# The Employment Effects of Fiscal Policy: How Costly Are ARRA Jobs? *

F. Gerard Adams
Department of Economics
University of Pennsylvania (Emeritus)

Byron Gangnes
Department of Economics and UHERO
University of Hawaii at Manoa

December 20, 2010
Working Paper No. 10-26

## Abstract

The American Recovery and Reinvestment Act was intended to stimulate the U.S. economy and to create jobs. But at what cost? In this paper, we discuss the range of potential benefits and costs associated with counter-cyclical fiscal policy. Benefits and costs may be social, macroeconomic, systemic, and budgetary. They may depend importantly on timing and implementation. There may be very different implications over the business cycle horizon and in the medium to long term. We use simulations of the IHS Global Insight macro-econometric model to evaluate some of these costs and benefits in the U.S. economy, looking specifically at the impact of the ARRA program and potential alternative policies.

**Keywords:** fiscal policy; employment; American Recovery and Reinvestment Act (ARRA); econometric model simulation.

**JEL classification:** E37, E62, E65

* We thank IHS Global Insight for allowing us to use their model. All responsibility for results and conclusions remains with us.

**The Employment Effects of Fiscal Policy: How Costly Are ARRA Jobs?**

Since the Employment Act of 1946 the U.S. Federal government has had an obligation, "to promote maximum employment, production and purchasing power." While this instruction has generally been followed during periods of recession, the effort made during the recent Great Recession, the American Recovery and Reinvestment Act of 2009 (ARRA), valued at $787 billion, far exceeded the scale and breadth of previous such efforts. However, there has been considerable concern that the stimulus program was costly, that it was not well timed, and that it did not produce enough jobs. The recovery to date has been weak, giving us what outgoing Obama economic advisor Larry Summers has called, "a statistical recovery and a human recession." At the time of this writing, Congress has just approved a new fiscal package that extends Bush era tax cuts and includes payroll tax relief, extended unemployment benefits and other stimulus. With public debt surging, there has been significant resistance to some aspects of the program.

How large is the effect of government stimulus spending on economic activity and on employment? How do these benefits compare with the scale of public spending? In this paper, we evaluate the cost and probable benefits of various types of stimulus expenditures that are either encompassed in the ARRA or that represent viable alternatives, with particular emphasis on the cost of creating jobs. While a formal cost-benefit analysis is extremely difficult, we can shed some light on the key issues and the relative magnitudes of policy impacts. Through simulation analysis, we can also consider

the all-important issue of timing: Does stimulus reach the economy when it is needed, or does it potentially overheat the economy after the recession period is over?

In the first part of the paper we consider the issues. Specifically, we consider the measurement of economic effects, including the GDP multiplier and the cost of each job created, the speed of implementation and effectiveness, and the likely continuation of beneficial (and/or adverse) effects after the stimulus expenditures have ceased.

In second part of the paper, we use the IHS Global Insight quarterly model of the U.S. economy as a framework in which to examine the impact of the ARRA program and alternative stimulus schemes.[1] We assess the overall macroeconomic impact of the ARRA program, and we discuss the differences in impacts and costs across its major component policies and alternatives that might have been included in a broader stimulus bill. With simulations, we hope also to measure the timing of the results and the impact after Federal government stimulus contributions have ended. The alternative stimulus programs to be considered range from Federal government spending and tax cuts to transfers to the states and individuals. Investment tax incentives are also considered.

We find that there are an array of potential costs and benefits that pose a substantial challenge to any comprehensive assessment of employment-focused government stimulus. Among alternative policies, government spending on consumption and investment have both a large and potentially rapid impact on the labor market, although the slow implementation during the ARRA demonstrates that practical impediments may be larger than traditionally believed. Direct transfers to states that are targeted at retaining jobs, a key component of the ARRA, have potentially large and rapid

[1] Other recent studies aimed at assessing the prospective or actual effects of the ARRA program include the semi-official estimates of Romer and Bernstein (2009), as well as Congressional Budget Office (2009), Blinder and Zandi (2010), Wilson (2010), Cogan *et al.* (2009), and Cogan and Taylor (2010).

effects, but the timing depends on how quickly they can be enacted and spent. While the long-run effects of investment tax credits are more significant than changes in current spending or taxes, near-term job creation would be very limited.

## Measuring Benefits and Costs of Fiscal Policy

*Output Effects: The GDP Multiplier*

The GDP multiplier has traditionally been the way to evaluate the impact of government expenditure programs on the aggregate economy. As students learn early in Econ 101, the multiplier can be derived from simple theoretical calculations. (Woodford, 2010). Unfortunately, the overly simplified presentations to which most people have been exposed produces a much higher value than a complete theoretical presentation or an evaluation through simulation of a fully articulated econometric model. As a result, many people are surprised to find that when the leakages and feedbacks of an economy are fully elaborated the short run expenditure multipliers are in the range of 1.0 for transfer payments or tax reductions to 2.0 or less for expenditure increases. The typical multiplier obtained for government expenditures from the latest version of the Global Insight quarterly model is in the range of 1.8 to 1.9. Blinder and Zandi (2010) report spending multipliers ranging from 1.1 to 1.7.[2]

Depending to varying degrees on the type of fiscal policy, multipliers build up gradually, over the span of a few quarters for expenditure programs and over a longer

[2] There has also been a vigorous debate about the size of fiscal policy multipliers Multiplier estimates from dynamic stochastic general equilibrium models are often found to be much smaller. See, for example, Cogan et al. (2009), Hall (2009). Some economists have argued that multipliers are well below 1 based on their reading of historical experience (see e.g. Barro and Redlick, 2010). Some discussion of these issues is included in Adams and Gangnes (2010) and Auerbach and Harris (2010).

time period for tax and transfer changes, and then recede thereafter. We will discuss the timing of macroeconomic responses in the IHS Global Insight model further, below.

*Employment Effects*

Effects on employment follow from the impact on production activity. The impact of increased demand on employment depends greatly on time. Because of the lag structure of employment determination with respect to changes in output, there will normally be small effects at first, building up to bigger impacts after output has been expanding for some time. Employment impacts also vary greatly depending on the nature of the stimulus expenditure. Investment projects have very different labor requirements than road repair or transfer payments, and as we will see there may be large effects for programs designed explicitly to prevent large-scale layoffs.

