

**EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS**



**ESTIMATES OF JOB CREATION FROM THE
AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009**

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The American Recovery and Reinvestment Act (ARRA) was designed to save and create jobs, as well as to cushion the economic downturn and make crucial public investments. At the time of passage, the Council of Economic Advisers (CEA) made estimates of the employment effects of the Act for the economy as a whole. As the money is being distributed by the various agencies, there is interest in estimates of the likely jobs effects of the individual pieces. Of course, as projects swing into action, the government will gather actual data on reported job creation. This report describes the estimating procedures used so far; specifies procedures to be used by recipients for estimating job creation going forward; discusses reporting requirements for job creation; and describes the procedures the CEA will use to evaluate the job creation and retention benefits of the ARRA going forward.

I. AGGREGATE ESTIMATES OF THE JOB IMPACT OF THE ARRA

The methodology used to estimate the job impact of the ARRA was described in detail in Romer and Bernstein (Obama Transition Document, January 11, 2009). In this section we briefly summarize the methodology and discuss the results.

Methodology

The ARRA of 2009 had a total fiscal impact of \$787 billion. The individual components fall into six broad categories: individual income tax cuts; a two-year patch to the alternative minimum tax; investment incentives; aid to people directly hurt by the recession; state fiscal relief, and direct government investment spending. At the time of passage, we took the best estimates available of the total amount of spending in each of these categories. We used Office of Management and Budget (OMB) estimates to specify the likely spend-out, by quarter, of each broad category.

To estimate the likely impact of the fiscal stimulus package on real GDP, we used multipliers that we feel represent a consensus of a broad range of economists and professional forecasters. Our particular multipliers for an increase in government purchases of 1% of GDP and a decrease in taxes of 1% of GDP are given in the Appendix. They are broadly similar to those implied by the Federal Reserve's FRB/US model and the models of leading private forecasters, such as Macroeconomic Advisers.

The final step is to take the effect on GDP and translate it into job creation. Not all of the increased output reflects increased employment: some comes from increases in hours of work among employed workers and some comes from higher productivity. We therefore use the relatively conservative rule of thumb that a 1 percent increase in GDP corresponds to an increase in employment of approximately 1 million jobs, or about three-quarters of a percent. This has been the rough correspondence over history and matches the FRB/US model reasonably well. The effect on jobs using the estimates from most private sector forecasting models would be somewhat larger. The effects on employment, however, lag slightly those on real GDP. To capture the usual pattern, we assume that one-half of the employment effect occurs in the contemporaneous quarter, one-third occurs in the subsequent quarter, and one-sixth in the quarter two quarters ahead.

Estimated Job Creation at Different Horizons

The results of this analysis show the effects on employment, relative to the no-stimulus baseline, in each quarter of the current and next several years. The Administration has summarized the results by looking at the number of jobs (relative to the baseline) as of 2010Q4. Our finding was that the ARRA would increase employment relative to the baseline in this quarter by approximately 3.5 million. Table 1 shows the estimated impact as of the fourth quarter of each of the current and next three years. This table shows that the jobs attributable to the recovery package rises over 2009 and 2010, as the stimulus increases, and then falls as the fiscal stimulus is withdrawn.

Table 1
Estimates of Jobs Saved or Created by the ARRA of 2009 at Different Times

<u>As of the 4th Quarter of</u>	<u>Average for the Year</u>
2009 1.5 million	2009 0.7 million
2010 3.5 million	2010 3.0 million
2011 1.7 million	2011 2.5 million
2012 0.3 million	2012 0.7 million

The results for each quarter can also be averaged over the year. The results of this exercise are also shown in Table 1. The numbers in the second column show the average impact on employment over the year (relative to the baseline) of the ARRA.

Total Job-Years Created

For some purposes, looking at the effects at a single point in time is not the most useful approach. Since the economy is likely to be operating below capacity for several years, job creation any time over the next several years is valuable. Thus, a second way to look at the employment effects of the program is to estimate the number of *job-years* the program will create over the President's first term. A job-year means simply one job for one year.

To estimate the impact of the ARRA in terms of job-years, one simply adds up the average jobs created per year over the total number of years. Two statistics summarizing the estimates are presented in Table 2. The first is the familiar estimate that the ARRA will save or create approximately 3.5 million jobs as of the fourth quarter of 2010. The other is an estimate that the Act will save or create about 6.8 million job-years by the end of 2012. This estimate is obtained by simply adding the estimates of the amount the program will increase average employment in each of 2009, 2010, 2011, and 2012. (The slight difference between the 6.8 million figure and what one obtains by summing the numbers reported in Table 1 is due to rounding.)

