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Distributional Impact of the American Recovery and Reinvestment Act: A Microsimulation Approach

by

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ABSTRACT

Over the last two decades, those at the bottom of the income scale have seen their incomes stagnate, while those at the top have seen theirs skyrocket. Without intervention, the recession that began in December 2007 was likely to exacerbate this trend. Will the American Recovery and Reinvestment Act of 2009 (ARRA) be able to keep the situation from getting worse for those at the bottom of the income scale? Will ARRA reverse the upward trend in inequality that we have seen in the recent past? We employ a microsimulation of ARRA to address these questions. We find that, despite a large amount of job creation, ARRA is likely to have little impact on overall income inequality, or on the income gaps between relatively advantaged and disadvantaged groups.

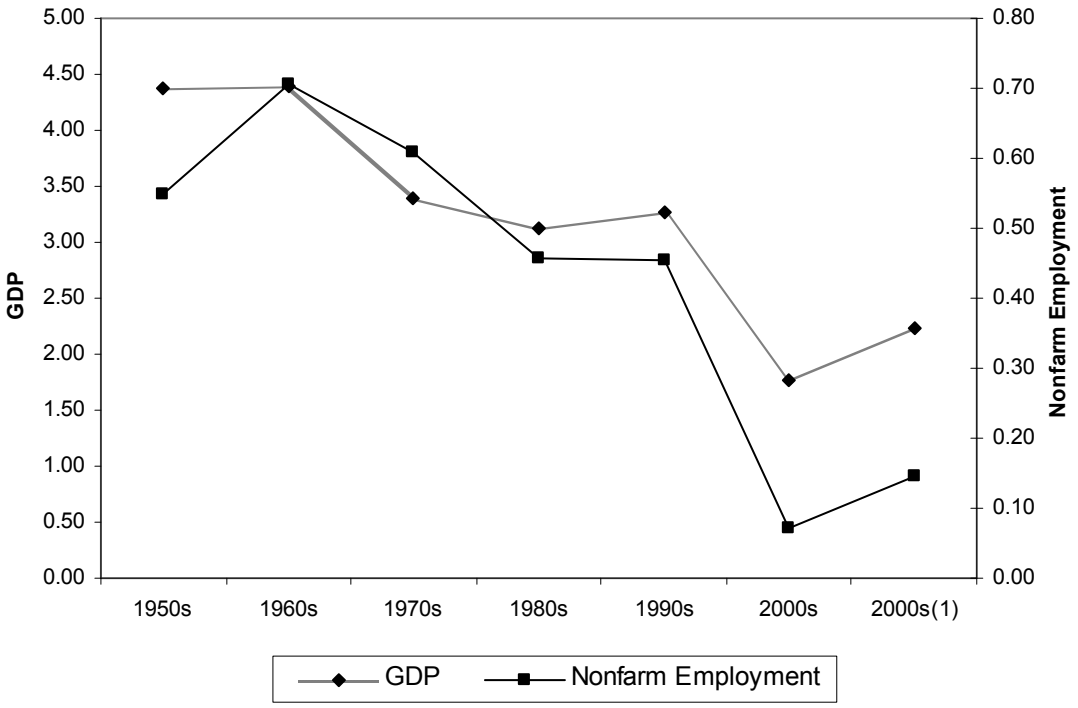
Keywords: Income Distribution; Inequality; Job Creation; American Recovery and Reinvestment Act; Policy Impacts

JEL Classifications: D31, D63, E62

INTRODUCTION

The first decade of the new millennium is likely to be the worst decade in terms of employment and output growth in the United States since the end of the Second World War. Even ignoring the sharp contraction that occurred in the last two quarters, growth in output and employment during the 2000s has averaged at levels much lower than what was observed since the 1950s (see figure 1).

Figure 1. Output and Employment Growth by Decade (in percent)

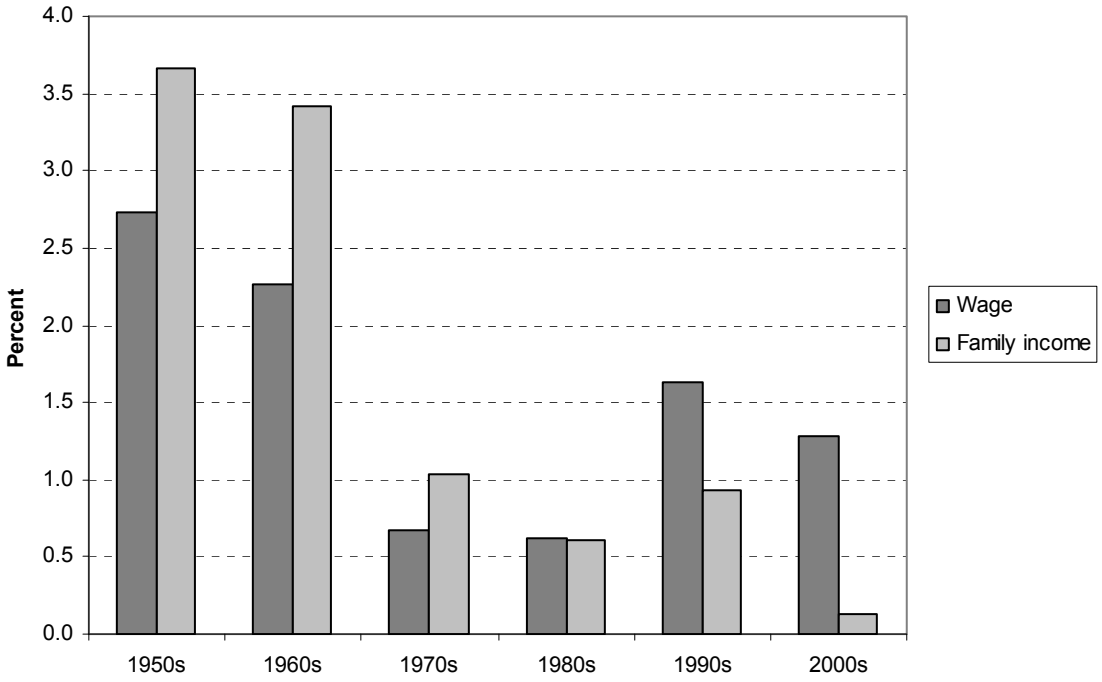


Notes: The numbers are averages of quarterly growth rates from 1950:1 to 2009:1. Employment refers to total nonfarm employment (seasonally adjusted). Growth rates in real GDP are seasonally adjusted at annual rates. The data points labeled "2000s(1)" exclude the data for last two quarters.
Source: Authors' calculations from BEA and BLS data.

The growth in the average wage also has been slower in the current decade as compared to the 1990s, as well as the two decades immediately following the Second World War. As we know, inequality in wage income was considerably higher during the

last two decades compared to the 1970s and 1980s. Hence, the faster growth in the average wage during the later period was driven, to a large extent, by the big gains made by those at the higher rungs of the wage distribution. For the population as a whole, median family money income is a better indicator of economic well-being than the average wage. Similar to the trends in output and employment, trends in median family money income also point to the 2000s as the decade of worst performance since the Second World War (figure 2). However, the deterioration in the average growth rate appears to be much more drastic for median family income than for output or employment.