Changing technology can also have an impact on the extent of job creation associated with fiscal stimulus. In the 1930s, make work projects like WPA road building were largely handwork—numerous men "working" with shovels. Today, even road repairs are capital intensive, using heavy machinery and two or three workmen with substantial skills. The share of labor in many public construction projects is much smaller than it once was, making job creation more challenging. Another structural factor that may affect employment responses is the flexibility of labor markets; in the recent downturn firms were particularly aggressive in laying off workers, and they have been slow to hire as the recovery has gotten underway, at least in part due to greater reliance on temporary employment.

In order to make meaningful comparisons across policies of varying magnitude, employment impacts can be assessed using an *employment elasticity*, computed as the percentage change in employment for each 1% of GDP increase in the policy variable.

On the basis of the employment impact, it is possible to compute a "cost per job created" figure. Such a calculation divides the number of jobs created by the value of the expenditure stimulus. The latter can be computed as the gross value of the stimulus, i.e. the direct increase in expenditure or reduction in taxes introduced into the model solution, or alternatively on the basis of the budgetary impact, computed using the change of expenditure net of increased revenues.

Simplistic calculations based on total expenditure have been the basis for extravagant cost estimates by opponents of the ARRA package. An oft-cited calculation by minority members on the U.S. House Appropriations Committee (2009) takes the total size of the ARRA package and divides this by an Administration estimate of 3 million jobs created or saved to arrive at a per-job cost of $275,000. This crude estimate ignores the time frame over which money is paid out, as well as the endogenous response of the economy and government revenues to the fiscal policy. In the first case, for example, the $275,000 per job estimate is two-to-three times larger than plausible because it ignores the fact that program costs are distributed over several years, so that the appropriate annual cost per job is necessarily much lower. Secondly, the true cost in budgetary terms may be much lower than the nominal cost because of induced growth in the tax base.

While the focus here is on cost, it is almost certainly the case that benefits of job creation are underestimated, at least in the context of a significant recession. Unemployment entails costs that go well beyond forgone income and output, ranging

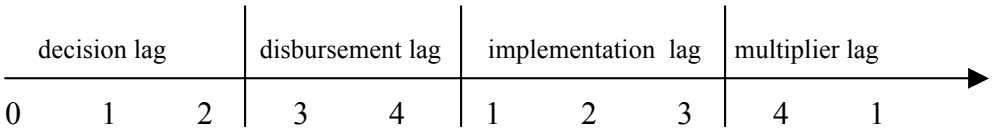
from social costs such as chronic poverty and increased substance abuse, to the loss of human capital, what Robert Gordon and others (1973) have called, "unlearning-by-not-doing."[3] These side effects of unemployment may reduce welfare and productivity for many years to come. In a deep and long downturn, like the one just experienced, the benefit from eliminating these side effects may be disproportionately large compared with a "normal" recession.

*Timing*

One of the difficulties with the ARRA program has been the delay in its implementation. In general, timing issues are a key aspect of macro policy, both the time required to make decisions about the expenditures and their disbursement, as well as the timing of the macroeconomic effects. The timing of stimulus can be decomposed into several components as shown in Figure 1. Only the implementation lag and the multiplier lag can be determined from model simulation, since decision and disbursement lags are not readily modeled econometrically. As a practical matter, it will generally also not be possible to distinguish the direct and the indirect effects in model simulations.

[3] There is an extensive literature addressing the incidence and cost of unemployment. While not attempting a comprehensive survey, we note that from the macroeconomic perspective Gordon et al. (1973), Feldstein (1978) and others have explored the extent to which foregone output (measured by *Okun's Law*) represents an appropriate estimate of the welfare cost of unemployment when benefits from leisure and productive job search are considered. In the tradition of Lucas (1987) and Clark et al. (1994), Douglas and Wall (2000) attempt to measure the welfare costs of unemployment based on revealed preference. At the microeconomic level, the large literature on job displacement (see the excellent survey by Kletzer, 1998) examines the nature of job losers and the follow-on effects on their future employment and earning. A number of papers looking at unemployment cost side effects are referenced in Trades Union Congress (2010).

**Figure 1. Timing of Stimulus Program**




We divide the time delays according to their origins as follows:

- Decision lag—the time lag associated with reaching the political decision, presumably up to the passage and effectiveness of legislation. This lag is unpredictable, at least for the economist, since it depends on the political process. (Note that monetary decisions made by the central bank are likely to have smaller lags than fiscal decision made by legislative authorities.)

- Disbursement lag—the time lags associated with disbursement of funds. Traditionally the assumption used to be that these lags would be short. Recently, the lags associated with ARRA have been quite long, in part because of allocation of funds to and by the states.

- Implementation lag—this lag involves the time until additional funds spent result directly in additional economic activity. The time delays involved here may be short but may differ between additional production activity and employment.

- Multiplier or indirect impact lag involves the response of other parts of the economy to the direct increase in expenditures.

*Hard Questions About Long-Term Effects*

An important consideration is the value of what is obtained for the expenditure. If spending consists of dollar bills dropped from a helicopter (a la Friedman), the budgetary consequences would be dollar per dollar on a gross basis and less on a net basis, though the real direct economic cost would be zero since no resources, except for paper (and fuel) are used. If government consumption is increased, there is also presumably no residual value. If, on the other hand, the money is spent on building new energy

infrastructure, the value of that infrastructure remains. Does this mean that expenditures should be evaluated on a net basis, offsetting the cost against the gain in GDP and the value of the asset that remains? Presumably yes, but valuing government investments is likely to be difficult and controversial.

A similar issue is what remains along other dimensions of the economy when the stimulus program is finished. For example, in the helicopter case what are the implications of the excess money supply that may remain after the close of the stimulus program? In the fiscal context, the pressing concern in this regard is the impact of current deficits on outstanding national debt. How burdensome will it be and how can this burden best be measured?

*Systemic Considerations*

A rationale for the broad Federal Reserve and U.S. Government response to the financial and economic crisis that erupted in 2008 was concern about the risk that large-scale corporate failures would have on the integrity of the financial and economic system itself. This is clearest in the case of the extensive (and expensive) bank bailouts, and in the industrial policy decision to bail out the automakers. These considerations played less of a role in discussions of fiscal policy, although certainly one can imagine a severe situation where policies to reduce unemployment could be viewed as essential to maintaining the basic fabric of the market economy.

