policy." NBER Working Paper 16311.
- Auerbach, Alan J., and Kevin A. Hassett.** 1991. "Recent U.S. Investment Behavior and the Tax Reform Act of 1986: A Disaggregate View." *Carnegie-Rochester Conference Series on Public Policy*, vol. 35(91): 185–215.
- Ball, Laurence, and N. Gregory Mankiw.** 1995. "Relative-Price Changes as Aggregate Supply Shocks." *Quarterly Journal of Economics*, 110(1): 161–93.
- Barro, Robert J.** 1974. "Are Government Bonds Net Wealth?" *The Journal of Political Economy*, 82(6): 1095–1117.
- Barro, Robert J., and Charles J. Redlick.** 2009. "Macroeconomic Effects from Government Purchases and Taxes." NBER Working Paper 15369.
- Barrow, Lisa, and Leslie McGranahan.** 2000. "The Effects of the Earned Income Credit on the Seasonality of Household Expenditures." *National Tax Journal*, 53(4): 1211–44.
- Bernstein, Jared, and Christina Romer.** 2009. "The Job Impact of the American Recovery and Reinvestment Plan." http://otrans.3cdn.net/ee40602f9a7d8172b8_ozm6bt5oi.pdf.
- Bertrand, Marianne, and Adair Morse.** 2009. "What Do High-Interest Borrowers Do with Their Tax Rebate?" *American Economic Review*, 99(2): 418–23.
- Blanchard, Olivier, and Roberto Perotti.** 2002. "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output." *Quarterly Journal of Economics*, 117(4): 1329–68.
- Blinder, Alan S.** 1981. "Temporary Income Taxes and Consumer Spending." *The Journal of Political Economy*, 89(1): 26–53.
- Blinder, Alan S., and Angus Deaton.** 1985. "The Time-Series Consumption Function Revisited." *Brookings Papers on Economic Activity*, no. 2, pp. 465–521.
- Blinder, Alan S., and Mark Zandi.** 2010. "How the Great Recession Was Brought to an End." <http://www.economy.com/mark-zandi/documents/End-of-Great-Recession.pdf>.
- Brainard, William C.** 1967. "Uncertainty and the Effectiveness of Policy." *American Economic Review*, 57(2): 411–25.
- Broda, Christian, and Jonathan Parker.** 2008. "The Impact of the 2008 Tax Rebates on Consumer Spending: Preliminary Evidence." <http://faculty.chicagobooth.edu/christian.broda/website/research/unrestricted/Stimulus%20Payments%20and%20Spending.pdf>.
- Campbell John Y., and N. Gregory Mankiw.** 1989. "Consumption, Income, and Interest Rates: Reinterpreting the Time Series Evidence." In *NBER Macroeconomics Annual*, ed. O. Blanchard and S., 185–216. MIT Press.
- Chambers, Valri, and Marilyn Spencer.** 2008. "Does Changing the Timing of a Yearly Individual Tax Refund Change the Amount Spent vs. Saved?" *Journal of Economic Psychology*, 29(6): 856–62.
- Chetty, Raj, Adam Looney, and Kory Kroft.** 2009. "Salience and Taxation: Theory and Evidence." *American Economic Review*, 99(4): 1145–77.
- Christiano, Lawrence, Martin Eichenbaum, and Sergio Rebelo.** 2009. "When is the Government Spending Multiplier Large?" NBER Working Paper 15394.
- Coenen, Günter, Christopher Erceg, Charles Freedman, Davide Furceri, Michael Kumhof, René Lalonde, Douglas Laxton, Jesper Lindé, Annabelle Mourougane, Dirk Muir, Susanna Mursula, Carlos de Resende, John Roberts, Werner Roeger, Stephen Snudden, Mathias Trabandt, and Jan in 't Veld.** 2010. "Effects of Fiscal Stimulus in Structural Models." International Monetary Fund Working Paper 10/73.
- CBO (See Congressional Budget Office)**
- CEA (See Council of Economic Advisors)**
- Cogan, John, Tobias Cwik, John Taylor, and Volker Wieland.** 2009. "New Keynesian versus Old Keynesian Government Spending Multipliers." NBER Working Paper 14782.
- Congdon, William J., Jeffrey R. Kling, and Sendhil Mullainathan.** 2009. "Behavioral Economics and Tax Policy." *National Tax Journal*,

52(3): 375–86.

Congressional Budget Office. 2008a. “Options for Responding to Short-Term Economic Weakness.” Washington: Congressional Budget Office.

Congressional Budget Office. 2008b. *An Analysis of the President’s Budgetary Proposals for Fiscal Year 2009*. Washington: Congressional Budget Office.

Congressional Budget Office. 2009a. “Estimated Macroeconomic Impacts of the American Recovery and Reinvestment Act of 2009.” Washington: Congressional Budget Office.