Figure 2. Growth in Average Wage and Median Family Income by Decade (in percent)



Notes: The numbers are averages of annual growth rates from 1950 to 2007. Average wage is the wage and salary accruals per full-time equivalent employee deflated by the price index for private consumption expenditures. Median family income is median income in current dollars deflated by the CPI-U (RS).
Sources: Authors' calculations from BEA, BLS, and Census data.

The evidence presented above suggests that economic performance in terms of growth in output, employment, wages, and family income was generally poorer in the 2000s, even before the onset of the financial crisis from September 2008. The financial crisis and the accompanying global slump constitute the greatest threat to restoring growth rates of wages and family income to their levels in the 1990s. However, such a restoration is unlikely to emerge without a set of coherent macroeconomic and labor market policies that go beyond merely addressing the financial crisis and recession.

The administration of President Barack Obama inherited an economic mess that was quickly transforming into a deep economic malaise when it took office on January 20, 2009. With remarkable speed, the administration managed to sign into law a package of spending increases and tax cuts known as the American Recovery and Reinvestment Act (ARRA) on February 19, 2009. According to the administration, the Act will create or save approximately 3.5 million jobs by the end of 2010. The transfers and tax cuts included in the Act are expected to provide relief to low-income and vulnerable households especially hurt by the economic crisis and, at the same time, support aggregate demand. Apart from playing the role of macroeconomic stabilization, the Act, in the words of the administration's recovery website, "will lay the foundation for a robust and sustainable 21st century economy" by "modernizing our health care, improving our schools, modernizing our infrastructure, and investing in the clean energy technologies of the future."[1]

Our aim is to provide a *preliminary* assessment of the Act in terms of its likely impact on median household income, gaps between advantaged and disadvantaged population subgroups, and income inequality. A central motivation for evaluating the Act from this particular standpoint was articulated quite poignantly by President Obama himself in his historic inauguration speech: "The success of our economy has always depended not just on the size of our gross domestic product, but on the reach of our prosperity; on the ability to extend opportunity to every willing heart—not out of charity, but because it is the surest route to our common good."[2]

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[1] See http://www.recovery.gov/?q=content/our-mission. Accessed on April 24, 2009.
[2] Available at: http://www.whitehouse.gov/blog/inaugural-address/. Accessed on April 24, 2009.

The preliminary and tentative character of the exercise cannot be emphasized enough. Only a small fraction of the total appropriations made under the Act has actually been spent so far. The specific purposes for which different levels and agencies of government will spend substantial chunks of the monies are still to be determined. There is also uncertainty regarding the manner (i.e., in the form of loans or grants) in which a considerable portion of the money will be spent. The "known unknowns" about the Act itself impose a sizeable degree of tentativeness to any evaluation. In addition, the methods and data utilized in conducting our assessment are also bound to change in the future as we refine our methods and better information becomes available. Admittedly, there is a great deal of uncertainty surrounding the construction of most future economic scenarios and ours is no exception.

METHODOLOGY

Our strategy toward assessing the implications of the Act consists of three main steps: constructing a baseline scenario; estimating the increase in employment by industry and occupation due to ARRA; and simulating the accompanying effects of changes in earnings on the distribution of money income.[3]

In the first step, we constructed a baseline scenario of labor market conditions and distribution of income against which the effects of the Act can be assessed. Given that the main objectives of our study are related to the level and distribution of income, we adopted the latest Annual Social and Economic Supplement (ASEC 2008) as the basic sample. The main drawback of the sample is that it reflects the income situation and labor market experience of individuals in 2007. To overcome this difficulty, we imputed labor force status in January 2009 and total income for the year 2008 for all civilian adults 16 years and older. Admittedly, imputation processes have their hazards, yet it is better than assuming as a baseline a sample that does not reflect the steep rise in joblessness during 2008 and the accompanying changes in earnings. The imputation process consisted of four major parts.

[3] The details of the sources and methods of our model will be available in Zacharias, Masterson, and Kim (forthcoming).

First, labor force categories were imputed within the ASEC 2008 data set. The method involved using the January 2009 CPS to run selection models for labor force participation, employment status, and full-time status, then predicting status in the ASEC. The predicted propensities were used to assign status to individuals, within cells constructed with industry, age, and sex. Second, the unemployed in the resulting data set were statistically matched with the January unemployed to transfer the duration of unemployment. The resulting data set was then augmented with income packages in three stages. In the first, earnings were multiply imputed using hot-decking for the labor force and chained equations for those not in the labor force. In the second stage, unemployment compensation, workmen's compensation, and disability payments were imputed using hot-decking with the results of the previous steps. In the third stage, means-tested transfers were imputed for families using hot-decking with the results of the prior steps. Other sources of income were carried over without change from 2007 to 2008. Finally, all components of money income were "aged" according to external data for each component (e.g., unemployment compensation for each recipient was "aged" by using the percent change in unemployment compensation per beneficiary by region, calculated from the administrative data). The resulting baseline scenario is a multiply imputed dataset with complete labor force characteristics and income profiles for 2008.

Once the baseline scenario was constructed, we turned to confront the issues of estimating the effects of ARRA on income distribution, relative to the baseline scenario. The only channel of influence that we consider here is the creation of new employment due to ARRA and the attendant effects on earnings, which, in turn, shapes total income (earnings plus all other money income).[4] Our approach may be described as "comparative-static" since we do not at all take into account how other changes in the economic environment would affect employment and income distribution in the current and future years. Therefore, our simulated effects of ARRA represent a "best-case scenario" for employment, since labor market conditions have worsened notably so far in

[4] The definition of money income used in this report is the standard Census Bureau definition: the sum of pre-tax cash income from all sources, excluding capital gains and losses.

2009 and most forecasts call for a relatively high unemployment rate during the next few years.[5]

Estimating the employment effects require us to identify the appropriate amount of fiscal stimulus (i.e., net addition to final demand) imparted by the Act. Our starting point was the CBO estimates of the budgetary costs of the Act over the period 2009–2019 (table 1). We made three adjustments to derive an appropriate amount of fiscal stimulus from the CBO cost estimates. First, we excluded the amounts explicitly set aside in the Act toward compensating for the expected cutbacks in state and local government spending because they do not constitute a net injection of additional aggregate demand. The amounts excluded were the State Fiscal Stabilization Fund and State Fiscal Relief. They constitute roughly 18.2 percent of the total budgetary cost over the period 2009–2019.[6] However, since many economists (including the Council of Economic Advisors) include some of these amounts in their assessments, we present our results with the inclusion of State Fiscal Stabilization Fund and State Fiscal Relief in Appendix A.

[5] For example, according to the March 2009 projection of the CBO, the unemployment rate will not fall below the 2008 level of 5.8 percent until 2013, even after taking into account the effects of ARRA. The administration forecasts the same year in its FY2010 budget, while the so-called "Blue Chip Consensus" forecasts 2015 (Congressional Budget Office 2009).

[6] While the amount set aside in ARRA will help to offset that reduction, it appears that the expected reduction in state budgets during the period 2009–2011 is much higher, at $350 to $370 billion (Johnson, Oliff, and Koulish 2009).