**Simulating the ARRA and Policy Alternatives**

In this section, we use policy simulations to evaluate the economic impact of the ARRA program and to compare characteristics of alternative component policies. As suggested above, our primary focus will be on employment effects, although we will touch on other elements as well.

The economic effects are evaluated using the IHS Global Insight quarterly model of the United States economy. (IHS Global Insight, undated.) The IHS Global Insight model is a quarterly econometric forecasting and simulation system in the tradition of the Wharton models that describes the operation of the U.S. economy in great detail, encompassing over 1400 variables. While the model strives to incorporate the best insights of many theoretical approaches to the business cycle—Keynesian, new Keynesian, neoclassical, monetarist, and supply-side—it follows traditional lines in many respects. It is a modern Keynesian model with respect to the behavior of demand forces—consumption, investment, government spending, exports and imports—in the short run. It incorporates aspects of supply-side and neoclassical growth (Solow) with focus on the economy's supply side potential—labor force and productivity—in the long run. Inflationary forces are captured by an augmented Phillips curve, monetary factors and exchange rates. Prices adjust in response to gaps between production and supply potential and changes in the cost of inputs. The monetary sector determines the federal funds rate endogenously on the basis of the demand for money and the supply of reserves. Other interest rates are linked to this rate plus expected inflation, Treasury borrowing, and sectoral credit requirements.

International competitiveness influences exports and imports, which serve as the primary links to the international economic environment. Imports and exports are endogenous (eight categories of goods and service imports and exports are modeled with an additional goods category for oil imports). The exchange rate of the U.S. dollar, which critically affects competitiveness given domestic prices, is endogenously determined.

The IHS Global Insight model system is used regularly for forecasting and policy simulation. In our application of the system, we begin with a base solution, a recent forecast of the macroeconomy using the model. This serves as our baseline. Then we compute forecast alternatives, assuming changes in expenditures and taxes as in the proposed stimulus policy. The effects are reported as differences between the alternative solutions and the baseline.

*The ARRA Program*

We begin with a simulation of the overall ARRA program, a $787 billion package of tax cuts, transfers to persons and directly to state governments, and government spending.[4] The program was adopted in February 2009, with the bulk of the expenditures and tax benefits expected to be spent during 2009 and 2010, with some programs continuing into 2011 and beyond.

A problem from the start has been a relatively slow pace of outlays. While tax cuts happened quickly, much of the spending was to be disbursed by the states. This meant first that time was needed to allocate funds to the states. Once allocations were

[4] However, we exclude from this analysis the roughly $70 b. that represents an extension of middle class relief from the Alternative Minimum Tax. These extensions have become routine in recent years.

made the states were to disburse quickly to "shovel ready" projects. But few projects were ready, and administrative approvals and meeting environmental regulations took considerable time to accomplish. As a result, even those parts of the program that were intended for quick disbursement were delayed. The recession deepened before offsetting spending was in place. Moreover, a program that would have amounted to 5 percent of GDP if disbursed on a one-year basis, was spread over three years.

A summary of the ARRA program and estimates of the payout over the first six quarters is given in Table 1 and illustrated in Figure 2. The timing is based largely on Blinder and Zandi (2010), applied to our somewhat different estimates of the allocations of spending across categories. Note that while personal and corporate tax cuts were implemented quickly, and virtually all of these funds were used by the middle of the first year, progress on spending has been much slower, with only 38% paid out by that time.[5] If, in fact, multiplier impacts of spending are larger than for taxes, these delays are particularly worrisome.

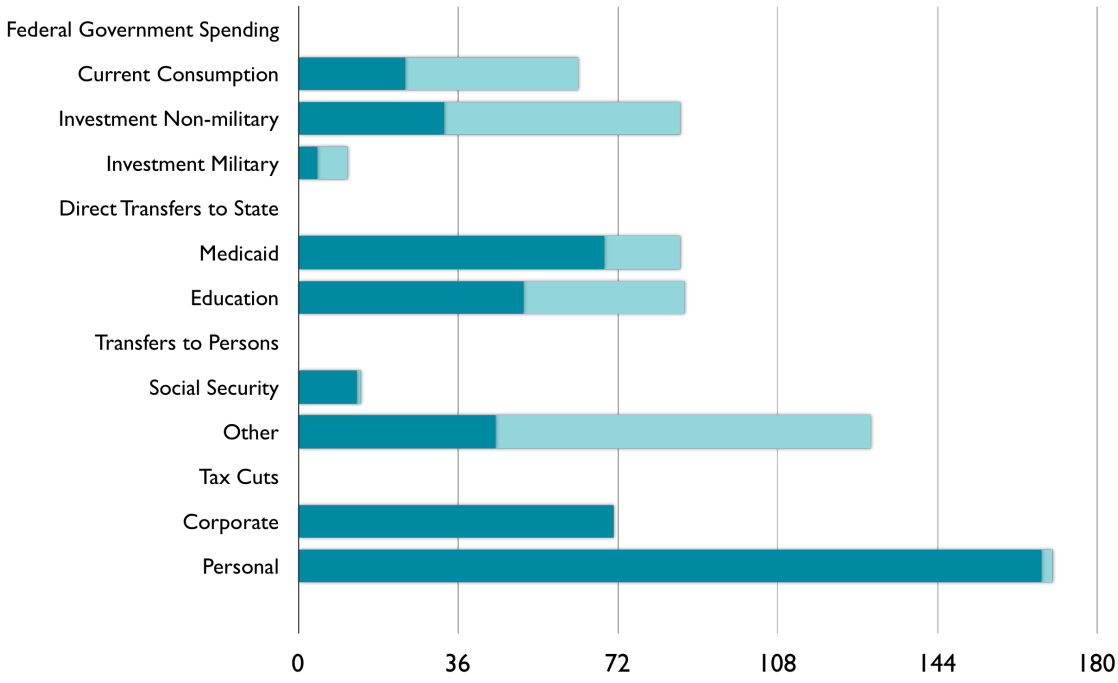
[5] In fact, delays may be even longer than these figures suggest because of slow spending by state governments of allocated funds. In Hawaii, for example, the state had received $1.3 billion in awards by mid-2010, but only $585 million of that money had been used. Roughly 75% of these expenditures were to shore up the unemployment insurance and Federal Medical Assistance (e.g. SCHIP and Medicaid) programs

