

Fiscal Stimulus Programs During the Great Recession

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Five years ago, in October 2013, the Brookings Institution and the Hoover Institution jointly held a conference on the fifth anniversary of financial crisis of 2008. The conference took place simultaneously in Washington, DC and Stanford, California with simulcasting between the two locations for maximum interaction of economists and legal scholars with different research findings as reflected in the title of the conference volume *Across the Great Divide: New Perspectives on the Financial Crisis*. The purpose was to look for common ground, and while there was some agreement, significant differences of opinion remained about the causes, the panic, the recession and lessons about future role of government.

We are now at the tenth anniversary of the crisis and the differences in findings of economic and legal research remain. But the passage of more time, and perhaps more journalistic summaries and the completion of memoirs of policy makers, has led to historical revisions which affect public perceptions of what took place and the lessons learned. This tendency exists in all policy areas, from monetary policy to regulatory policy to international policy, but it is particularly true of fiscal policy. Writing recently in the *Wall Street Journal*, for

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example, Edmund Phelps (2018) complains that “Among economists and policy makers it is widely thought that fiscal stimulus—increased public spending as well as tax cuts—helped pull employment from its depths in 2010 or so back to normal in 2017.” And disagreements about the stimulus programs are often whether they should have been “larger” and “longer,” as Joseph Stiglitz (2018) wrote recently, rather than whether they should have been undertaken at all.

This paper reexamines the empirical research on fiscal stimulus packages which were enacted into law and implemented around the time of the Financial Crisis and Great Recession of 2007-2009. These deficit-expanding programs included federal transfers to the states for infrastructure building, tax rebates, temporary income tax cuts, cash for clunkers, and financial aid for first-time homebuyers. Many researchers analyzed these policy actions. My empirical findings and that of others showed that these fiscal actions did little or nothing to stimulate the economy.² Indeed, for a while the stimulus packages were viewed as so ineffective that the very term “stimulus package” was often avoided. Some of the negative ramifications of these policies continue as the federal budget deficit remains large and is expected to grow larger, taking the federal debt to new records. Accordingly, the paper also considers the impact of multi-year fiscal consolidation plans to reduce the deficit.

The focus here is on macroeconomic analysis. I first review research that uses macroeconomic models to estimate the impact of demand-side stimulus packages. I then examine data on the direct macroeconomic impact of specific discretionary stimulus programs—

² Many of the papers, books, congressional testimonies, and op-eds on these programs are posted on my web page JohnBTaylor.com and discussed on EconomicsOne.com. An assessment of the infrastructure spending component of recent counter-cyclical stimulus packages was undertaken by the Transportation Research Board of the National Academies (2014), but as committee member Dupor (2014) pointed out, the review omitted much relevant research, suggesting the need for more comprehensive reviews.

such as aid to the states or temporary tax rebates—used during these years, with less emphasis on models. I also examine some journalistic interpretations of research and the use of models designed specifically to estimate the impact of long-term credible fiscal consolidation plans.

1. Macro Model Estimates of the Impacts of Fiscal Stimulus in 2007-09 Recession

Structural macroeconomic models are natural starting point for the evaluation of fiscal policy. Policy simulations with such models can help estimate the impact of actual fiscal stimulus packages and thereby determine whether such policies are appropriate.

When estimating the impacts of fiscal policy, however, different macro models can give different answers. Figure 1 illustrates of how large the differences can be, at least as seen from the vantage point of 2008. It shows two estimates from two different macro models of the impact of a one-time permanent increase in government spending on real GDP in the United States. One type of model—often called new Keynesian—endeavors to incorporate the behavior of forward-looking agents who try to anticipate changes in policy and adapt accordingly. The other type of model, which might be called old Keynesian for contrast, does not incorporate forward looking behavior and assumes that expectations adapt slowly over time. Both types of models incorporate rigidities such as sticky wages and prices.

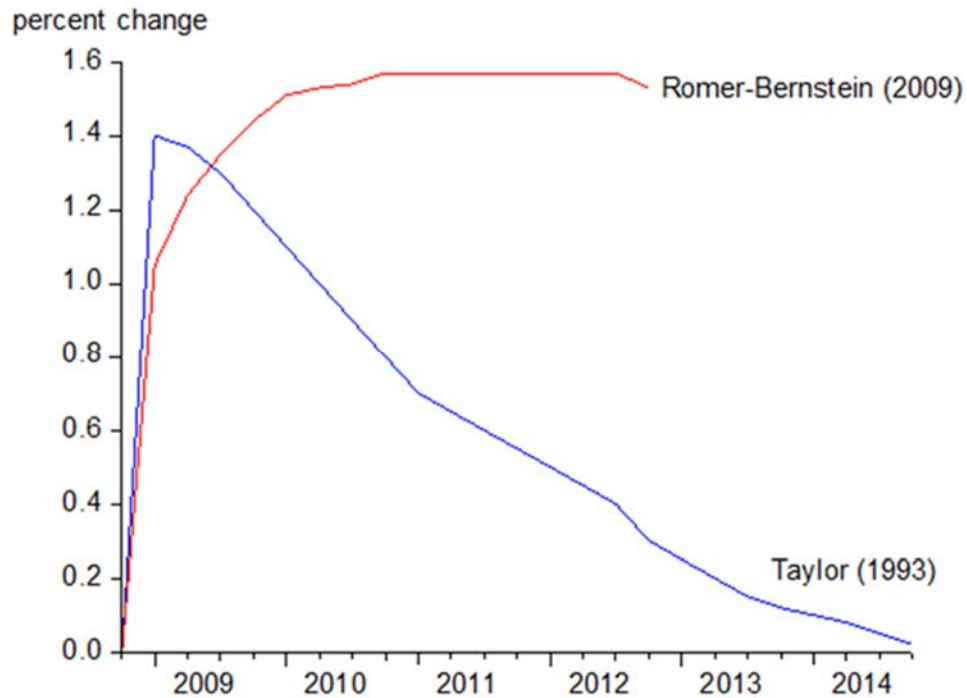


Figure 1. Estimated Impact on Real GDP of a Permanent Increase in Government Purchases of 1 percent of GDP

The path labeled “Romer and Bernstein (2009)” in Figure 1 is based on an average computed by Romer and Bernstein (2009) in January 2009 of models of the old Keynesian variety that were used by the staff of the Federal Reserve Board and a private forecasting firm at that time. It shows the estimated impact of an unanticipated permanent increase in government purchases of 1 percent of GDP; according to this type of model, the policy would lead to an increase in real GDP of 1.6 percent. Figure 1 also shows the estimated effect of the exact same policy change—a permanent increase in government purchases—using a model of the new Keynesian type developed by Taylor (1993) which also existed at that time. It is clear from Figure 1 that the two approaches imply vastly different results. In one case higher government

spending keeps on adding to GDP, while in the other case the effect on GDP diminishes quickly as non-government components are crowded out by government spending.