Table 1. Derivation of the Fiscal Stimulus from the ARRA over the Period 2009–2011 (in millions)

	Amount	Percent
Total Budgetary Cost, 2009-2019	787,242	100.0%
Less: Compensating for expected reductions in the contribution to aggregate demand by state and local governments	143,642	18.2%
State Fiscal Stabilization Fund	53,600	6.8%
State Fiscal Relief	90,042	11.4%
Less: coverage differences	61,108	7.8%
Less: timing differences (adjustments for budgetary costs during 2012-2019):	51,528	6.5%
Equals:		
Fiscal Stimulus for Employment Estimates, 2009-2011	530,964	67.4%

Source: Authors' calculations from CBO (2009).
Notes: (1) Consists mainly of grants for preventing cutbacks in state and local education expenditures. (2) Consists mostly of grants for Medicaid. (3) Consists of all direct loans and loan guarantees, and some subsidies such as health information-technology incentive payments. (4) Consists mostly of outlays on discretionary spending scheduled after 2011 in Division A of the Act, as estimated by CBO.

The other two adjustments reflected considerations with respect to coverage and timing. We excluded some items that could not be considered (at least in a national accounting sense) as adding to aggregate demand (e.g., loans) and some items that could not be assigned appropriate multiplier effects (e.g., subsidies for information-technology improvements in healthcare). Finally, in order to focus on the near-term effects, we excluded budgetary costs that the CBO considered to be incurred only beyond 2011. The two adjustments due to coverage and timing differences reduced the CBO estimate of budgetary cost by 14.3 percent.

The fiscal stimulus was split among three main categories for the estimation of employment effects (table 2). Following the conventional method, the impact of tax cuts, transfers, and subsidies on GDP were calculated using a set of multipliers that convert an additional dollar of government expenditure (or tax cut) into an increase in GDP.[7] For each tax cut and transfer, the CBO specifies the range of values for the multiplier ("low" and "high" values). We performed estimation using the high value and the midpoint of

[7] There is a great deal of controversy about the "appropriate" value of multipliers that fundamentally reflect deep-rooted differences among macroeconomic theories. For the administration's approach, see Romer and Bernstein (2009) and Council of Economic Advisors (2009). Cogan et al. (2009) advanced an opposing view (with very low multiplier values).

the range as alternative values for the multiplier (CBO 2009). The resulting increase in aggregate GDP was distributed among the major industries according to their GDP shares in 2006. In the next step, using the employment-GDP ratios in 2006, the increases in GDP by industry were translated into increases in employment by industry.[8]

Table 2. Outlays and Tax Cuts in Fiscal Stimulus

	Amount (millions)	Share (percent)
Outlays	241,376	45.5%
Purchases of goods and services	119,519	22.5%
Transfers to persons and subsidies[1]	121,857	23.0%
Tax cuts	289,588	54.5%
TOTAL	530,964	100.0%

Source: Authors' calculations
Note: (1) The subsidies amount to 0.75 percent of total outlays

A different method, based on input-output analysis, was adopted for estimating the employment effect of government purchases of goods and services. The increase in government purchases was distributed across the final demand for the products of the 201 industries in the 2006 input-output table. We employed two alternative assumptions about the distribution of the increase in final demand across industries. Under one assumption, which reflects current input-output and national accounting conventions, the increase is distributed among the government industries in the table.[9] Below, we refer to this assumption as the "government" assumption. The alternative assumption involves distributing the increase in final demand across government and private industries, with the latter capturing most of the increase and government industries receiving only outlays

[8] We are assuming here that increase in final demand will be met by increase in the number of persons employed and not by increase in the hours worked by existing workers and/or increase in productivity. Since productivity is generally considered to be procyclical (Basu and Fernald 2001), our assumption may be viewed as being biased toward a higher estimate of job creation; however, since economic activity during several quarters of the period of projection is likely to remain moribund, the bias may not be considerable.

[9] They are: federal government defense; federal government non-defense (except enterprises); local government enterprises except passenger transit; local government hospitals; local government educational services; local government excluding enterprises, educational services, and hospitals; state government enterprises; state government hospitals; state government educational services; and state government excluding enterprises, educational services, and hospitals.

that are destined for tasks that, under the current institutional arrangements, are essentially performed by government bodies. This assumption, called the "private" assumption, reflects the older national accounting view that government is solely a consumer, rather than the current view that regards government as a consumer and producer.[10]

In input-output analysis, the employment multiplier matrix provides the link between increase in final demand and employment. The matrix shows direct and indirect impacts of changes in final demand on employment due to inter-industry linkages. For instance, final demand increase on construction translates into increasing demand for inputs produced by other industries in the economy and, in turn, raises labor demand for both construction and input suppliers. In this exercise, the fiscal stimulus generates an initial, direct boost of final demand for goods and services produced by industries classified under two different assumptions. Indirect impacts follow via inter-industry transactions of intermediate inputs. To account for the domestic employment impact of the Act, we exclude job impacts on the foreign economy from which some of the inputs are imported.

The employment estimates generated by the conventional and input-output methods were combined to form the total additional employment resulting from the stimulus in each industry. It is reasonable to expect that the employment effects will vary not just across industries, but also across occupations. We assumed that the additional employment created by the ARRA would be split across occupations in each industry in the same proportions that it was split in 2006. The latter proportions were taken from the occupation-industry matrix created by the Bureau of Labor Statistics.

In the final step, we assumed that the additional demand for labor created by the stimulus would be met by an increased supply of labor from the pool of "employable" individuals in the ASEC. The employable pool consisted of individuals (16 years and older) who were deemed to be currently (that is, as of January 2009) not working. Additionally, we excluded individuals who did not work at all in 2007 and gave the

[10] For example, expenditures on research conducted by the National Institute for Health are classified as boosting the final demand for "scientific research and development services (BLS sector number 134)" under the "private" assumption and "federal non-defense government except enterprises (BLS sector number 184)" under the "government" assumption.

reason for not working as being retired, ill, disabled, taking care of family, or, for those under twenty years of age, in school.

For each of the scenarios, the newly created jobs were distributed by industry and occupation. In order to accomplish the assignment, we created a ranking for each individual of occupations and industries by likelihood of being employed in each. The method was to estimate a multinomial probit regression for industry and occupation and then predict probabilities for each.[11] For each individual, industries and occupations were ranked based on highest propensity. Then we estimated likelihood of being employed for each individual, using a probit procedure.[12] With these three sets of information for each individual, we assigned employment status to those not already employed in the baseline scenario using an iterative procedure, stepping through industry and occupation pairs, selecting those most likely to be employed from among those most likely to be employed in that industry-occupation pair, until all the available jobs are assigned. Once we have assigned jobs, we reassign earnings to those individuals who received a new job. Once again, the method is hot-decking. Other components of money income remain unchanged for the final scenarios.

FINDINGS

We begin by discussing job creation under ARRA. Then, estimates of the new jobs among industries, occupations, and demographic groups are presented. Finally, we turn to the likely impact of the additional employment on median household income, income disparities among population subgroups, and income inequality.