Table 1. American Recovery and Reinvestment Act Estimated Spend Out Through 2010Q2

| | Total Authorized ($ billion) | Spending By Quarter | | | | | | Total Spent First 6 Qtrs | |
|---|---|---|---|---|---|---|---|---|---|
| | | 09Q1 | 09Q2 | 09Q3 | 09Q4 | 10Q1 | 10Q2 | ($ billion) | Percent |
| Federal Government Spending | | | | | | | | | |
| Current Consumption | 63 | 0.0 | 2.2 | 3.9 | 5.3 | 6.0 | 6.5 | 24.0 | 38% |
| Investment, Non-military | 86 | 0.0 | 3.0 | 5.4 | 7.3 | 8.2 | 8.8 | 32.8 | 38% |
| Investment, Military | 11 | 0.0 | 0.4 | 0.7 | 0.9 | 1.1 | 1.1 | 4.2 | 38% |
| Direct Transfers to State | | | | | | | | | |
| Medicaid | 87 | 10.0 | 14.9 | 13.1 | 12.6 | 9.0 | 9.3 | 68.9 | 79% |
| Other | 87 | 0.0 | 8.7 | 11.5 | 11.4 | 8.2 | 10.9 | 50.7 | 58% |
| Transfers to Persons | | | | | | | | | |
| Social Security | 14 | 0.0 | 13.1 | 0.0 | 0.0 | 0.0 | 0.0 | 13.1 | 94% |
| Other | 129 | 0.8 | 7.5 | 8.9 | 8.9 | 9.0 | 9.2 | 44.4 | 34% |
| Tax Cuts | | | | | | | | | |
| Corporate | 71 | 0.0 | 32.0 | 39.1 | 0.0 | 0.0 | 0.0 | 71.0 | 100% |
| Personal | 170 | 2.9 | 22.3 | 25.8 | 42.1 | 38.3 | 36.0 | 167.5 | 99% |
| Total | 718 | 13.7 | 104.2 | 108.3 | 88.6 | 79.8 | 81.9 | 476.5 | 66% |

Source: Authors' estimates based on Blinder and Zandi (2010); additional information from IHS Global Insight (2009), Wall Street Journal (2009), and Wikipedia.com.
Note: Excludes extension of alternative minimum tax relief.

**Figure 2. ARRA Allocations and Spend-out Through 2010Q2**




The economic impact of the ARRA program as simulated in the IHS Global Insight model is summarized in Tables 2 and 3. Table 2 shows the quarterly build up of impacts through 2010Q2, and Table 3 reports annual figures running out eight years.[6] The ARRA program raises output 3.1% above base by the second quarter of 2010, producing 2.8 million additional jobs by that time. (The employment impact peaks at 2.9 million jobs in the following quarter.) The unemployment rate falls below baseline by 1.3 percentage points. (See Figure 3.) These figures are similar to those obtained by other

[6] For the period beyond 2010Q2, we have assumed a pace of continued ARRA spending that exhausts direct transfers to states by the first half of 2011 and government spending by the first half of 2012. Total annual ARRA expenditures in our simulation are $315 billion in 2009, $249 b. in 2010, $94 b. in 2011 and $23 b. in 2012. The current pace of Federal transfer payments to individuals suggests that all ARRA monies will not be fully expended by the end of 2012. Details are available from the authors upon request.

Table 2. Effect on U.S. Economy of ARRA (First Six Quarters)
(Different from Baseline Unless Otherwise Indicated)

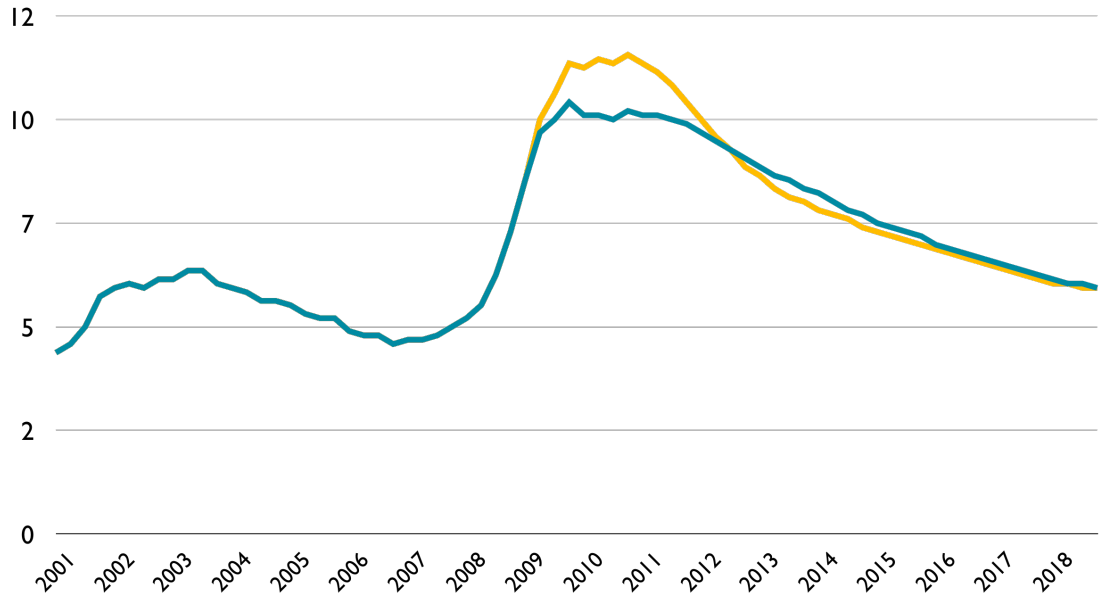
| | 2009Q1 | 2009Q2 | 2009Q3 | 2009Q4 | 2010Q1 | 2010Q2 |
|---|---|---|---|---|---|---|
| Real GDP | 32.5 | 163.6 | 251.1 | 349.8 | 389.5 | 422.5 |
| %Difference | 0.2 | 1.2 | 1.9 | 2.6 | 2.9 | 3.1 |
| Nominal GDP | 36.4 | 184.2 | 286.0 | 405.0 | 463.7 | 520.3 |
| %Difference | 0.3 | 1.3 | 1.9 | 2.7 | 3.1 | 3.4 |
| Employment | 0.1 | 0.8 | 1.4 | 2.0 | 2.3 | 2.8 |
| %Difference | 0.1 | 0.6 | 1.0 | 1.5 | 1.8 | 2.1 |
| Unemployment Rate | -0.1 | -0.3 | -0.6 | -0.9 | -1.1 | -1.3 |
| CPI Inflation (yr-yr) | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 |
| 10-Year T Note Yield | 0.0 | 0.2 | 0.3 | 0.4 | 0.5 | 0.5 |
| Federal Budget Balance | -11.4 | -95.5 | -95.8 | -66.7 | -51.7 | -49.9 |
| Ratio to GDP | -0.3 | -2.5 | -2.4 | -1.5 | -1.0 | -1.2 |
| Publicly held dedt | 10.4 | 98.9 | 196.9 | 265.5 | 317.8 | 367.7 |
| Ratio to GDP | -0.1 | -0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| Fed Govt Interest Payment | 0.2 | 2.0 | 7.6 | 15.4 | 23.7 | 31.0 |