In assessing the effect of government actions on the economy, it is of course important to model how households and firms adjust their spending decisions as their expectations of the future changes. Because new Keynesian models endeavor to capture how people's expectations and economic behavior change over time in response to policy interventions, they are more suitable for estimating the effects of policy. For this reason, they are often taught in economics graduate schools and are a foundation upon which improvements are considered in research. We focus on new Keynesian models in this review. This focus reduces, but does not eliminate, as I will show, the differences between models. A very important topic for future research is the examination of the impact of fiscal stimulus packages using improved new Keynesian models including those that deal with heterogeneous agents as in Auclert (2017) or Kaplan, Moll, and Violante (2018).

Consider the impact of the 2009 stimulus package using the new Keynesian Smets-Wouters model of the U.S. economy, one of the best known of the empirically-estimated new Keynesian models. It is very similar to another well-known empirically-estimated new Keynesian model developed by Christiano, Eichenbaum and Evans (2005) (CEE) and has been cited by Woodford (2009) as a leading model in a review of current thinking in macroeconomics.

What does this model imply about the impact of the 2009 fiscal stimulus package? Cogan, Cwik, Taylor and Wieland (2010) (CCTW) answered this question by simulating the fiscal stimulus package enacted and signed into law on February 17, 2009; the results are summarized in Cogan, Taylor, and Wieland (2009). The stimulus package was a mixture of higher government purchases, increased transfer payments, and tax refunds. In fact, about half of

that stimulus package consisted of transfer payments (for unemployment assistance, nutritional aid, health and welfare payments, and temporary tax cuts). Another component was federal government transfers to state and local governments to be used for the purchase of goods and services and build infrastructure.

Figure 2 presents the results of the simulation showing the impact of the change in government purchases. The bar graph shows how much government purchases increased as a share of GDP, and the line graph shows the impact of the increase in purchases on real GDP in the Smets-Wouters model.

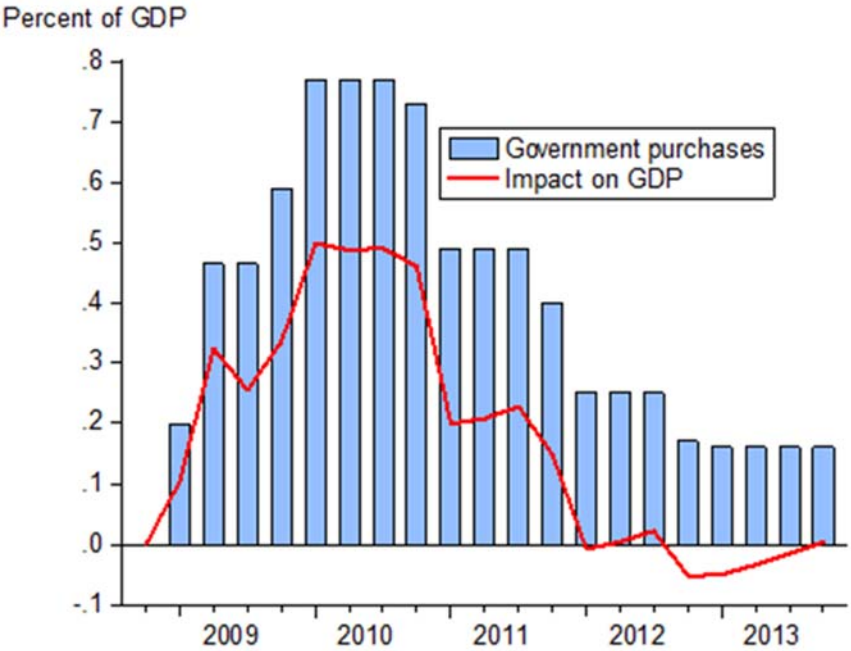


Figure 2. Impact of the 2009 stimulus package based on the Smets-Wouters model

According to the Smets-Wouters model, the estimated impacts on GDP are very small, with the multiplier well below one. Note that during the first year the estimated stimulus is

minor and then even turns down in the third quarter. Why is the effect so small in the first year? The answer comes in part from the timing of the government expenditures and the forward-looking perspective of households. The small amount of government spending in the first year is followed by a larger increase in the second year. Households and firms anticipate the second-year increase during the first year. They also anticipate that ultimately the expenditures will be financed by higher taxes. The negative impact of the delayed government spending and the negative wealth effect on private consumption of higher anticipated future taxes combine to reduce the positive impact of the stimulus. As a result, the first-year GDP impact is initially small and turns down.

In the Smets-Wouters model there is also a strong crowding out of investment. Hence, both consumption and investment decline as a share of GDP in the first year according to the model. This negative effect is offset, as shown in Figure 2, by the increase in government spending in the first year, but it causes the multiplier to be below one right from the start.

Of course, not all new Keynesian models are the same as the Smets-Wouters model; there are different views of the theoretical framework and econometric methodology. But how different are the estimated results of the fiscal stimulus packages? An answer is proved in the paper, “Effects of Fiscal Stimulus in Structural Models,” written by economic researchers at central banks and international institutions around the world (Guenter Coenen, Chris 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). The authors compared the Smets-Wouters model estimates of the 2009 stimulus package with the CEE model, used in Christiano, Eichenbaum, and Rebelo (2011), and four other new Keynesian structural

macroeconomic models of the kind used in practice by policymakers and their staffs. The other four models are the Bank of Canada’s GEM model (BOC), the Fed’s FRBUS model (FRB), the Fed’s SIGMA model (SIGMA), and the International Monetary Fund’s GIMF model (IMF).

Coenen et al. (2012) simulated all 6 models using same time profile of government purchases used by CCTW to describe the American Recovery and Reinvestment Act of 2009 (ARRA). The estimates, of course, depend on the monetary policy rule used in the model. The results for GDP are shown in Figure 3 (which corresponds to Figure 7 of Coenen et al. (2012)) and refers to the estimates with the assumption of two full years of monetary accommodation during which the central bank keeps the interest rate near zero. Observe that the four policy models give estimates very similar to those of CCTW, though the CEE model appears to be an outlier.