Table 2
Estimates of the Overall Jobs Effects of the ARRA of 2009

Jobs Created in 2010Q4	3.5 million
Job-Years Created through End of 2012	6.8 million

II. JOBS ESTIMATES FOR INDIVIDUAL PROGRAMS AND AGENCIES

Different elements of the program have quite different spending patterns. For example, some of the elements that provide assistance to individuals directly hurt by the recession will have substantial spending in 2009, while some of the elements that emphasize long-term investment will have significant spending in 2011. Given the projected weakness in the economy, job creation in both years is very valuable. But, because the time patterns are so different, there is no single quarter one can focus on that provides a useful summary of how each piece is contributing to overall job creation. For that reason, in looking at a specific part of the program, it is more helpful to look at the employment effects in terms of total job-years over the next four years. The Administration will therefore focus on job-year figures for specific parts of the program. For the program as whole, in contrast, it is helpful to consider the employment effects both as of 2010Q4 and in terms of total job-years, and the Administration will emphasize both measures.

Job-Years Created by Different Types of Stimulus

To estimate the job-years created by different types of fiscal stimulus, we simulate the macroeconomic model. We consider the three main types of fiscal stimulus: government spending, a tax cut, and state fiscal relief. In each case, we simulate a change of \$100 billion in fiscal year 2009. The model uses a plausible assumption about the distribution of the spending or tax reduction over the fiscal year. This simulation shows the job-years created by \$100 billion of a type of fiscal stimulus by the end of 2012. The results of this simulation are given Table 3. The results show that a dollar of government spending creates roughly 1.6 times as many job-years as a dollar of tax cuts and 1.3 times as many job-years as a dollar of state fiscal relief. These numbers are a reflection of the different multipliers used in the simulation.

Table 3
Estimates of Job-Years Created by Different Types of Fiscal Stimulus

\$100 billion of government spending creates 1,085,355 job-years

\$100 billion of tax cuts creates 687,991 job-years

\$100 billion of state fiscal relief creates 857,610 job-years

These simulation results can also be used to give an estimate of the approximate amount of spending it takes to create a job-year for different types of stimulus. To derive these estimates, one just divides \$100 billion by the estimated number of job-years. The results are given in Table 4. They suggest that the spending needed per job-year is noticeably higher for tax cuts than for state fiscal relief or direct government spending.

Table 4
**Estimates of Spending Needed to Create 1 Job-Year
for Different Types of Fiscal Stimulus**

Government spending: \$92,136 per job-year

Tax cuts: \$145,351 per job-year

State fiscal relief: \$116,603 per job-year

Guidance to Agencies on Estimating Job-Years from Government Spending

The estimates for the job-years created by direct government spending indicate that it takes approximately \$92,000 of spending to create one job-year. Thus, for example, if increased spending in one portion of the program through the end of 2012 is \$11 billion, that spending will create about 120,000 job-years during the President’s first term.

Since most workers earn much less than \$92,000 a year, the figure of \$92,000 per job-year may seem large. The source of the gap between average wages and the cost per job-year is that the increase in GDP resulting from stimulus does not all take the form of wages for newly-employed workers. Some workers switch from part-time to full-time; some find their existing time at their jobs more fully utilized; and some add overtime. Further, there are increases in compensation costs other than wages, and in rents, profits, and other types of non-compensation

income. A useful comparison is that the ratio of annual GDP to total employment in the economy is about \$105,000. Thus, a figure of \$92,000 per job-year is plausible and represents a very reasonable “bang for the buck.”

Agencies often breakdown job-year estimates into three categories:

- Direct jobs, which are the job-years created in the actual government-sponsored project.
- Indirect jobs, which are the job-years created at suppliers who make the materials used in the project.
- Induced jobs, which are the job-years created elsewhere in the economy as increases in income from the direct government spending lead to additional increases in spending by workers and firms.

Both indirect jobs and induced jobs are entirely in the private sector. Some direct jobs may represent workers hired directly by the government. But, for the American Recovery and Reinvestment Act, we anticipate that the vast majority of these are private sector jobs at firms working under contract on government projects or receiving grants or tax incentives for particular activities, such as weatherization.

The macroeconomic methodology used to derive the aggregate jobs estimates provides only an imperfect way to try to separate out the different types of jobs created by government spending. In particular, we are able to separate the direct and indirect jobs (together) from the induced jobs. To do this, we assume that the direct and indirect output effects of government spending move one-for-one with spending. That is, each dollar spent goes one-for-one into GDP. We then use the usual rule of thumb that a 1% rise in GDP creates 1 million jobs (distributed over three quarters) to estimate the direct and indirect jobs of a type of spending. The induced jobs are estimated as the difference between the total jobs created and the estimate of the direct and indirect jobs. For a typical government spending project, we find that 64% of the job-years created by government spending represents direct and indirect effects of the spending, and the remaining 36% represent induced effects.