Table 3. Effect on U.S. Economy of ARRA (Annual Figures)
(Different from Baseline Unless Otherwise Indicated)

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|
| Real GDP | 199.3 | 382.0 | 183.2 | -11.5 | -72.9 | -54.9 | -32.0 | -36.1 |
| %Difference | 1.5 | 2.8 | 1.3 | -0.1 | -0.5 | -0.4 | -0.2 | -0.2 |
| Nominal GDP | 227.9 | 483.9 | 332.6 | 192.1 | 206.6 | 306.6 | 403.1 | 462.8 |
| %Difference | 1.5 | 3.2 | 2.1 | 1.1 | 1.2 | 1.7 | 2.1 | 2.3 |
| Employment | 1.1 | 2.7 | 2.0 | 0.5 | -0.5 | -0.6 | -0.4 | -0.3 |
| %Difference | 0.8 | 2.0 | 1.5 | 0.3 | -0.3 | -0.4 | -0.3 | -0.2 |
| Unemployment Rate | -0.5 | -1.3 | -0.9 | -0.1 | 0.3 | 0.3 | 0.2 | 0.1 |
| CPI Inflation (yr-yr) | 0.0 | 0.3 | 0.4 | 0.4 | 0.5 | 0.4 | 0.4 | 0.3 |
| 10-Year T Note Yield | 0.2 | 0.5 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.4 |
| Federal Budget Balance | -269.4 | -119.3 | -38.5 | -103.1 | -153.4 | -178.5 | -132.4 | -77.3 |
| Ratio to GDP | -1.7 | -0.6 | -0.1 | -0.6 | -0.8 | -0.9 | -0.6 | -0.3 |
| Publicly held dedt | 142.9 | 363.9 | 410.2 | 485.1 | 622.0 | 794.3 | 950.2 | 1046.5 |
| Ratio to GDP | 0.0 | 0.3 | 1.1 | 2.1 | 2.7 | 3.1 | 3.4 | 3.4 |
| Fed Govt Interest Payments | 6.3 | 33.4 | 45.7 | 49.9 | 57.7 | 68.8 | 79.8 | 88.6 |

researchers, if on the low side. Romer and Bernstein (2009) estimated a net increase of 3.7% in output and 3.7 million in employment by the end of 2010. On an annual basis, Blinder and Zandi (2010) estimate that the ARRA (and some additional fiscal stimulus) will reduce the unemployment rate by 1.6 percentage points by 2011. The Congressional Budget Office (2010) has estimated a range of 0.7-1.5 percentage point reduction in the unemployment rate by the first quarter of 2010; our estimate of 1.1 percentage points for that quarter lies in the middle of that range.

**Figure 3. U.S. Unemployment Rate Path With and Without ARRA**




While these effects are substantial, it is important to view them in the context of the significant output gap that existed at the depth of the recession. Using CBO estimates of the natural rate of unemployment (about 5%) and an *Okun's Law* multiplier of 2, the U.S. economy had an output gap of about 10% at the end of 2009. This is consistent with the estimates used in the IHS Global Insight model. Other mainstream estimates are in

the 6-7.5% range (Kiley, 2010). In our simulations annual ARRA spending peaks at $315 billion in 2009, just over 2% of GDP in that year. Even with a substantial multiplier, spending on this scale can only be expected to close a fraction of the output shortfall.

The magnitude of multipliers in these model simulations presumably reflects in part their imposition during a period of extreme slack. The impact on interest rates is quite small (about 50 basis points on the long rate), reflecting both a minimal policy interest rate response and an even more modest rise in long rates. Presumably there is little resulting crowding out in this scenario, although this is difficult to assess because of the strongly pro-cyclical investment response.

The net effect on the Federal budget deficit is much smaller than the nominal program cost because of multiplier effects. By 2012, publically held debt rises by $485 billion, compared with nominal spending of $681 billion over that time frame. The debt/GDP ratio is just 2.1 percentage points higher than in the baseline. This implies relatively low per-job costs when the overall budget impact is considered, as we will see below.

Timing is an important consideration. Despite the slow pace of spending, our simulations suggest that there was significant job creation by the second half of 2009: employment was 2 million above base in the fourth quarter and the unemployment rate 0.9 percentage points lower. Most of this was due to tax cuts and direct transfers to states, since government consumption and investment were very slow to come on line.

As we have suggested above, one area of concern is the adverse impact on the economy of ARRA phase out over the next several years. As shown in Table 3, this does

represent a significant drag on the economy in the 2013-1015 period. Employment is 600,000 below baseline in 2014 and the unemployment rate three tenths of a percentage point higher. This is not severe enough to cause a new recession, but growth is certainly anemic during this period.