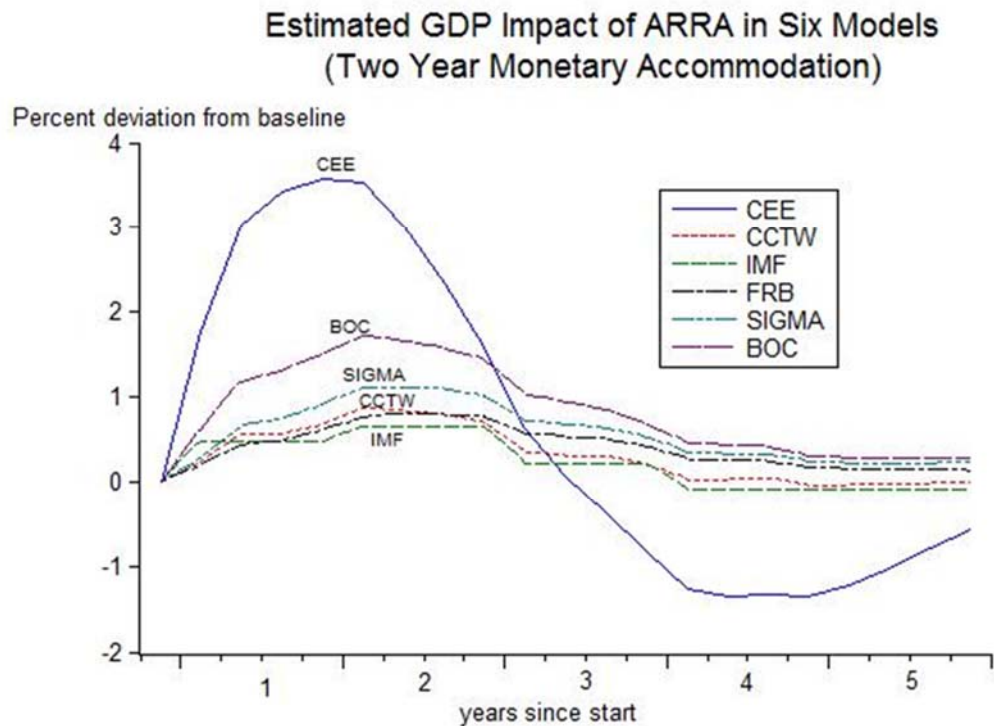


Figure 3. Estimates of Fiscal Stimulus based on Simulations of Different Macro Models

Given the range of variation in Figure 1, one wonders where the idea came from that there was a consensus that the stimulus was very effective as mentioned by Phelps (2018). One answer is that journalistic and popular reporting sometimes characterized the situation differently. A good example is a November 2009 article in the *New York Times* with the headline “New Consensus Sees Stimulus Package as a Worthy Step.” (Calmes and Cooper (2009)). The article noted that “the accumulation of hard data and real-life experience has allowed more dispassionate analysts to reach a consensus that the stimulus package, messy as it is, is working. The legislation, a variety of economists say, is helping an economy in free fall a year ago to grow again and shed fewer jobs than it otherwise would.”

As evidence, the article included three graphs, which are reproduced on the left of Figure 4. Each of the three graphs on the left corresponds to a model maintained by the modelling group shown above the graph. All three graphs show that without the stimulus economic growth would be considerably weaker. The difference between the black line and the gray line is their estimated impact of the stimulus.

Now what about the so-called “consensus?” In fact, as is clear from the previous discussion, other economic models estimated that the stimulus was not very effective. To illustrate this, I have added two other graphs on the right-hand side of Figure 4 which did not appear in the *New York Times* article. The first one is based on the Smets-Wouters model simulations discussed above. Focus on the difference between the black and the gray lines, which is what is predicted by that model, which shows that the impact is very small. The second additional graph on the right is based on the research of Barro (2009) about which he explained, “when I attempted to estimate directly the multiplier associated with peacetime government purchases, I got a number insignificantly different from zero.” So according to that research, the

difference between the black and the gray line should be about zero, which is what that graph shows. In sum, there is no consensus after all.

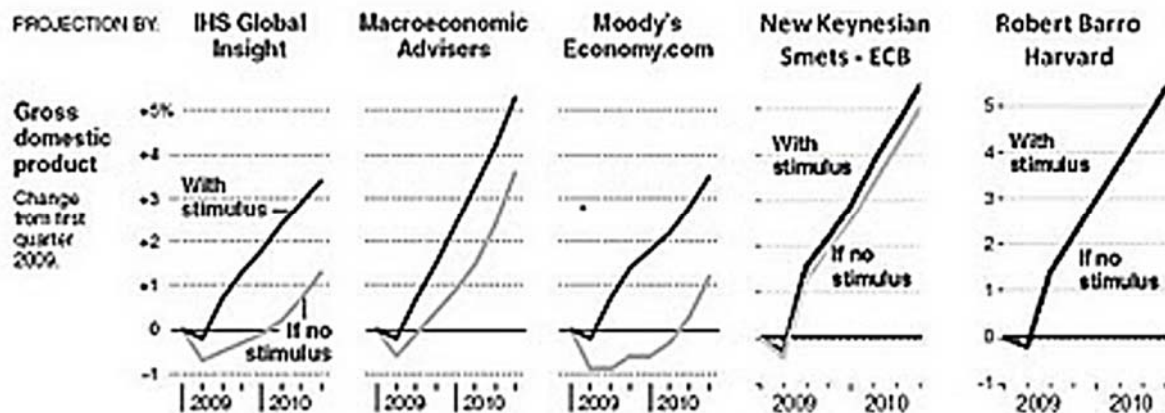


Figure 4. Evaluation of stimulus packages: 3 models from *NYT* article and 2 alternatives.

Some algebra will help show what is going on. Consider two models relating the size of the stimulus package S to output Y . Model A is $Y = \alpha S + Z$ and Model B is $Y = Z$, where Z is an unobservable shock and α is a coefficient which we set to 1.5. Now, suppose that a stimulus is enacted with $S = 2$, but Y decreases by -1. Then the shock implied by Model A is $Z = -4$ while the shock implied by model B is $Z = -1$.

Now consider policy evaluation of the stimulus based on a counterfactual where there is no stimulus so $S=0$. Economists using Model A would say: “Just as we predicted, the stimulus package worked. Without it, Y would have fallen to -4 rather than -1. The decline in output would have been 4 times as deep, a Great Depression 2.0.” Economists using Model B would simply say “Just as we predicted the stimulus package did not work.”

2. The Direct Macroeconomic Estimates of the Impact of Fiscal Stimulus Programs

One way to address the problem of differing models is to look at data on the direct effect of the stimulus packages without imposing a rigid model structure. First, I look at the effect of the temporary transfers and tax rebates in the 2001, 2008, and 2009 stimulus packages on consumption. Then I consider the impact of government purchases. The approach used here focuses on stimulus-specific timing and compositional effects which help in identifying the impacts of the policy changes.

Temporary Tax cuts and Rebates

The macroeconomic theory that rationalizes such temporary payments holds that they increase the demand for consumption, stimulate aggregate demand, and thereby help get the economy on a path to recovery. Counterarguments arise from doubts about the reliability and stability of the connection between income and consumption, especially when the increase in income due to the stimulus is temporary.