In estimating the job-years created by direct government spending, agencies will be asked to use the simple rule that \$92,000 creates one job-year. This procedure is somewhat crude and does not take into account the obvious differences in wages and other costs across different types of projects and across different parts of the country. It does, however, take into account the key difference between tax changes or state fiscal relief, and direct government investment spending. The rule’s key virtue is its simplicity and conservatism. Because it is derived to be consistent with the macroeconomic jobs estimates, it minimizes discrepancies between the aggregate jobs estimates and those agency by agency. Also, since the main focus of the agencies will be on actual reporting of jobs created and retained, this simple procedure minimizes the resources devoted to the early job estimation.

Table 5
Simple Rule for Estimating Job-Years Created by Government Spending

\$92,000 of government spending creates 1 job-year

64% of the job-years represent direct and indirect effects

36% of the job-years are induced effects

III. REPORTING ACTUAL DIRECT JOB CREATION

All recipients of recovery funds for government investment are required to report the jobs retained or created by the funds. These reports will provide information on the direct job creation and retention of this crucial piece of the ARRA. This information will be useful in the overall evaluation of the employment effects of the act.

General Reporting Guidelines

OMB guidelines for reporting jobs created or retained are under review and will be released shortly. This report describes the general approach that will be in the guidelines.

- Primary recipients are required to report an estimate of jobs directly created or retained by project and activity or contract. Grant recipients should report on the employment impact of sub-recipients. Recipients should not attempt to report on the employment impact on materials suppliers (so called “indirect” jobs) or on the local community (“induced” jobs).
- A job created is a new position created and filled; a job retained is an existing position that would not have been continued were it not for ARRA funding. Only compensated employment should be reported.
- The number of jobs should be expressed as “full-time equivalents (FTEs),” which is calculated as total hours worked in jobs created or retained divided by the number of hours in a full-time schedule, as defined by the recipient.
- The number reported should represent a reasonable average of FTE’s created and retained for the quarter. Such an estimate would ideally be done by taking FTE’s for each pay period in the quarter and averaging them. It could also be done at a single point in time, as long as care is taken that the single point is representative of the quarter.

- A brief description of types of jobs created or retained should be provided.

Checks of Reported Job Creation

As the recipient reports are received, agencies, OMB and CEA will check the data for completeness and plausibility. This process will involve numerous steps, including:

- Comparing reports of similar projects in different locations to identify obvious outliers.
- Comparing recipient reports to other labor market indicators for the area.
- Comparing recipient reports of job creation with estimates of expenditures and local wage rates to test for consistency.

In cases where the results appear to be problematic, agencies will ask the reporting recipient for more information and, if necessary, revisions to the reporting methodology.

Results of the Reporting Requirements

Once the jobs reports have been appropriately checked and revised if necessary, they will provide information on the jobs directly created or retained by the portions of the American Recovery and Reinvestment Act covered by the reporting requirements. We will thus have some independent documentation of jobs created or retained by the Act.

While such independent documentation is immensely valuable, it is important to be aware of the limitations of the reported jobs numbers. Among the factors that need to be considered are:

- The direct reporting requirements only cover about one-third of the recovery funds. The ARRA included roughly \$271 billion in direct government investment spending. As described above, the rest of the fiscal stimulus took the form of tax cuts, state fiscal relief, and transfer payments to people directly hurt by the recession. There is no mechanism available for collecting data on actual job creation from these parts of the Act.
- The recipient reports will show the number of jobs recipients retain or create. These are what are typically referred to as “direct” jobs. Some of the spending will go to the providers of materials, such as cement or asphalt for a road construction process. The reports will typically not have information on the jobs created at suppliers (so-called “indirect” jobs). The reports will certainly not have information on the jobs created throughout the community as employed workers buy other goods and services (“induced” jobs). Thus, the reports will only provide information on a fraction of the jobs that will be created even by the government spending portion of the Act.
- There will likely be inconsistencies and measurement error across the individual reports. This limitation is present whenever thousands of recipients with very different types of projects are asked to provide information. The problem is heightened by the fact that the

funds will be allocated in a wide variety of formats. Some will be managed by the federal government, some will be run by state governments, and some will be distributed and managed as grants. As a result, the level at which the job reporting is done and how far down the sub-recipient chain the reports go will be highly variable. This will likely cause some inconsistencies in the job reports, which must be anticipated.