*Simulations of ARRA Components and Alternatives*

The limited macroeconomic effects of the ARRA reflect both the limited size of the overall program and the delays in implementation discussed above. They presumably also reflect the emphasis in the program on personal tax cuts and transfer payments as opposed to direct spending. In this section we consider the differential impacts of a set of fiscal policies, using standardized policy simulations. Our discussion will focus in particular on labor market effects, and will address the relative speed with which each policy is felt. The simulated policies include the following:

- FISGC—Federal government non-military consumption spending
- FISGI—Federal government non-military investment spending
- PTAX—Federal personal current taxes (lump sum)
- PTRF—Federal personal current transfers
- FTRST—Federal transfers to state governments
- ITC—Federal investment tax credit

Note that the first five simulations represent policies that form components of the ARRA package. The final simulation, of a broad-based investment tax credit, is considered as a potential alternative policy, of interest primarily because of its potential for persistent positive effects on capital formation and productivity. Each policy is implemented as a permanent shock. See the Appendix for details.

Table 4 reports standard real GDP multipliers for each of the alternative policies.

Table 4. Expenditure and Tax Multipliers
Chg(Real GDP)/Chg(Real Policy Var)

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|
| FISGC | 1.6 | **1.8** | 1.6 | 1.4 | 1.2 |
| FISGI | 1.5 | **1.8** | 1.6 | 1.5 | 1.4 |
| FTRST | 1.1 | **1.5** | 1.4 | 1.2 | 1.0 |
| ITC | 0.6 | 1.4 | 1.7 | **2.0** | 1.9 |
| PTAX | 0.6 | **1.1** | 1.1 | 1.0 | 0.9 |
| PTRF | 0.5 | 0.8 | **0.9** | 0.8 | 0.8 |

As one would expect, government spending—whether for consumption or investment—has a rapid and large multiplier effect, peaking at 1.8 in the second year of stimulus. Personal tax cuts and increases in transfer payments have smaller peak effects and also particularly weak effects in the first year. The predominance of tax and transfer measures in the ARRA (they account for more than half of all spending) explains in part the relatively small initial effects. Direct transfers to states fall between the expenditure and tax/transfer policies, with a multiplier greater than 1 in the first year, peaking at 1.5 in year two. The relatively rapid and potent effect comes from the fact that a portion of these transfers flows directly into job creation or maintenance at the state level.[7] (In the ARRA, these funds were expressly intended to support health care spending and to avoid state layoffs of teachers, although revenues are fungible.) Once job saving occurs, there are additional multiplier effects. The alternative policy of investment tax credits has a large impact, but its peak effect comes very late.

[7] Following Council of Economic Advisors (2009), we assume that of each dollar transferred to the states 30 cents is used to avoid state tax increases that would otherwise have occurred and 60 cents is used to prevent state expenditure cuts, with the remaining 10 cents used to avoid a more rapid drawdown of state rainy day funds. Of the expenditure change, we assume that half offsets layoffs and half is used to cushion cuts in state transfer payments, which are predominately Medicaid benefits. These assumptions generate larger effects than the model's normal endogenous response to Federal transfers, which generates much more delayed effects on output and especially employment. The latter seem unrealistic in the current environment where there is considerable pressure to avoid deep layoffs of state workers.

The employment effects of the policies are summarized in Tables 5 and 6. The table's *employment elasticities* give the percentage increase in employment resulting from a one-percent-of-GDP change in the policy instrument. Table 5 shows the response of employment over the first four quarters, with a five-year annual picture given by Table 6.

Table 5. Employment Elasticities (First Four Quarters)
Percent change in employment for each 1% of GDP increase in policy variable

| | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| FISGC | 0.4 | 0.7 | 1.0 | 1.1 |
| FISGI | 0.4 | 0.7 | 1.0 | 1.2 |
| FTRST | 0.5 | 0.7 | 0.9 | 1.0 |
| ITC | 0.0 | 0.1 | 0.3 | 0.5 |
| PTAX | 0.1 | 0.2 | 0.4 | 0.5 |
| PTRF | 0.1 | 0.2 | 0.3 | 0.4 |

Table 6. Employment Elasticities (Annual Figures)
Percent change in employment for each 1% of GDP increase in policy variable

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|
| FISGC | 0.8 | **1.4** | 1.4 | 1.2 | 0.9 |
| FISGI | 0.8 | 1.4 | **1.5** | 1.2 | 1.0 |
| FTRST | 0.8 | **1.3** | 1.3 | 1.2 | 0.9 |
| ITC | 0.2 | 0.8 | 1.0 | **1.1** | 1.0 |
| PTAX | 0.3 | 0.8 | **0.9** | 0.8 | 0.8 |
| PTRF | 0.2 | 0.6 | **0.7** | 0.7 | 0.6 |

The relative employment effects largely mirror the output effects of Table 4, but with a lag of about one year in most cases. This reflects businesses' tendency to delay hiring until revenue improvement is well underway. Job creation is faster for spending policies than for taxes and transfers. Investment tax credits have weak employment effects, presumably because of their bias toward capital inputs relative to labor. Direct transfers to states have employment effects similar to direct Federal spending. This

reflects in part our assumption of immediate employment effects on state worker payrolls, which may or may not be realistic in practice.[8]

*Measuring the Cost of Job Creation*

The employment responses and budgetary impacts from the model simulations can be used to calculate alternative measures of the cost of job creation. Table 7 reports the simple cost per job as the policy-related expenditure divided by the net increase in employment compared to the baseline. Data are reported both for the second year of the simulation (year one figures are exceptionally high because of the lagged response of employment to spending) and averages for a three-year period. In each case two costs are reported: (A) the cost measured as the increase in spending (the "nominal" cost) and (B) the cost measured as the change in the budget deficit.