What do the data show? First consider the 2008 rebate for which we have monthly data as described in Taylor (2009). Figure 5 illustrates the impact on consumption. The upper line shows disposable personal income for the months from January 2007 through October 2008. The data are seasonally adjusted and are stated at annual rates. Disposable personal income is the total amount of income after taxes and government transfers; it therefore includes the rebate payments. Subtracting the rebate payments from the top line results in the dashed line in Figure 5, which shows what disposable personal income would have been without the rebates. Notice the sharp increase in disposable personal income in May 2008 when rebates were mailed or deposited in people's bank accounts. Disposable personal income then started to come down in

June and July as total payments declined and by August had returned to the trend that was prevailing in April.

The lower line in Figure 5 is personal consumption expenditures over the same period. Observe that consumption shows no noticeable increase at the time of the rebate. As the picture illustrates the temporary rebate did little or nothing to stimulate consumption demand, and thereby aggregate demand, or the economy. In fact, the data show that consumption began declining in July 2008 and continued to decline through October.

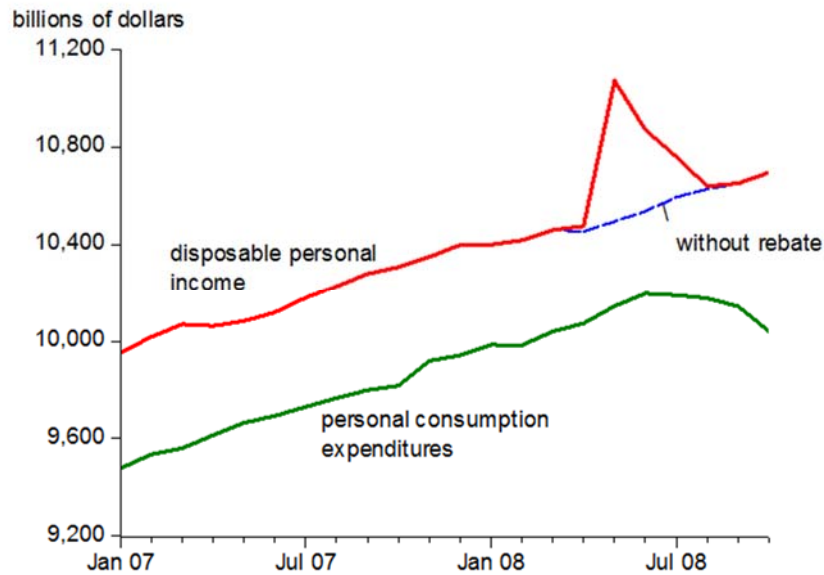


Figure 5. Income, Consumption, and the 2008 Rebate Payments

Now compare the tax and transfer components of the 2001, 2008 and 2009 stimulus packages using quarterly data. Figure 6 shows the impact on *quarterly* disposable personal income of the temporary changes in taxes and transfers due to the three stimulus packages of the

2000s as calculated in Taylor (2011). The impacts of the packages on income were calculated by BEA. For the 2001 and 2008 packages the data were collected from various monthly BEA press releases of “Personal Income and Output.” For the 2009 package the data were collected in a satellite quarterly account on ARRA prepared by BEA, “Effect of the ARRA on Selected Federal Government Sector Transactions” under the categories “personal current taxes” or “current transfer payments to persons.” These changes include one-time \$250 payments, refundable credits, and a “making work pay” tax credit.

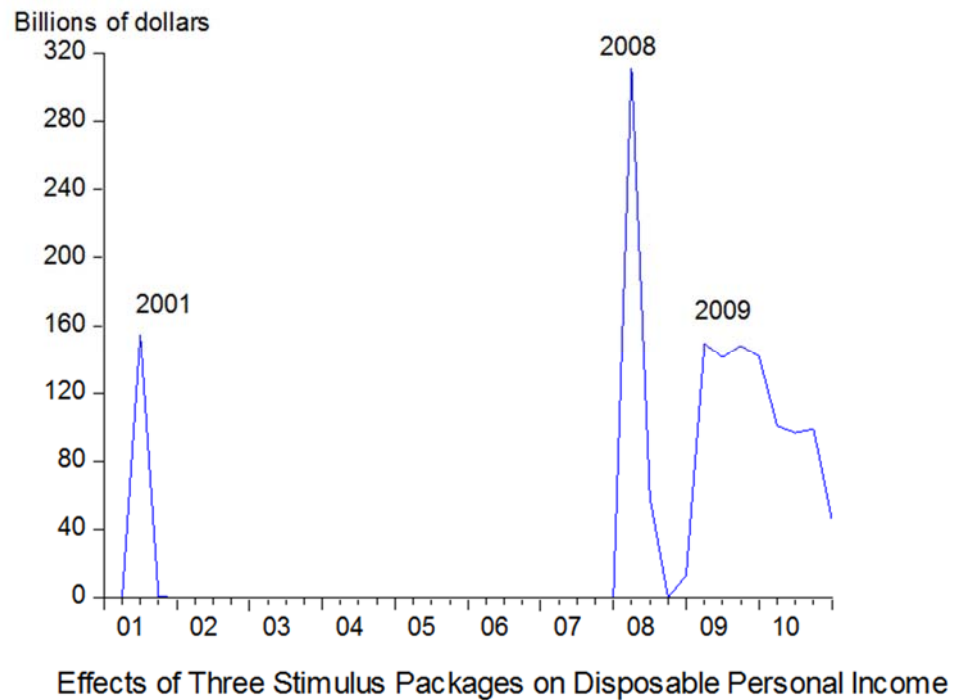


Figure 6

Though these packages differed in size, duration, and the mechanism for distribution of the stimulus payments, they were quite similar from the point of view of macroeconomics

because they were all widely viewed as temporary and were justified on the grounds of stimulating or jump-starting consumption. In fact, a big idea underlying the 2008 and 2009 stimulus packages was that they should be temporary, as well as targeted and timely. This temporary feature distinguishes these actions from more permanent changes such as the personal income tax rate cuts of the 1980s.

Now consider the impact of these temporary changes in disposable personal income on consumption. It would be too narrow an interpretation of the macro theory to say that consumption would adjust perfectly in synch with the ups and downs in income due to the payments. But if the stimulus payments worked to stimulate the economy as envisioned in this model, one would have to see some associated movements in consumption. To look for such direct effects, I subtracted the payment amounts in Figure 6 from actual disposable personal income to get an adjusted income series as shown in Figure 7 for the 2008 and 2009 stimulus packages. The actual and adjusted series can then be compared with personal consumption expenditures also shown in Figure 7.