A. Estimates of Job Creation

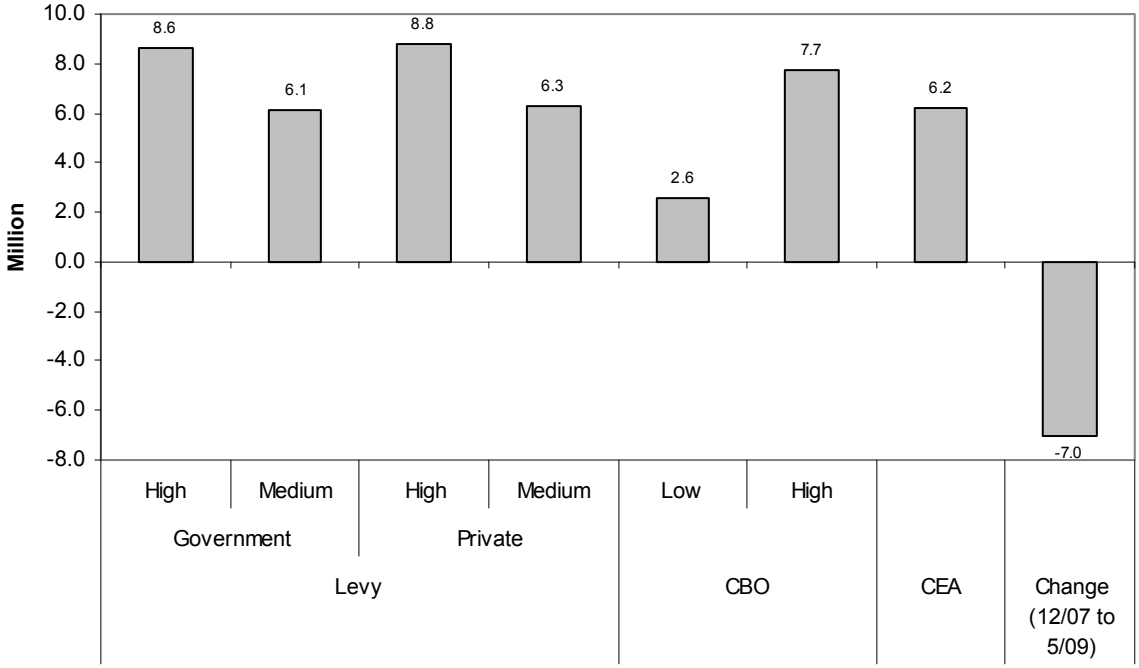
As discussed before, we estimated the potential additional employment from the stimulus under two sets of values for the multipliers for transfers, taxes, and subsidies ("high" and "medium"), and under two assumptions regarding the industrial distribution of final

[11] Independent variables for the industry and occupation multinomial logits were census division, metropolitan status, age, marital status, sex, educational attainment, and race.

[12] Independent variables for the employment probit were census division, metropolitan status, age, age squared, marital status, sex, educational attainment, and race.

demand generated by government purchases ("government" and "private"). The combination of assumptions produces four scenarios. Our estimates of new jobs are shown in figure 3, along with the estimates by the CBO and the Council of Economic Advisors (CEA).

Figure 3. Estimates of Job Creation under ARRA, 2009–2011 (in millions)



Source: Authors' estimates, CBO (2009), Council of Economic Advisors (2009), and BLS.

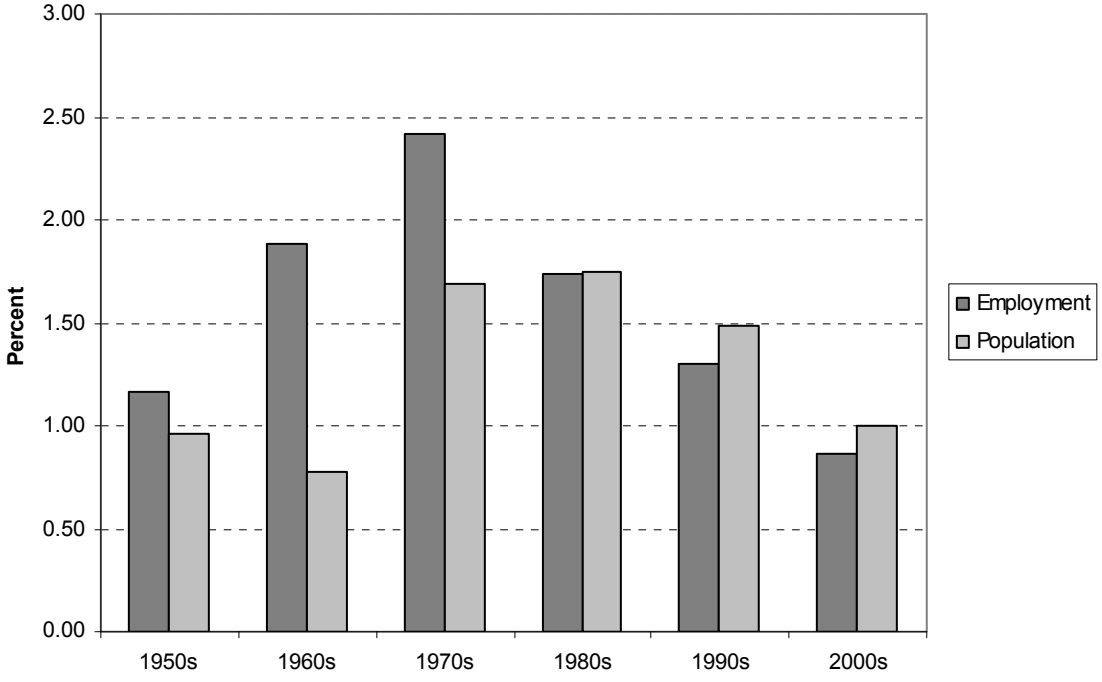
It is a remarkable coincidence that the estimates of new jobs under our "medium" scenarios are nearly identical to the estimate by the administration. In our view, this finding casts considerable cloud over the charge made by Cogan et al. (2009) that the administration's estimates are not robust. We used a substantially different methodology and set of assumptions to derive our results, yet the additional employment resulting from two of our scenarios is indistinguishable from the administration's estimate. Of course,

this congruence is no guarantee that the "reality" is more likely to match the scenario.[13] Furthermore, even with the potential of an additional 6.2 million jobs over 2009–2011, it is sobering to note that total employment has already fallen by 6.5 million between the start of the recession in December 2007 and March 2009 (according to the monthly CPS figures).[14] Given that a sizeable decline in employment is likely to occur during the period of projection, even the potential employment from our "high" scenario estimates (8.6 to 8.8 million) or that of the CBO (7.7 million) will largely have a palliative, rather than a curative, effect on the employment crisis (figure 4).

[13] We place the word "reality" in quotes because the additional employment created by the ARRA cannot be calculated precisely, even in the future. While the direct employment effect can be quantified *post factum*, indirect employment due to the backward linkages generated by additional final demand from government purchases, as well as the employment effects generated by tax cuts and transfers, will necessarily have to be estimated from economic models.

[14] Estimates are based on seasonally unadjusted monthly figures.

Figure 4. Employment and Population Growth by Decade (in percent)



Notes: (1) The numbers refer to average percent change over the preceding year. (2) Employment refers to employment of persons 16 years and older. Population growth is shown for prime-age workers (age 25 to 64 years). (3) The data for employment during the 2000s include estimates of employment for 2009–2011. The latter were obtained by adding our estimate of ARRA employment under the "government-medium" assumption to the CBO baseline estimate of employment. (4) The data for the population during the 2000s include estimates for 2009–2011. They were obtained by extrapolation using the annual average growth rate during 2008–2010 for 2009 and 2010; the growth rate during 2010–2015 was used for deriving the 2011 estimate.
Source: Authors' calculation from Census Bureau data.