Because of these limitations, the reported jobs numbers will need to be used with caution and as part of a more complex estimation strategy.

IV CEA QUARTERLY REPORTS ON JOB CREATION

The ARRA requires the Council of Economic Advisers to report to Congress each quarter on the employment effects of the Recovery Act. The first report is due in August 2009 and will cover the full first quarter under the Act. While the methodology we will use to do this report will surely evolve as we gain experience and gather additional information, we anticipate using the following methods and approaches.

First, it will be important to check the spending assumptions underlying our original estimates. The estimates assumed a certain timing pattern for when spending would reach recipients and when tax cuts would show up in household disposable income. Actual data on spending and tax cuts are being collected weekly by OMB and the Treasury. We will compare these data to our assumptions. We will then rerun our forecasting model using the actual, rather than projected spending and tax change data.

Second, we will use the job data reported by recipients described in Section III to check and update our estimates. This procedure is more complicated than it might appear because of the limitations of the reporting data. The reports only cover direct jobs, whereas our estimation procedure currently does not separate direct and indirect job creation. For this reason, we will need to use extensive microeconomic analysis of the composition of typical government spending projects to estimate the breakdown of job creation into the amount occurring with the primary contractor and the amount occurring with suppliers. Once this is accomplished, we will compare our estimates of direct job creation based on the forecasting model with the reported direct job creation information. We will report new aggregate job estimates including the available reported data.

Third, our analyses will include a number of important checks on the quarterly estimates. One macroeconomic check will be to compare aggregate measures of employment at the reporting date to a number of baseline forecasts (without stimulus) done at the time the act was passed. This is a way to quantify whether employment is higher than it otherwise would have been, and thus provides empirical rigor to the jobs estimates at the time of passage. Of course, many other macroeconomic developments will affect employment and could render the February baseline forecasts inaccurate. But, this is an exercise that should be done despite its likely large margin of error.

A useful microeconomic check that we will do is to use detailed county-level employment data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages. These data show detailed employment by industry for each county. For key areas where we have spending data isolated by county, we will use this to check both our estimates of jobs created and the direct reports. This county-level analysis can help show how much recovery spending increases employment in a sector overall versus how much reflects a shift of employment from private to recovery projects.

APPENDIX

Multipliers for Different Types of Spending

For the output effects of the recovery package, we started by 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. The two sets of multipliers are similar and are broadly in line with other estimates. We considered multipliers for the case where the federal funds rate remains constant, rather than the usual case where the Federal Reserve raises the funds rate in response to fiscal expansion, on the grounds that the funds rate is likely to be at or near its lower bound of zero for the foreseeable future. The multipliers for conventional tax cuts and spending increases are given in the table below.

Output effects of a permanent stimulus of 1% of GDP (percent)

<u>Quarter</u>	<u>Government Purchases</u>	<u>Tax Cuts</u>
1	1.05	0.00
2	1.24	0.49
3	1.35	0.58
4	1.44	0.66
5	1.51	0.75
6	1.53	0.84
7	1.54	0.93
8	1.57	0.99
9	1.57	0.99
10	1.57	0.99
11	1.57	0.99
12	1.57	0.99
13	1.57	0.99
14	1.57	0.99
15	1.57	0.99
16	1.55	0.98

We applied these multipliers directly to the straightforward elements of the package. We made adjustments to the multipliers for elements that take the form of transfers to the states, the patch to the alternative minimum tax, and tax-based investment incentives.

- For transfers to the states, we assumed that 60% is used to prevent spending reductions, 30% is used to avoid tax increases, and the remainder is used to reduce the amount that states dip into rainy day funds. Thus, we created a new multiplier that was a weighted average of the two above, with a weight of 0.6 on the spending multiplier and 0.3 on the tax multiplier. We assumed that these effects occur with a one quarter lag.

- Because a patch to the alternative minimum tax was surely largely anticipated by the households affected, it is unlikely that this particular tax cut had the same impact as a fresh, permanent reduction in taxes. For this reason, we reduced the multiplier for this portion of the package. We created a new multiplier that was calculated as 0.5 times to conventional tax multiplier.
- For tax-based investment incentives, we used the rule of thumb that the output effects correspond to one-fourth of the effects of an increase in government spending with the same immediate revenue effects. This implies a fairly small effect from a given short-term revenue cost of the incentives. But, because much of the lost revenue is recovered in the long run, it implies a fairly substantial short-run impact for a given long-run revenue loss. We confess to considerable uncertainty about our choice of multipliers for this element of the package.