Table 7. Annual Cost Per Additional Job Created
(includes induced private and public job creation)

| | Year 2 | | 3-year Average | |
|---|---|---|---|---|
| | A. Chg(Pol Var)/ Chg(empl) | B. Chg(Fed Defciit)/ Chg(empl) | A. Chg(Pol Var)/ Chg(empl) | B. Chg(Fed Defciit)/ Chg(empl) |
| FISGC | $83,700 | $28,900 | $101,600 | $48,100 |
| FISGI | 79,900 | 17,400 | 99,900 | 38,767 |
| FTRST | 91,200 | 25,700 | 109,067 | 43,500 |
| ITC | 143,900 | 74,100 | 239,333 | 170,200 |
| PTAX | 152,500 | 147,200 | 220,000 | 212,067 |
| PTRF | 200,100 | 143,000 | 278,400 | 213,033 |

The annual nominal cost per job for government consumption and investment is in the vicinity of $80,000 in year two and $100,000 for the three-year average. This

[8] In the composite ARRA simulation of Table 1 to 3, we assume some lag in employment effects because of state budgeting and expenditure lags.

accords with estimates used as guidance to Federal agencies in reporting ARRA impacts.[9] Council of Economic Advisors (2009) prescribes a figure of roughly $92,000 per job year. The CEA notes that while these may appear large compared with typical salaries, they implicitly include non-wage income and profit generated from the program. Costs-per-job are much higher for income taxes and transfers because of the late employment response and smaller multiplier effects. (It is not clear why the transfers cost is so much higher than for personal tax cuts.) For similar reasons an ITC is also a relatively expensive way to create new jobs—at least in the short run. Costs for the direct transfers to states are only a bit higher than for direct government spending.

The nominal cost estimates overstate the budgetary costs of stimulus policies. Net costs are much lower when we consider the effect of the induced rise in economic activity on the Federal tax base and revenues. Cost estimates fall by more than half to about $39,000 (three-year-average basis) for government investment and approximately $48,000 for government consumption. The cost of job creation (job saving in the ARRA context) through direct transfers to states is $43,500 in these simulations. Costs remain high for personal tax and transfer policies.

*Assessing Long-Term Implications*

Assessing the longer-term impacts of fiscal policies is complex and will be the subject of further work. One way to get a simple insight into the differing steady-state effects of alternative policies is to measure their effect on potential output a number of

[9] This is not altogether surprising, since it is likely that CEA estimates were based in part on information from IHS Global Insight. CEA (2009) reports that their multiplier estimates came from "averaging the multipliers for increases in government spending and tax cuts from a leading private forecasting firm and the Federal Reserve's FRB/US model" (page 11).

years down the road. Table 8 reports the percent deviation from base of real potential output five years out.

Table 8. Increase in potential GDP, Year 5
Percent change in potential GDP in year 5 for each 1% of GDP increase in policy variable

| | |
|---|---|
| FISGC | 0.2 |
| FISGI | 0.6 |
| FTRST | 0.2 |
| ITC | 1.1 |
| PTAX | 0.1 |
| PTRF | 0.0 |

In the model, potential output growth is driven by assumptions about full-employment labor force and productivity growth and endogenous growth of the capital stock through investment. Policies that fail to raise the productive capital stock cannot have steady-state effects on the real economy. So not surprisingly the only policies that raise potential output in these simulations are investment tax credits and to a smaller extent government investment. Of course this view is probably overly simplistic, since presumably government spending in other areas—including education, social safety net programs, and grants for research and development—would be expected to affect potential output through their impact on human capital or on technological know how. These channels are not modeled here.

The positive impact on potential output of public investment, or of programs that stimulate private sector investment, highlights an advantage of such programs as means of job creation. In fact, it provides an additional reason that simple pecuniary measures of stimulus cost per job likely overstate the cost of job creation. To the extent that public

programs add to productive capacity, the resulting output reduces the net cost of job creation compared to a case where job creation were entirely "make work."

As we suggested above, another important long-term issue is the debt burden left behind once a stimulus program has ended. A comparison of annual interest payments associated with each policy five years out is reported in Table 9. Accumulated debt and associated financing costs are higher for the relatively weak tax and transfer policies than with the more stimulative expenditure policies, particularly the investment-related policies. Note that while this direct budgetary cost may be most important to policymakers, the relative burdens would be lower if one took into account the implications of rising output for the interest expense as a ratio to GDP.

Table 9. Increase in Federal Interest Cost, Year 5
Change in federal interest payments in year 5 for each 1% of GDP increase in policy variable
(Billions of 2005 dollars)

| | |
|---|---|
| FISGC | 31.0 |
| FISGI | 22.3 |
| FTRST | 33.4 |
| ITC | 22.0 |
| PTAX | 49.3 |
| PTRF | 48.5 |

**Conclusions**

In this paper we have explored the issue of job creation by fiscal policy. After reviewing the major issues, we have tried to obtain empirical estimates of job costs using simulations of the IHS Global Insight quarterly U.S. model. We have evaluated the impact of the large ARRA program adopted in 2009, and we have assessed the relative

impacts of the major component policies as well as an investment tax credit alternative. Consistent with a number of other estimates, we find that Federal spending on government consumption and investment has a larger and more immediate impact on output and employment than the tax cut and transfer programs that represented a significant part of the ARRA programs. However, the slow pace of "spend out" under the ARRA suggests that there are important practical impediments to a timely spending response. An investment tax credit alternative would have large long-run effects but would be a poor option from the standpoint of near-term job creation. Direct transfers to states have potentially large and immediate employment impacts; the inclusion in the ARRA of monies to relieve state fiscal distress was one of the relative success stories of the recent U.S. fiscal policy exercise.

While we have measured the nominal and budgetary costs of job creation, we have largely sidestepped the more difficult question of whether these new jobs are "worth it." Are these costs outweighed by net benefits to society from the spending? In some sense, one could argue that any macro policy with a multiplier greater than one meets this test, since the program more than pays for itself in higher output. But this ignores the fact that there will be opportunity costs if public expenditure crowds out private activity (this is of less concern in a deep downturn than in more "normal" times). In the present politically difficult budget climate there are also very real opportunity costs in that any particular fiscal expenditure very likely means some other program will not be funded. While it seems unlikely that a completely satisfactory cost-benefit accounting can be done for these broad macro policies, these issues nevertheless require a great deal more thought.

Another issue that deserves further attention is the long-term fiscal cost of job creation under these fiscal programs. The direct interest cost is straightforward; estimating real impacts through higher borrowing costs, inflationary pressure, or borrowing premia will be more difficult to assess.

Standing in late-2010, it is clear that the recovery to date has been sub-par, and the labor market in particular is likely to remain weak for a number of years. Additional government stimulus may yet be needed. This research demonstrates that alternative policy options have very different implications for the extent of job creation, as well as the associated costs and long-term effects.