Congressional Budget Office. 2009b. “Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output as of September 2009.” Washington: Congressional Budget Office.

Congressional Budget Office. 2010. “Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from January 2010 Through March 2010.” Washington: Congressional Budget Office.

Corsetti, Giancarlo, Andre Meier, and Gernot J. Muller. 2009. “Fiscal Stimulus with Spending Reversals.” IMF Working Paper 09/106.

Council of Economic Advisors. 2009a. “The Economic Impact of the American Recovery and Reinvestment Act: First Quarterly Report.” Washington: Council of Economic Advisors.

Council of Economic Advisors. 2009b. “The Effects of Fiscal Stimulus: A Cross-Country Perspective.” Washington: Council of Economic Advisors.

Council of Economic Advisors. 2009c. “The Effects of State Fiscal Relief.” Washington: Council of Economic Advisors.

Council of Economic Advisors. 2010. “Economic Impact of the American Recovery and Reinvestment Act: Fourth Quarterly Report.” Washington: Council of Economic Advisors.

Cummins, Jason G., Kevin A. Hassett, and R. Glenn Hubbard. 1994. “A Reconsideration of Investment Behavior Using Tax Reforms as Natural Experiments.” *Brookings Papers on Economic Activity*, no. 2, pp. 1–74.

Davig, Troy, and Eric M. Leeper. 2009. “Expectations and Fiscal Stimulus.” http://www2.riksbank.se/upload/Dokument_riksbank/Kat_foa/2009/Eric%20Leeper%202009.pdf.

Davis, Steven J., and James A. Kahn. 2008. “Interpreting the Great Moderation: Changes in the Volatility of Economic Activity at the Macro and Micro Levels.” *Journal of Economic Perspectives*, 22(4): 155–80.

Edwards, Ryan D. 2004. “Macroeconomic Implications of the Earned Income Tax Credit.” *National Tax Journal*, 57(1): 45–65.

Eggertsson, Gauti B. 2008. “Can Tax Cuts Deepen Recessions?” Preliminary and

incomplete. <http://www.newyorkfed.org/research/economists/eggertsson/ContractionaryTaxes.pdf>.

Epley, Nicholas, Dennis Mak, and Lorraine Chen Idson. 2006. “Bonus or Rebate?: The Impact of Income Framing on Spending and Saving.” *Journal of Behavioral Decision Making*, 19(3): 213–27.

Favero, Carlo, and Francesco Giavazzi. 2009. “How Large Are the Effects of Tax Changes?” NBER Working Paper 15303.

Finkelstein, Amy. 2009. “E-ZTAX: Tax Salience and Tax Rates.” *Quarterly Journal of Economics*, 124(3): 969–1011.

Giavazzi, Francesco, and Marco Pagano. 1990. “Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small European Countries.” NBER Macroeconomics Annual 1990: 75–122.

Gramlich, Edward M. 1978. “State and Local Budgets the Day After it Rained: Why is the Surplus so High?” *Brookings Papers on Economic Activity*, no. 1, pp. 191–216.

Gramlich, Edward M. 1979. “Stimulating the Macroeconomy through State and Local Governments.” *American Economic Review*, 69(2): 180–85.

Gruber, Jonathan. 1996. “Cash Welfare as a Consumption Smoothing Mechanism for Single Mothers.” NBER Working Paper 5738.

Gruber, Jonathan. 1997. “The Consumption Smoothing Benefits of Unemployment Insurance.” *American Economic Review*, 87(1): 192–205.

Hall, Robert E. 2009. “By How Much Does GDP Rise if the Government Buys More Output?” *Brookings Papers on Economic Activity: Fall 2009*, pp. 183–231.

Hassett, Kevin A., and R. Glenn Hubbard. 2002. “Tax Policy and Business Investment.” In A. Auerbach and M. Feldstein, eds., *Handbook of Public Economics*, vol. 3, pp. 1293–1343. North-Holland.

House, Christopher L., and Matthew D. Shapiro. 2008. “Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation.” *American Economic Review*, 98(3): 737–68.

Hsieh, Chang-Tai. 2003. “Do Consumers React to Anticipated Income Changes? Evidence from the Alaska Permanent Fund.” *American Economic Review*, 93(1): 397–405.

IMF Fiscal Affairs Department. 2009. “The State of Public Finances Cross-Country Fiscal Monitor: November 2009.” IMF Staff Position Note, SPN/09/25. Washington, DC: International Monetary Fund.

Izzo, Phil. 2010. “Economists Credit Fed For Alleviating Crisis.” *Wall Street Journal*, A.2.

Johnson, David S., Jonathan A. Parker, and Nicholas S. Souleles. 2006. “Household Expenditure and the Income Tax Rebates of 2001.” *American Economic Review*, 96(5): 1589–1610.