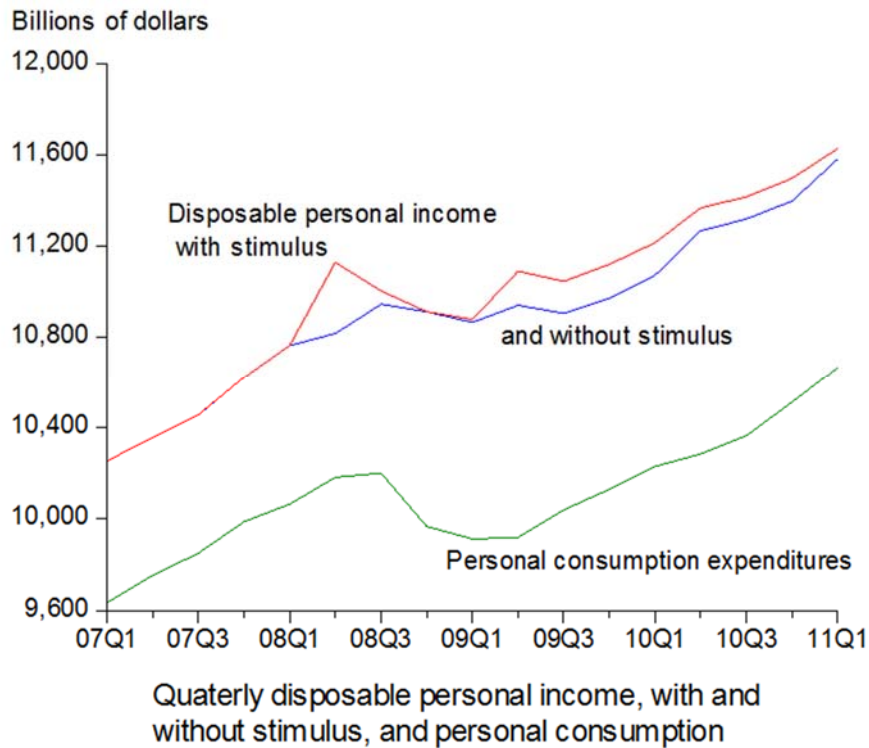


Figure 7

Figure 7 does not reveal any noticeable effects of the temporary payments on consumption. The sharp increases in personal disposable income in the second quarter of 2008 and the second quarter of 2009 do not show up in movements in consumption. Recall that the lack of a relationship is even more striking with monthly data as shown in Figure 5.

More precise information about the direct impact of the stimulus payments on consumption can be obtained from regression estimates. Table 1 reports the results from three regressions in which personal consumption expenditures (PCE) is the left-hand side variable. In regression equation 1, displayed in column 1, the income variable is simply disposable personal income (which includes the stimulus). In the second regression equation, the income variable is disposable personal income without the stimulus. In the third equation, the stimulus payments for

2001, 2008 and 2009 are added as a separate variable. In all three regressions, oil prices and household net worth are included as control variables. Higher oil prices would be expected to depress consumption while higher net worth should have a positive effect, both with some lag, and this is what the regressions show with the lag equal to two quarters.

By choosing to put consumption on the left-hand side, we are looking for effects of the stimulus payments on consumption, which is where most macro theories say we should find them. By splitting disposable personal income into two parts—a temporary part due to the stimulus and the remaining more permanent part—we are allowing for a distinction predicted by the permanent income theory, though we are not prejudging the size of the temporary versus permanent effect. The regressions are estimated over the sample period 2000Q1- 2011Q1 which includes the effects of all three stimulus packages.

First note that the standard error in regression equation 2 is less than the standard error in regression equation 1. In other words, including the stimulus payments in disposable personal income worsens the fit of the equation, suggesting that the impact of the temporary changes on consumption is less than the more permanent changes. This idea is borne out by comparing equation 2 with equation 3 where the stimulus payment is separated from other sources of income. Regression equation 3 indicates that the temporary stimulus payments had a very small effect on consumption and that this effect is not statistically significantly different from zero. In contrast, the adjusted disposable personal income variable—a more permanent measure of income—has a much larger and statistically significant effect in regression equation 3.

This is the kind of regression result that one would expect from Milton Friedman's permanent income hypothesis, Franco Modigliani's life cycle hypothesis or from consumption smoothing in an inter-temporal utility maximization model. Experimenting with different

regression specifications gives similar results, so effectively the data are speaking for themselves without the constraint of a model or functional form. The results imply that the Keynesian multiplier for transfer payments or temporary tax rebates was not significantly different from zero for the kind of stimulus programs enacted in the 2000s.

Table 1—Quarterly PCE Regressions With and Without Stimulus Payments

| | (1) | (2) | (3) |
|---|------------------|------------------|------------------|
| Constant | 104.5 (.78) | -47.1 (-.48) | -27.1 (-.25) |
| Disposable Personal Income | .817 (40.9) | ---- | ---- |
| Disposable Personal Income--Without Stimulus | ---- | .857 (73.0) | .851 (60.4) |
| Stimulus Payments | ----- | ----- | 0.128 (0.81) |
| Oil Price (\$/bbl lagged 2 quarters) | -2.41 (-4.71) | -2.55 (-4.14) | -2.55 (-4.61) |
| Net Worth (lagged 2 quarters) | .021 (8.53) | .017 (7.32) | .018 (7.97) |
| Standard error of regression | 76.9 | 65.8 | 66.3 |

Note: The dependent variable is personal consumption expenditures (PCE). The t-statistics in parentheses are based on Newey-West standard errors. The oil price variable is West Texas Intermediate and net worth variable is Household Net Worth from the Flow of Funds, Table B-100, line 42. Sample period is 2000Q1 - 2011Q1.

Government Purchases and Infrastructure Spending in the 2009 Stimulus Act

Now consider the impact of changes in government purchases. The 2001 and 2008 stimulus programs did not have a government purchases component, so we focus on the 2009 stimulus package. Figure 8 summarizes the impact of the stimulus legislation on federal government sector transactions from 2009.1 to 2011.1. Three components are shown:

1. The temporary transfers and tax rebates or credits which increase the disposable personal income of individuals and families.

2. Federal government purchases of goods and services (government consumption and government investment) and

3. Federal grants to states and local governments.

The second category, federal government purchases of goods and services, is part of GDP and thereby contributes directly to changes in GDP. The amount by which an increase in government purchases in a stimulus package raises GDP is of course the government purchases multiplier. From a fiscal stimulus perspective, the purpose of the third category—sending grants to state and local governments—is to get these governments to increase purchases.

As shown in Figure 8, only a small part of the 2009 stimulus went to purchases of goods and services by the federal government. At the maximum effect, which occurred in the third quarter of 2010, federal government purchases due to ARRA reached only 0.21 percent of GDP and federal infrastructure only 0.05 percent of GDP.

These amounts are too small for the stimulus package to have had a significant effect on the overall economy. In this case the debate over the size of the government purchases multiplier is largely moot because the government purchases multiplier had virtually nothing to multiply at the federal level.