While the ameliorating effect of the stimulus plan on the employment situation is surely welcome, it appears that the government could have achieved more at the same cost. As shown in table 2, roughly 55 percent of the fiscal stimulus over the period 2009–2011 will be delivered via tax cuts. In accordance with the general macroeconomic consensus, we found that the amount of stimulus required per new job created was much higher for taxes than outlays under all scenarios. Each additional job would cost approximately $69,000 in tax cuts versus $52,000 in spending increases in the "medium" scenarios and $110,000 versus $69,000 in the "high" scenarios.

B. Job Creation by Industry, Occupation, and Demographic Characteristics

The industrial composition of the additional employment under alternative assumptions regarding the industrial distribution of final demand is shown in table 3.[15] As one would expect, the most notable difference is the much lower share of government employment under the "private" assumption compared to the "government" assumption (19.2 versus 28.8 percent). The much higher share of construction (9.5 versus 5.4 percent) accompanies the lower share of government under the "private" assumption. In turn, this reflects the substantial investments made in the stimulus package for improving the nation's infrastructure and structures under public ownership or control. Smaller increases, relative to the "government" assumption, can also be observed for the shares of the education and health services, as well as professional and business services.[16] Under both assumptions, the government sector will be the largest employer,[17] followed by professional and business services, and education and health services.

[15] Our estimates of industrial composition did not change much in response to assumptions about the values of the multipliers.

[16] Education and health services industry also include the social assistance industry. It should be noted that under both assumptions public education was treated as a part of government production. The higher share of employment in this industry under the private assumption is partly due to the fact the final demand assigned is higher by $9.3 billion. Community block grants for child development, public housing support, and employment and training services are included in the relevant industries (education and social assistance) under the private assumption. However, under the government assumption, the items are assigned to general government. In addition, the direct job impact is greater than the indirect impact by approximately three to one. Combining these two aspects leads to higher job creation in the sectors under the private assumption.

[17] State and local government would account for 82 to 90 percent of the jobs created in the government sector.

Table 3. Industrial Composition of ARRA Employment (in percent)

Industry	Levy		Romer and Bernstein (2009)
	Government	Private	
Agriculture, Forestry, Fishing, and Hunting	1.2	1.3	0.0
Mining	0.4	0.4	0.7
Construction	5.4	9.5	18.4
Manufacturing – Total	8.3	8.7	11.1
Wholesale Trade	3.5	3.5	4.3
Retail Trade	8.6	8.8	16.4
Information	1.9	2.0	1.4
Financial Activities	5.3	5.2	5.8
Professional and Business Services	11.5	13.3	9.4
Education and Health Services	10.3	13.4	6.5
Leisure and Hospitality	7.6	7.4	13.6
Other Services	4.0	3.9	2.7
Utilities	0.4	0.4	0.3
Transportation and Warehousing	2.9	3.0	2.7
Government – Total	28.8	19.2	6.6
Total	100.0	100.0	100.0

Note: Employment effects reported in the table were calculated with "medium" values for multipliers (see note 12).
Source: Author's calculations; Romer and Bernstein (2009).

For the sake of comparison, we also report the estimates from Romer and Bernstein (2009), with the caveat that the latter estimates pertain to jobs created by the last quarter of 2010, whereas our estimates also include 2011. The methodology used by Romer and Bernstein to obtain the shares of individual industries is not clearly spelled out in their paper. This difficulty, along with the difference in the time horizon, rules out an adequate explanation for the differences in the estimates. Nevertheless, it is of note that the estimated share of government employment is only 6.6 percent in their model, which is far lower than under our "private" assumption regarding final demand (19.2), and the actual share of government employment in 2007 (14.3). In contrast, Romer and Bernstein estimate the shares of construction, retail trade, and leisure and hospitality to be far higher than us. It is not obvious why such a large proportion of employment created by ARRA should fall in the latter two industries.

We estimate that the additional employment generated by ARRA would favor blue-collar and low-end service occupations relative to other occupations (table 4). As discussed before, we did not estimate separately the occupation mix of each industry in our simulation of ARRA. Hence, the occupational composition of ARRA employment is

purely a consequence of the estimated industrial distribution of additional employment. The occupations favored by ARRA pay, on the average, wages that are considerably below the wages in the other occupations. Compared to the average weekly earnings of workers in blue-collar occupations, those in managerial, professional, and high-end service occupations earned, respectively, 79, 67, and 11 percent more in 2008. A similar comparison for low-end service workers show that the gaps were even higher: employees in managerial, professional, and high-end service occupations earned, respectively, 120, 106, and 36 percent more in average weekly earnings in 2008.[18] We can, therefore, expect the additional employment created by the ARRA to benefit workers on the bottom rungs of the earnings distribution—an outcome that could have a favorable effect on the distribution of household money income, as we discuss later.

Table 4. Occupational Composition of Baseline and ARRA Employment (in percent)

Occupation		Assumption about Final Demand	
	Baseline	Government	Private
Manager	15.0	10.4	9.8
Professional	12.3	11.7	11.5
High End Service	12.6	8.3	8.6
Low End Service	40.9	46.0	43.3
Production	19.2	23.5	26.8
All	100.0	100.0	100.0

Note: Occupational effects reported in the table were calculated with "medium" values for multipliers. "Managers" include "management, business, and financial" occupations. "Professionals" include "computer and mathematical science; architecture and engineering; life, physical, and social science; legal; and, healthcare practitioner and technical" occupations. "High-end" services include "community and social service; education, training, and library; arts, design, and entertainment; and healthcare support" occupations. "Low-end" services include "protective service; food preparation and serving; building and grounds cleaning and maintenance; personal care and service; sales and related; and office and administrative support" occupations. "Production" include "farming, fishing, and forestry; construction and extraction; installation, maintenance, and repair; production; and transportation and material moving" occupations.
Source: Author's calculations

[18] We calculated weekly earnings by occupational groups from the monthly outgoing rotations of the 2008 CPS.

Our simulation model allowed us to estimate the demographic composition of ARRA employment (table 5).[19] As we discussed before, the model assigned "employable" individuals in the sample to the industry-occupation cells formed by the combination of occupations shown in table 4 and a slightly more elaborate list of industries shown in table 3. Demographic characteristics of individuals played a crucial role in placing an individual in a particular cell. Our results indicate that, relative to the baseline, ARRA employment is likely to be more male than female, more black and Asian than white or Asian, more college-educated than not college educated, and more likely to be older than 60 than under 60.