- Joint Committee on Taxation.** 2009. *Description of The American Recovery And Reinvestment Tax Act of 2009*. JCX-10-09. Washington: Joint Committee on Taxation.
- Kahn, James A., Margaret M. McConnell, and Gabriel Perez-Quirós.** 2002. "On the Causes of the Increased Stability of the U.S. Economy." Federal Reserve Bank of New York *Economic Policy Review*, 8(1): 183–206.
- Leeper, Eric M., Todd B. Walker, and Shu-Chun Susan Yang.** 2009. "Government Investment and Fiscal Stimulus in the Short and Long Runs." NBER Working Paper 15153.
- Lucas, Robert E., Jr.** 1976. "Econometric Policy Evaluation: A Critique." *Carnegie-Rochester Conference Series on Public Policy*, no. 1, pp. 19–46.
- Organisation for Economic Co-operation and Development.** 2009. "The Effectiveness and Scope of Fiscal Stimulus." Chapter 3 of *Economic Outlook Interim Report*.
- Parker, Jonathan A.** 1999. "The Reaction of Household Consumption to Predictable Changes in Social Security Taxes." *American Economic Review*, 89(4): 959–73.
- Pierotti, Roberto.** 1999. "Fiscal Policy in Good Times and Bad." *Quarterly Journal of Economics*, 114(4): 1399–1436.
- Poterba, James M.** 1988. "Are Consumers Forward-Looking? Evidence from Fiscal Experiments." *American Economic Review*, 78(2): 413–18.
- Poterba, James M.** 1994. "State Responses to Fiscal Crisis: The Effects of Budgetary Institutions and Politics." *Journal of Political Economy*, 102(4): 799–821.
- Prasad, Eswar, and I. Sorkin.** 2009. "Assessing the G-20 Economic Stimulus Plans: A Deeper Look." Brookings Institution. http://www.brookings.edu/articles/2009/03_g20_stimulus_prasad.aspx.
- Ramey, Valerie A.** 2009. "Identifying Government Spending Shocks: It's All in the Timing." NBER Working Paper 15464.
- Ramey, Valerie A., and Matthew Shapiro.** 1997. "Costly Capital Reallocation and the Effects of Government Spending." *Carnegie-Rochester Conference on Public Policy*, 48(1): 145–94.
- Reischauer, Robert D.** 1978. "Federal Countercyclical Policy—the State and Local Role." Prepared for the Seventy-first Annual Conference on Taxation of the National Tax Association-Tax Institute of America, Philadelphia, Pennsylvania, November 13, 1978.
- Romer, Christina D.** 2009. "Back From the Brink." Address to the Federal Reserve Bank of Chicago. Chicago, Illinois, September 24. <http://www.whitehouse.gov/administration/eop/cea/BackFromTheBrink>.
- Romer, Christina D., and David H. Romer.** 2007. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks." NBER Working Paper 13264.
- Rubin, Robert E., Peter R. Orszag, and Allen Sinai.** 2004. "Sustained Budget Deficits: Longer-Run U.S. Economic Performance." Paper presented at the AEA-NAEFA Joint Session. San Diego.
- Shapiro, Matthew D., and Joel Slemrod.** 1995. "Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding." *American Economic Review*, 85(1): 274–83.
- Shapiro, Matthew D., and Joel B. Slemrod.** 2003. "Consumer Response to Tax Rebates." *American Economic Review*, 93(1): 381–96.
- Shapiro, Matthew D., and Joel B. Slemrod.** 2009. "Did the 2008 Tax Rebates Stimulate Spending?" *American Economic Review*, 99(2): 374–79.
- Souleles, Nicholas S.** 1999. "The Response of Household Consumption to Income Tax Refunds." *American Economic Review*, 89(4): 947–58.
- Souleles, Nicholas S.** 2002. "Consumer Response to the Reagan Tax Cuts." *Journal of Political Economy*, 85(1): 99–120.
- Stock, James, and Mark W. Watson.** 2002. "Has the Business Cycle Changed and Why?" Chap. 4 in NBER Macroeconomics Annual 2002. MIT Press.
- Summers, Lawrence H.** 2007. "The State of the US Economy." Presentation at Brookings Institution forum, December 19, 2007. http://www.brookings.edu/events/2007/1219_us_economy.aspx.
- Taylor, John B.** 1993. "Discretion versus Policy Rules in Practice." *Carnegie-Rochester Conference Series on Public Policy*, 39(1): 195–214.
- Watanabe, Katsunori, Takayuki Watanabe, and Tsutomu Watanabe.** 2001. "Tax Policy and Consumer Spending: Evidence from Japanese Fiscal Experiments." *Journal of International Economics*, 53(2): 261–81.
- Wilcox, David W.** 1989. "Social Security Benefits, Consumption Expenditure, and the Life Cycle Hypothesis." *Journal of Political Economy*, 97(2): 288–304.
- Woodford, Michael.** 2010. "Simple Analytics of the Government Expenditure Multiplier." NBER Working Paper 15714.