**References**

Adams. F. Gerard and Byron Gangnes (forthcoming), "Why Hasn't the U.S. Economic Stimulus Been More Effective? The Debate on Tax and Expenditure Multipliers," *World Economics* Volume Vol. 11, No. 4.

Auerbach, Alan J. and William G. Gale (2010), "Activist Fiscal Policy," *Journal of Economic Perspectives* Vol. 24, No 4, Fall.

Barro, Robert and Charles Redlick (2010), "Stimulus Spending Doesn't Work," *The Wall Street Journal*, undated, http://online.wsj.com/article/SB10001424052748704471504574440723298786310.html. Accessed Oct. 5, 2010.

Blinder, Alan S. and Mark Zandi (2010), "How the Great Recession was Brought to an End." New York: Moody's Inc.

Clark, Kenneth, Derek Leslie and Elizabeth Symons (1994), The Costs of Recession," *The Economic Journal*, January, pp. 20-36.

Cogan, John, Tobias, Cwik, John B. Taylor and Volker Wieland (2009), "New Keynesian versus Old Keynesian Government Spending Multipliers", CEPR Discussion Paper 7236, March.

Cogan, John and John Taylor (2010), "What The Government Purchases Multiplier Actually Multiplied in the 2009 Stimulus Package," NBER Working Paper 16505, October.

Congressional Budget Office (2009), "Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output as of September 2009," November. http://www.cbo.gov/ftpdocs/106xx/doc10682/Frontmatter.2.2.shtml. Accessed Oct. 5, 2010.

Council of Economic Advisors (2009), "Estimates of Job Creation From The American Recovery And Reinvestment Act of 2009," May.

Douglas, Stratford and Howard J. Wall (2000), "The Revealed Cost of Unemployment," Federal Reserve Bank of St. Louis *Review*, March/April, pp. 1-10.

Feldstein, Martin (1978), "The Private and Social Costs of Unemployment," The *American Economic Review Papers and Proceedings*, Vol. 68, No. 2, May, pp. 155-158.

Gordon, Robert J., William Nordhaus and William Poole (1973), "The Welfare Costs of Higher Unemployment," *Brookings Papers on Economic Activity*, Vol. 1973, No. 1, pp. 133-205.

Hall, Robert E. (2009), "By How Much Does GDP Rise if the Government Buys More

Output?" *Brookings Papers on Economic Activity* 2009:2, pp. 183-249

IHS Global Insight (undated), "Global Insight model of the U.S. economy," Lexington, Massachusetts.

IHS Global Insight (2009), "Fiscal Stimulus and the U.S. Economic Outlook: March Update," April 3.

Kiley, Michael T. (2010), "Output Gaps," Finance and Economics Discussion Series 2010-27, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C. http://www.federalreserve.gov/pubs/feds/2010/201027/201027pap.pdf (Accessed Oct. 7, 2010.)

Kletzer, Lori G. (1998), "Job Displacement," *The Journal of Economic Perspectives*, Vol. 12, No. 1, Winter, pp. 115-136.

Lucas, Robert E. (1987), *Models of Business Cycles*. Blackwell.

Romer, Christina and Jared Bernstein (2009), "The Job Impact of the American Recovery and Reinvestment Act," January. http://otrans.3cdn.net/45593e8ecbd339d074_l3m6bt1te.pdf. Accessed October 5, 2010.

Trades Union Congress, United Kingdom (2010), "The Costs of Unemployment," briefing, Economic and Social Affairs Department, March.

U.S. House Committee on Appropriations, Republican (2009), "Quick Facts on the Democrat Stimulus Proposal," January 15. http://republicans.appropriations.house.gov/index.cfm?FuseAction=PressReleases.Detail&PressRelease_id=64 Accessed October 10, 2010.

Wall Street Journal (2009) "What's in the Stimulus Bill?" February 17. http://online.wsj.com/public/resources/documents/STIMULUS_FINAL_0217.html. Accessed October 5, 2010.

Wilson, Daniel J. (2010), "Fiscal Spending Jobs Multipliers: Evidence from the 2009 American Recovery and Reinvestment Act," Federal Reserve Bank of San Francisco Working Paper 2010-17, September. http://www.frbsf.org/publications/economics/papers/2010/wp10-17bk.pdf . Accessed October 3, 2010.

Woodford, Michael (2010), "Simple Analytics of the Government Expenditure Multiplier, Columbia University, June 13, 2010.

## Appendix. Description of Policy Scenarios

In all cases, the default Federal Reserve reserve targeting rule is used, exchange rates are endogenous.

FISGC—$100 billion (2005 chained dollars) permanent increase in Federal government non-military consumption spending (exogenous assumption GFCOR)

FISGI—$100 billion (2005 chained dollars) permanent increase in federal government non-military investment spending (exogenous assumption GFOGIR)

PTAX—Approximately 1 percentage point reduction in the effective average Federal personal income tax rate; no change in marginal rates. (Implemented using TXREBSUR policy lever.)

PTRF—Permanent $100 billion increase in Federal transfers to persons: $50 b. in Social Security transfers (YPTRFGFSISS), $50 b. in other Federal transfers to persons (YPTRFGFO). Implemented as addfactor adjustments.

FTRST— Permanent $100 billion increase in Federal transfers to states: $50 billion in Medicaid funds and $50 billion in other Federal transfers. (Implemented as corresponding increase in real transfers variables GFAIDSLSSMEDR and GFAIDSLOR.) Assume states allocate $30 b. to Medicaid transfers (YPTRFGSLPAM, exogenized), $30 b. as a state personal income tax cut (TXPGSL, exogenized) and $30 b. as increase in state payroll spending (corresponding change to real variable GSLCWSSR, exogenized; deflator JPGSLCWSS also exogenized). See footnote 7 for discussion. Some endogenous growth in nominal values occurs in the model.

ITC—5 percentage point increase in Federal investment tax credit. Gradually phased out beginning in year 6 to avoid model divergence. Software category excluded because of model instability.

ARRA Simulation—Combines component policies above, other than ITC, scaled to reflect magnitude and timing as summarized in Table 1. Also includes cuts in effective corporate tax income tax rate (using lever RTXCGFRES). State payroll spending component of FTRST effect phased in over first several quarters.