Table 5. Demographic Composition of Baseline and ARRA Employment (in percent)

Category	Baseline	Additional ARRA Employment			
		Government		Private	
		High	Medium	High	Medium
A. Sex					
Male	52.4	57.1	59.8	59.7	63.0
Female	47.6	42.9	40.2	40.3	37.0
B. Race/Ethnicity					
White	69.3	63.2	60.5	63.1	60.7
Nonwhite	30.7	36.8	39.5	36.9	39.3
C. Education					
Less than High School	9.8	4.7	3.6	5.5	4.4
High School Graduate	27.7	22.1	21.1	24.8	22.0
Some College	29.5	35.2	36.5	35.8	36.4
College Graduate	32.9	37.9	38.8	33.8	37.3
D. Age					
Less than 25	12.9	11.5	9.9	11.6	11.5
25 to 60	79.2	74.9	76.9	76.2	80.8
Greater than 60	8.0	13.6	13.2	12.2	7.6

The pool from which we selected job recipients consisted of those individuals who were not employed in the baseline, with the exception of all those who were listed as not working because they were disabled, retired, homemakers, or in school in 2007. Of those reporting in-school status, only those under the age of twenty were left out of the

[19] We present all four scenarios in this case because, unlike our estimates of industrial and occupational composition, the estimates of demographic composition proved to be somewhat sensitive to the value of the multipliers.

pool. In the resulting pool of over 28 million potential workers, 54.2 percent were male. Thus, in our assignment, males were likelier than females to be selected for job recipiency. The racial composition of our pool was 62.4 percent white and 37.6 percent nonwhite. Whites were more likely to be selected in the "high" scenarios than their presence in the pool would indicate and less likely in the "medium" scenarios. The opposite is true for nonwhites. In terms of educational attainment, 21.9 percent of the pool had less than a high school diploma, 32.6 percent were high school graduates, and 30.7 percent had some college, while 14.9 percent were college graduates. Thus, those with a high school degree or less were much less likely to be job gainers in any scenario than their presence in the pool would indicate, while those with at least some college were more likely. Finally, in terms of age, those less than 25 were less likely, while those over 60 were more likely, and those of prime age were much more likely to be job recipients than their respective shares of the pool would indicate. In sum, we can say that, compared to their shares in the employable pool, the stimulus favors men over women, the college educated over those without any college, and prime age over younger workers.

Romer and Bernstein estimated that the share of female employment in total ARRA employment was approximately 42 percent (Romer and Bernstein 2009). They derived this result by multiplying the ARRA employment in each industry by the share of women in total employment in 2008, adding up the resulting count of female jobs across industries, and then dividing the total number of ARRA jobs going to women by the total ARRA employment. We estimate the share of women in ARRA employment to be generally lower, with the exception of one scenario. Romer and Bernstein argue that the stimulus jobs package could be considered as somewhat skewed toward women because their share in ARRA employment is much higher than their share in the job losses since the onset of the current recession. Although it is important to examine whether the stimulus program is creating jobs for those hit hardest by the recession, from an equity standpoint it is also imperative to compare the demographic composition of ARRA

employment against the composition of the employable pool of individuals or composition of employment without ARRA.[20]

The importance of scrutinizing the equity aspects of the employment creation under ARRA using both different yardsticks becomes clearer when we consider that they can produce opposite results. Estimates are shown in table 6 for the demographic composition of employment in December 2007 (the start of current recession), job losses incurred between then and March 2009, and our estimate of ARRA employment under the "government-medium" scenario [columns (1) through (3)].

Table 6. Job Losses versus Job Creation, by Demographic Groups (in percent)

	Shares			(4) Net Change, Relative to 12/07
	(1)	(2)	(3)	
Category	December 2007	Job Losses	ARRA	
A. Sex				
Male	53.3	73.5	59.8	-0.02
Female	46.7	26.5	40.2	0.01
B. Race/Ethnicity				
White	69.0	64.6	60.5	-0.01
Black	10.5	13.5	15.0	0.00
Hispanic	14.0	16.1	11.9	-0.02
Other	6.5	5.8	12.5	0.04
C. Education				
Less than High School	10.6	28.3	3.6	-0.10
High School Graduate	29.3	51.6	21.1	-0.05
Some College	28.8	15.3	36.5	0.03
College Graduate	31.3	4.7	38.8	0.04
Total	100.0	100.0	100.0	0.00

Note: The zeros in column (4) indicate numbers between minus 0.01 percent and plus 0.01 percent.
Source: Authors' calculations

The yardstick employed by Romer and Bernstein would suggest that the job creation by ARRA is skewed toward females, nonwhites, and those who attended or graduated from college. However, if we use the shares in December 2007 as the benchmark, we would reach the same conclusion only for the last mentioned group.

[20] Consider, for example, a society with two mutually exclusive groups, one of which is completely excluded from employment due to discrimination. If a government program to combat job losses created jobs only for those who were employed previously, then it would reinforce the existing system of discrimination.

Females and nonwhites now appear to be somewhat disadvantaged under ARRA. By either standard, the picture for those who have not attended college appears to be particularly bleak. They made up about 40 percent of total employment at the start of the recession and accounted for 80 percent of job losses, yet their share of ARRA employment is likely to be less than 25 percent. Those who have attended or graduated from college appear poised to appropriate the bulk of new jobs created. In light of our discussion of the estimated occupational composition of ARRA employment (table 4), it may very well be the case that a significant proportion of them would end up in relatively low-paying and low-skilled jobs.

The final column in the table shows the difference between jobs created under ARRA and jobs lost in the recession until March 2009 as a percentage of the level of employment in December 2007. It is worth emphasizing that the estimates in the column are constructed by ignoring job losses that have happened since April 2009 and job losses that are expected to persist for some time. They also assume the additional employment from the stimulus is created instantaneously.

We already pointed out that the job losses from the onset of the recession until March 2009 exceed the administration's estimates of job creation due to ARRA and our estimate under two scenarios (figure 3). However, there appears to be some differences among groups. The jobs created for women are likely to be more than the jobs they have lost so far in the current recession and, consequently, their resulting level of employment will be slightly higher than at the start of the recession as a result of ARRA. Among the racial groups, whites lose ground in employment relative to the start of the recession even with the ARRA, while nonwhites make no significant gain. Individuals who have not graduated from high school will suffer the largest loss, even after accounting for the employment gains from ARRA, followed by those with just a high school degree.

C. Effects on Earnings and Household Income

In this section we focus on the scenario that resulted in an estimate of the aggregate employment effect that was closest to the estimate of the administration (approximately 6.2 million new jobs). This scenario was described earlier as the "government-medium" scenario (see figure 1), reflecting the assumptions made regarding the industrial

distribution of additional final demand generated by government purchases and the values of multipliers attached to transfers and taxes. As discussed in the methodology section, once we assigned the ARRA jobs to the employable pool of individuals, we also estimated their annual earnings. The annual earnings of the newly employed individuals were added to the annual incomes of other individuals in the household to obtain the new level of household income.[21]

Our estimates suggest that the average annual earnings for individuals employed in the ARRA jobs are likely to be higher than the baseline earnings (i.e., annual earnings of earners in non-ARRA jobs) by about 3 percent. Combining both groups of earners produces a level of earnings that is 0.7 percent higher than the baseline (table 7, the last entry under the column "with ARRA employment"). Turning to earners in different subgroups, the most striking increase is for workers in the bottom quintile of the earnings distribution. The average earnings in the bottom quintile of the ARRA earnings distribution are estimated to be 11.9 percent higher than the baseline bottom quintile. Caution in interpreting this number is advised, however. The baseline bottom quintile contains a significant number of individuals with negative earnings, while this is not true for the individuals added to the bottom earnings quintile as a result of ARRA job recipiency. We can see, in general, that the effect of the ARRA is to raise the lower end of the earnings distribution. In addition, average earnings for women increase a bit more than for men, although this increase is small compared to the earnings gap. The same can be said of the ARRA's impact on the white/nonwhite earnings gap. Finally, the ARRA seems to be a greater gain for those who are high school, but not college, graduates, although this boost will do little to shrink the gap between these groups and college graduates.