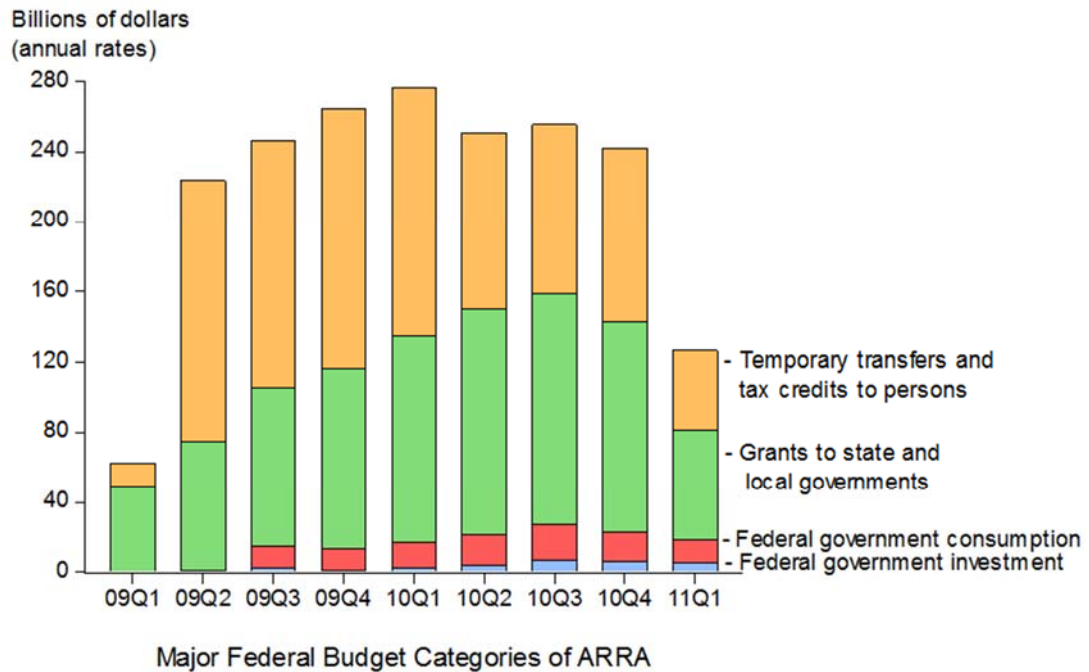


Figure 8

State and local governments received substantial grants under ARRA as shown in the bar chart. The purpose of sending these grants to the states was to encourage them to undertake infrastructure projects and purchase other goods and services. But this is not what happened.

Consider Figure 9 which shows the stimulus grants along with the change in state and local government purchases, borrowing, and expenditures other than government purchases relative to the fourth quarter of 2008. Stimulus grants increased steadily from the first quarter of 2009 through the third quarter of 2010 before tapering off. But as shown by Cogan and Taylor (2011, 2012), state and local government purchases hardly changed at all during this period. The biggest change during the period of the stimulus grants was a large decrease in net borrowing by state and local governments, or, equivalently, an increase in net lending. Expenditures other than

the purchases of goods and services rose by a smaller amount than net lending. Net borrowing by the state and local government sector is defined as the difference between the net increase in financial liabilities and the net acquisition of financial assets or equivalently by total expenditures less total revenues.

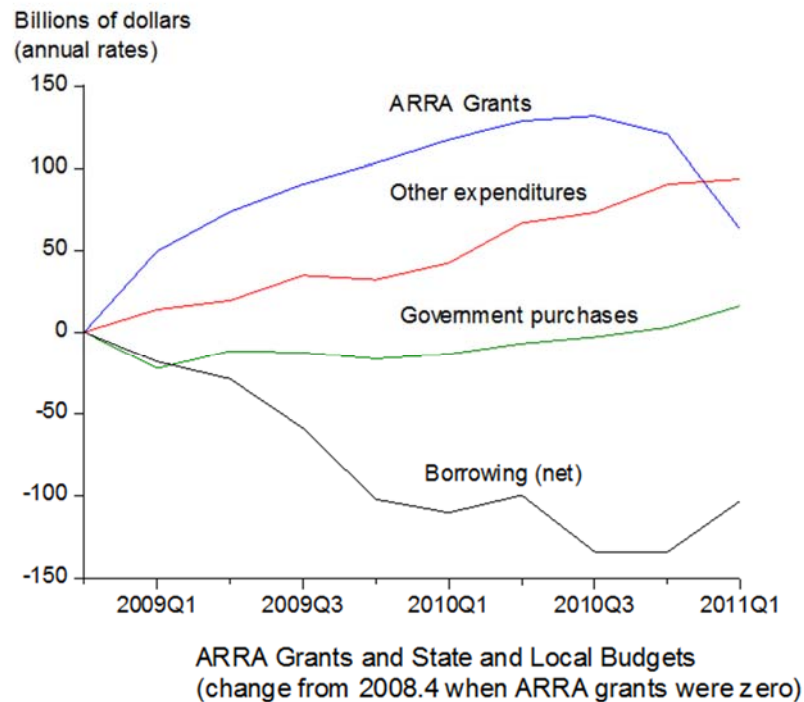


Figure 9

To get a better estimate of the direct impact of the ARRA grants on government purchases Cogan and Taylor (2012) used regression methods to control for other state and local government revenues (excluding ARRA grants) and also to take account of the state and local government budget constraint. By imposing the budget constraint on the regression coefficients, we let the data determine what component of the budget the ARRA grants affected and by how

much. We found that the direct effect of ARRA grants was to lower net borrowing by the same amount as these ARRA grants, so they had no effect on the sum of purchases and other expenditures.

Some argue that the economy would have been worse off without these stimulus packages, but the results do not support that view. If there had been no ARRA grants to states and localities, their total expenditures would have been about the same. The counterfactual simulations show that the ARRA-induced decline in state and local government purchases was larger than the increase in federal government purchases due to ARRA. In terms of the simple example of Model A versus Model B presented above, these results are evidence against the views represented by Model A, and thus against using such models to show that things would have been worse.

Others, including Stiglitz (2018), argue that the stimulus was too small, but the results do not lend support to that view. Using the estimated equations, a counterfactual simulation of a larger stimulus package—with the proportions going to state and local grants, federal purchases, and transfers to individual the same as in ARRA—would show little change in government purchases or consumption, as the temporary funds would be largely saved. Of course, the story would be different for a stimulus program designed more effectively to increase purchases, but it is not clear that such a program would be politically or operationally feasible.

Cash for Clunkers

Another important example of a specific stimulus action was the Cash for Clunkers program of 2009. This program was supposed to jump-start the economy and help increase and sustain economic growth. As estimated by Mian and Sufi (2012), there was a small temporary

effect on consumption, but it diminished quickly and was offset by declines a few months later as illustrated in Figure 10.