[21] We assume that there will be no new households, i.e., the newly employed individuals continue to live in their current households.

Table 7. Average Annual Earnings, Baseline and Government-medium Scenario

Category	Baseline (2008)	Percent Change from Baseline with ARRA Employment
A. Sex		
Male	50,505	0.5
Female	33,074	0.8
B. Race/Ethnicity		
White	46,392	0.6
Nonwhite	33,307	1.0
C. Education		
Less than High School	18,491	0.2
High School Graduate	31,499	1.2
Some College	35,720	1.1
College Graduate	68,330	-0.1
D. Earnings quintile		
Bottom	4,320	11.9
Second	17,416	2.7
Third	29,823	1.4
Fourth	47,156	0.6
Top	112,667	-0.3
All earners	42,271	0.7

Note: The estimates are for all earners with positive and negative earnings.
Source: Authors' calculations

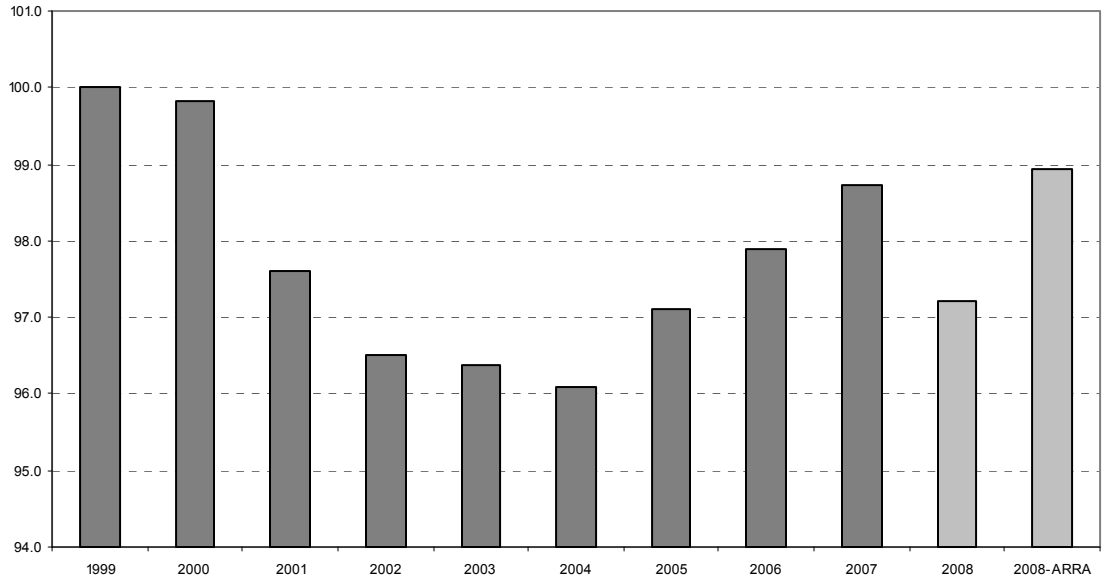
We next turn to our estimates of median household income (figure 5). The peak of the real household money income series between 1967 and 2007 occurred in 1999, at approximately $52,800 (in 2008 dollars), which we have set equal to 100 in the figure. The values for the other years are expressed as a percentage of the 1999 level. Our estimates for 2008 and 2008 with ARRA effects are shown by the bars labeled, respectively, "2008" and "2008-ARRA." We find that median household income is likely to decline in 2008 by 1.5 percent. The comparative-static effect of the ARRA on household income is estimated to slightly more than offset that decline. If it were to materialize, the level of income would still be lower than what the average household received in 1999 and 2000, but it might represent a softening of the blow delivered on the middle class by the current economic crisis.

The administration has estimated that the likely impact of the ARRA will be to boost the average money income of the middle quintile of working age families[22] by 2.3

[22] Families with family heads aged 25 to 64 years are defined as working-age families.

percent (Middle Class Task Force 2009). This estimate was obtained by projecting the impact of the expected decline in unemployment due to ARRA on to family income. The actual relationship used was based on the results of a regression analysis conducted in the early 1990s based on CPS data from 1967 to 1991 (Blank and Card 1993). Our own estimates for the same group of families, however, show a much more modest gain of 1.8 percent.

Figure 5. The Effect of ARRA on Median Household Income

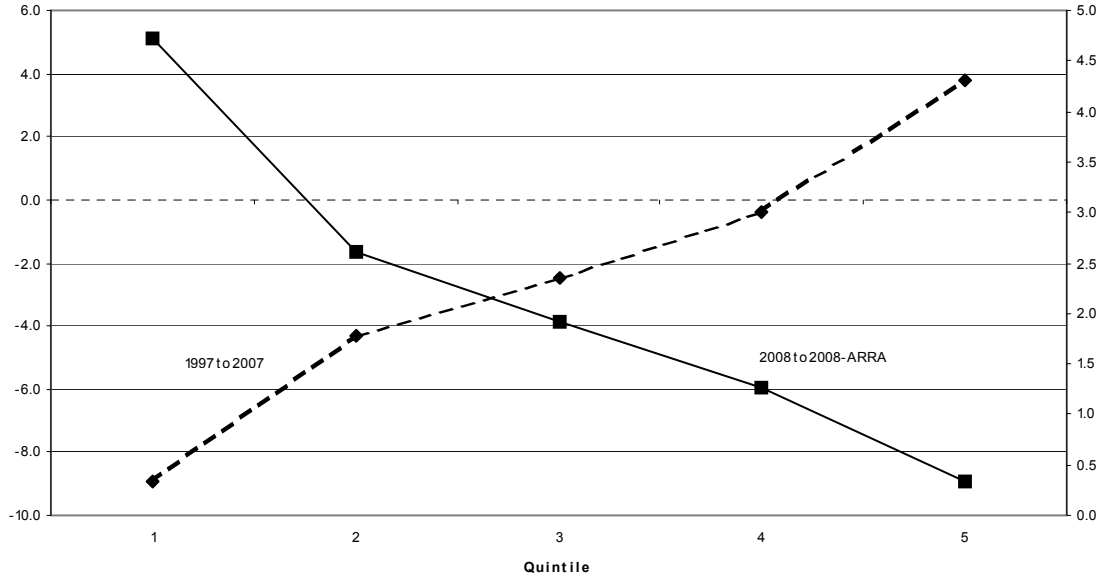


Notes: "Baseline" refers to our estimate for 2008; "2008-ARRA" represents the baseline revised to include the effects of ARRA.
Source: The estimates for 2008 and 2008-ARRA are authors' estimates. The data for the remaining years are from the U.S. Census Bureau.

We also found that the percentage gain in average income will be higher for the lower quintiles than the higher quintiles when we incorporate the effects of ARRA (figure 6). This is consistent with our findings regarding average earnings across the earnings quintiles. The outcome is partly an arithmetical artifact since the average income is, by definition, lower for the lower quintiles so that a higher percentage increase can

still mean a smaller increase in absolute terms.[23] However, when compared against the change in mean income by quintile between 1999 and 2008, it appears that the gains from ARRA are distributed in a pro-poor fashion. The pro-poor pattern of income growth that could result from ARRA is expected to have only a negligible effect on the shares of aggregate income going toward each quintile. This might be an indication of the likely effect of ARRA on overall inequality in money income—very little (figure 7).