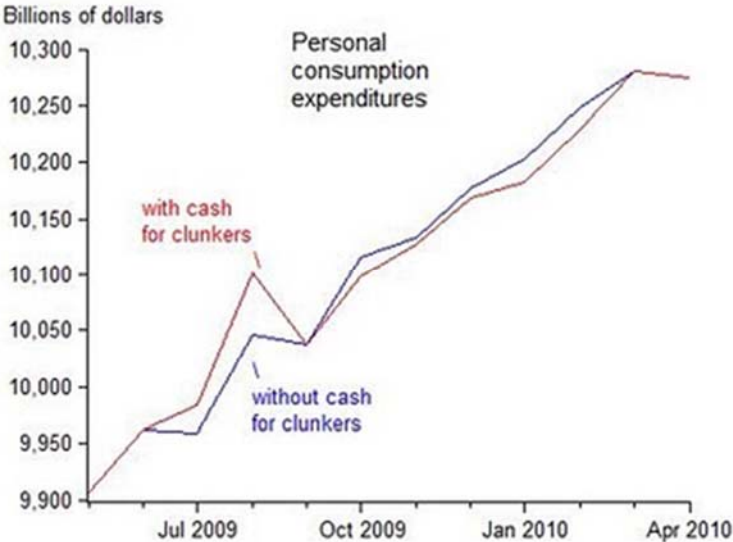


Figure 10. Impact of Cash for Clunkers as Estimated by Mian and Sufi (2012)

Figure 11 shows the size of the impact of the cash for clunkers program in comparison with the rest of the economy. Given this small size, it's hard to see how such a policy could work to get the economy to recover at a faster pace.

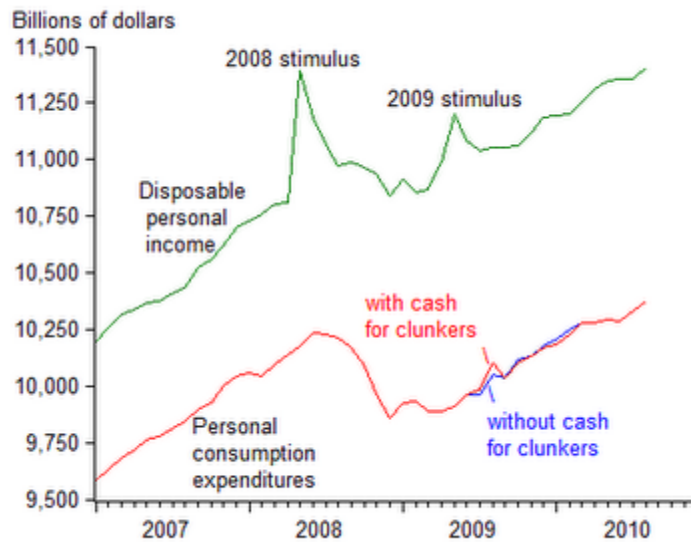


Figure 11. Cash for Clunkers in Comparison with Other Programs

3. Macro Model Estimates of the Impact of Fiscal Consolidation

While the Cash for Clunkers was small compared to the other fiscal stimulus packages in the past few years, it exemplifies a common problem with temporary fiscal actions. At best they provide a short-term boost to the economy without promoting a faster-growing sustainable recovery. And when they end, they leave the economy with more debt and with the recovery growing at least as slowly as it was before they were enacted. Without some offsetting fiscal consolidation, the growing debt itself becomes a drag on the economy. To the extent that the two-year payroll tax holiday of 2011 and 2012 boosted the economy, it too had this same transitory effect. Such short-term policies also take policymakers' eyes off the enactment of ever important long run growth policies, such as tax and budget reform. Figure 12 shows the trajectory of the debt and interest payments on the debt from the latest CBO (2018) long-term projection. Clearly the need for fiscal consolidation remains.

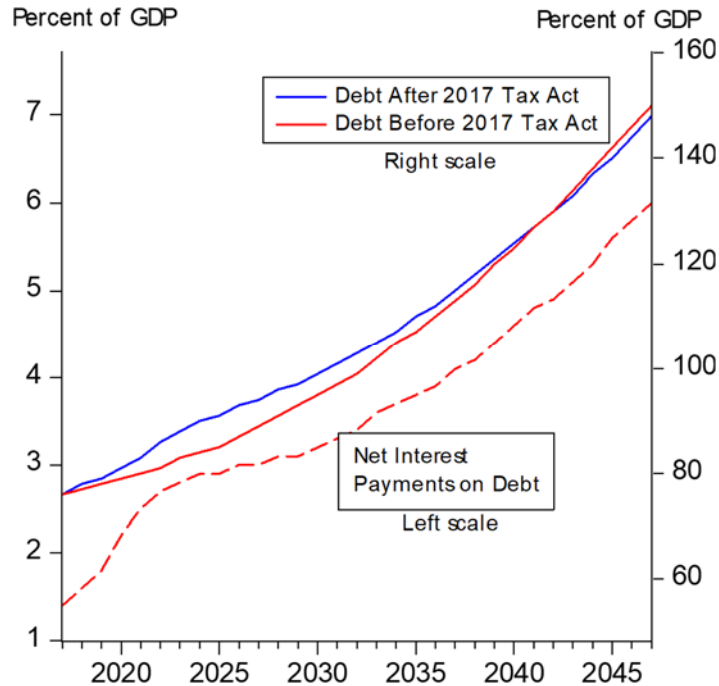


Figure 12. Debt and Interest Payments on the Debt
 Calculated from Congressional Budget Office (2018)

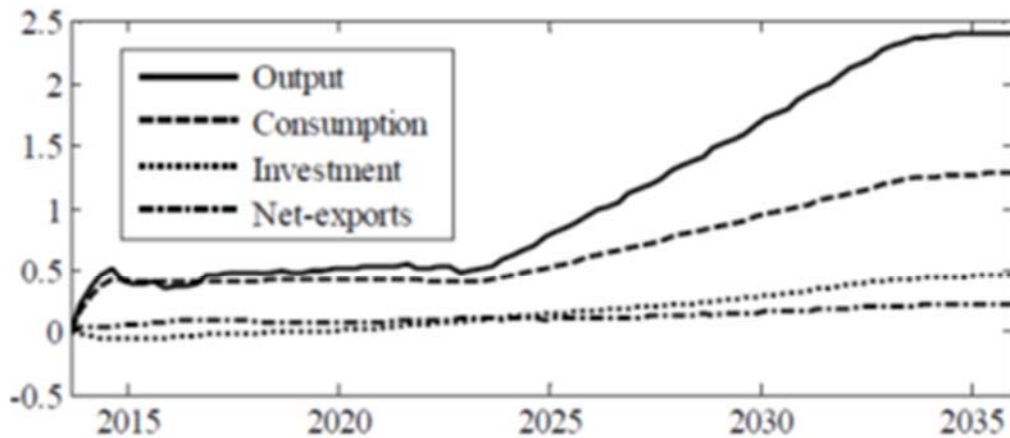
What do structural macro models say about the impact of long-term credible fiscal consolidation plans that reduce the deficit, including through budget reforms that slow the growth of entitlements. One might guess, at least extrapolating from the so-called consensus that stimulus packages worked, that such a plan would be contractionary, but that is not what new Keynesian models show. As new Keynesian models, they incorporate nominal rigidities that prevent immediate adjustment towards market equilibrium, but they also include the decision-making of forward-looking households and firms.

To consider alternative deficit reduction strategies in these models, Cogan, Taylor Wieland and Wolters (2013a, 2013b) adapted a model developed and used at the European Central Bank by Coenen, McAdam and Straub (2008) (CMS). The CMS model not only has nominal rigidities in price-wage setting and forward-looking agents, it also takes account of

distortionary taxes on income, capital and consumption. Cogan, Taylor, Wieland and Wolters (2013a, 2013b) calibrated the coefficients of the model using parameter values from Cogan, Cwik, Taylor and Wieland (2010).

Government spending, tax and debt decisions are subject to a budget constraint in the model. The model also distinguishes between government purchases and transfers. Households pay taxes on consumption, on wage income and on capital income. They also pay social security contributions and receive transfers. They make their decisions in a forward-looking utility-maximizing manner so that changes in fiscal policy today and anticipated in the future have an immediate effect on their decisions. Thus, changes in fiscal policy have a direct effect on consumption, investment, and labor supply. In the CMS model the staggered nominal wage setting is used to generate wage rigidities. Firms and workers who cannot reset their wage in a specific period adjust their wage by indexing it to the last period's change in prices.

Cogan, Taylor Wieland and Wolters (2013a, 2013b) examined several alternative fiscal consolidation strategies which tried to slow and stop the rise in spending. One example of their estimates of the impact of the budget consolidation on GDP, consumption, investment and net exports as a percent of the model's baseline is shown in Figure 13. Note that real GDP increases throughout the simulation. Even in the short-run, the consolidation strategy would boost economic activity in the private sector sufficiently to overcome the reduction in government spending. The extra impact in later years occurs as the delayed tax cuts take hold.



Estimated Impact of Fiscal Consolidation

Figure 13

The CBO currently estimates the impact of multi-year fiscal consolidation plans by combining a short-run Keynesian modeling approach with a long-run growth modeling approach. The Keynesian approach captures demand-side effects while the growth model captures supply-side effects due to changes in the capital stock and labor supply. Estimated output effects for the 1st, 2nd, 3rd, and 4th years of the consolidation plan have weights of 1.00, 0.75, 0.50, and 0.25, respectively, on the short-run model with the remaining weight on the long-run model. Estimates for the fifth year and beyond are based entirely on the long-run model. See Whalen and Reichling (2015) for more information. Obviously, the weights are rather arbitrary, and a single state-of-the-art model which combines these effects in a consistent way would be preferable. Nevertheless, the results are worth exploring

One of CBO's estimates of the effect of a multi-year fiscal consolidation on the percentage deviation of real GDP per capita from the baseline is shown in Figure 14. (See CBO (2016). According to the CBO, there is a negative demand-side effect in the short-run, but it is

quite small especially compared with the larger and continuing longer-run supply side effects. In contrast, the Cogan, Taylor, Wieland, and Wolters (2013a, 2013b) model shows that the short-run effects are all positive due largely to expectation effects. In any case, the CBO finds the overall impact of fiscal consolidation to be, on balance, very positive for economic growth.

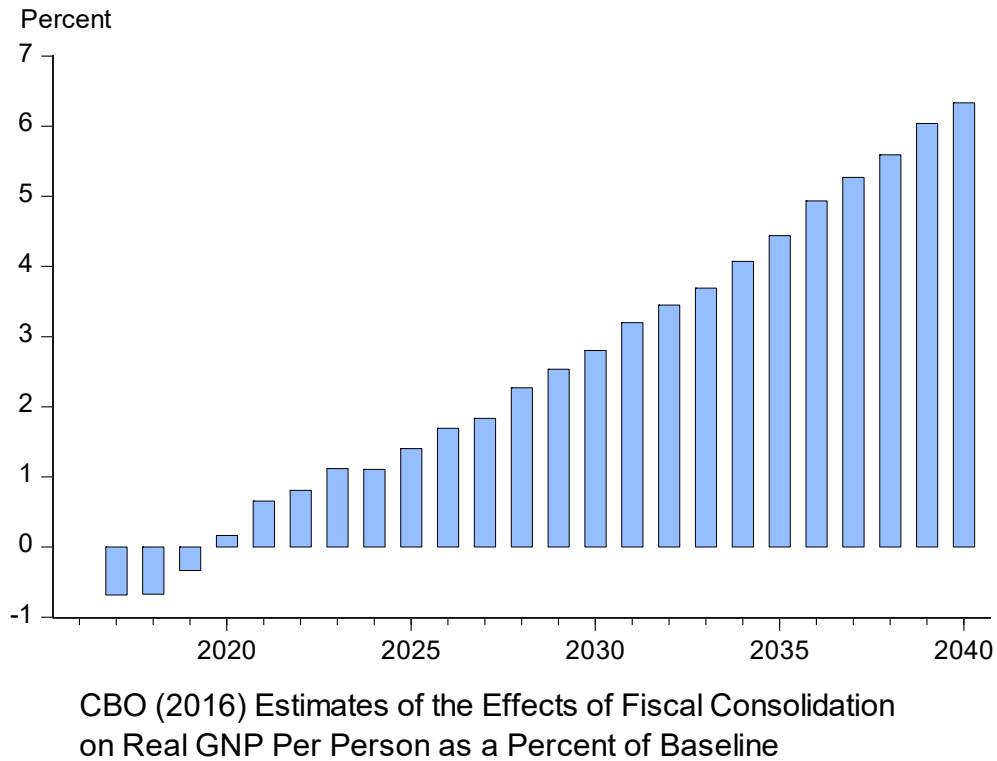


Figure 14

4. Conclusion

Despite claims that there is a consensus that stimulus packages worked to rescue the economy from the recession of 2007-09, the macro model simulations reexamined here indicate that the impacts of countercyclical stimulus programs were small. In addition, empirical examination of the direct macroeconomic effects indicate that they did not stimulate the

economy: Individuals and families largely saved the transfers and tax rebates; state and local governments used the stimulus grants to reduce their net borrowing (largely by acquiring more financial assets) rather than to increase expenditures, and they shifted expenditures away from purchases toward transfers. This conclusion about the impact of stimulus packages during the recession of 2007-2009 is very similar to the conclusion reached 40 years ago by Gramlich (1978, 1979) and others about stimulus packages in the 1970s.

In addition, we now have improved macro models that can be used to evaluate the impact of fiscal consolidation. These models show that gradual, credible reductions in the deficit through control of growth of spending can be beneficial to the economy in the short run and the long run.

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