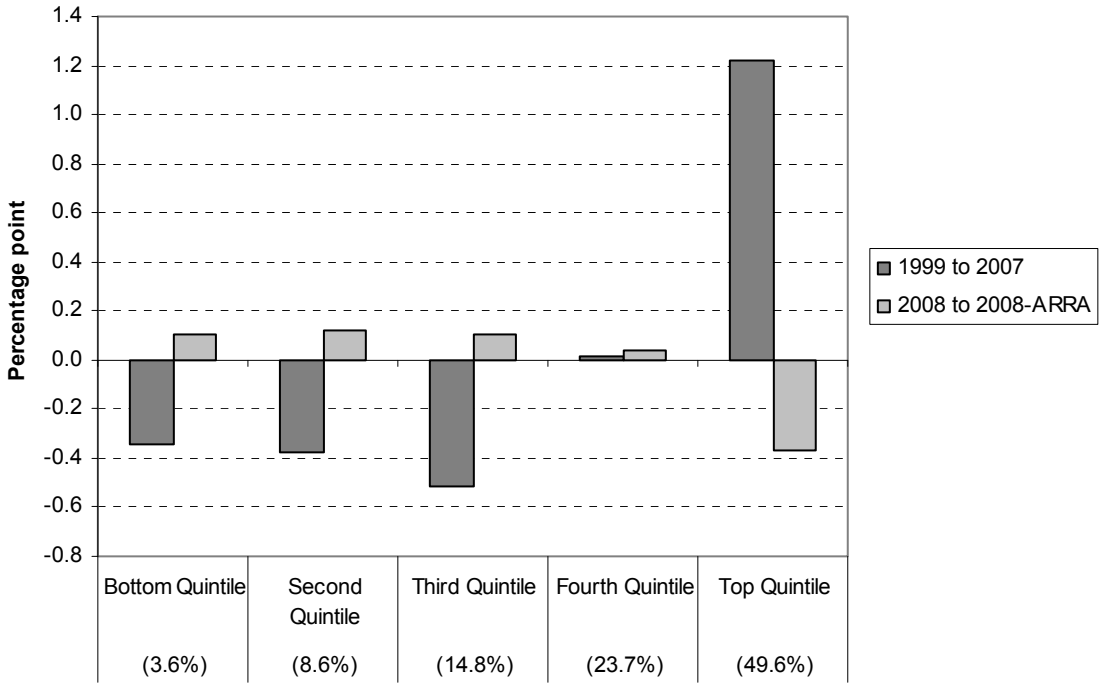
Figure 6. Change in Mean Income by Quintile (in percent), 1999 to 2007 (left-axis) and Baseline to with ARRA (right-axis)



Notes: "2008-ARRA" represents the baseline revised to include the effects of ARRA.
Source: Authors' estimates

[23] For example, the absolute increase in mean income from incorporating the effects of ARRA was the highest for the middle quintile ($1,138) and lowest for the bottom quintile ($555).

Figure 7. Change in the Share of Aggregate Income by Quintile (in percentage points)



Notes: "2008-ARRA" represents the baseline revised to include the effects of ARRA. The percentage shares in aggregate income in 2007 were as follows: top quintile–49.6 percent; fourth quintile–23.7 percent; third quintile–14.8 percent; second quintile–8.6 percent; and bottom quintile–3.6 percent.
Source: Authors' estimates

Given the demographic differences that we observed earlier regarding the effects of earnings growth under ARRA, it is useful to examine how much of the favorable change in earnings translates into differential growth in household income (relative to the baseline) among groups of households (table 8). Consistent with our findings regarding the likely effects on earnings, we find that household income growth under ARRA is likely to favor nonwhites as opposed to whites. There does not appear to be much difference in expected income growth among households in different educational groups, except for college graduates who are estimated to receive a lower boost in household income—a finding that mirrors our earlier finding that the mean earnings of college graduates are likely to be lower with the ARRA jobs. Families headed by single females are likely to experience a higher income growth than married-couple families, again a

probable result of the expected higher earnings growth for females relative to males under ARRA.

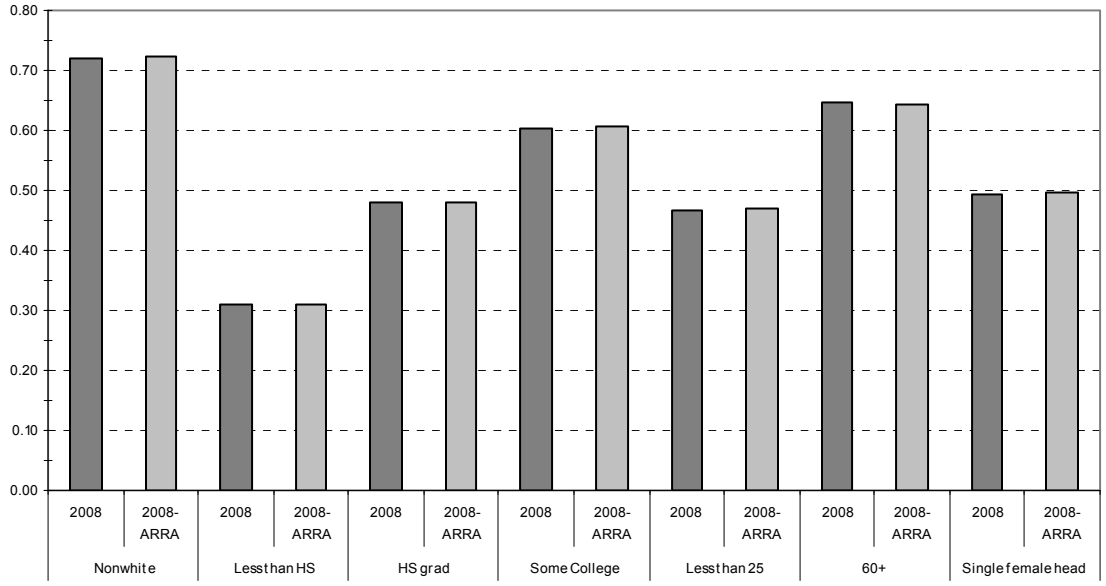
Table 8. Change in Mean Household Income Relative to the Baseline by Demographic Groups (in percent)

Characteristic of Householder	Change (%)
A. Race/Ethnicity	
White	0.9
Nonwhite	1.9
B. Education	
Less than High School	1.1
High School Graduate	1.2
Some College	1.3
College Graduate	0.9
C. Age	
Less than 25 Years	1.8
25 to 60 Years	1.1
60 Years and Older	0.8
D. Family Type	
Married Couple	1.0
Single-female Head	1.3

Source: Authors' calculations

The expected movements in money income generated by the ARRA generally appear to favor the groups usually considered as disadvantaged. However, the likely size of the movements is bound to make no appreciable dent in the substantial disparities in money income that exist between the groups (figure 8). Nonwhite households continue to gather an annual income that is 28 percent less than that of white households. Almost no change is visible in the income disadvantage faced by households headed by individuals who are not college graduates. Those with less than a high school education receive an annual income that is only 31 percent of that of college graduates; for high school graduates and those with some college education, the comparable percentages are, respectively, 48 and 60. The gap between single–female headed families and married couples also appears to be unmoved as a result of the effects of ARRA on household income.

Figure 8. The Effect of ARRA on Disparities in Money Income among Selected Subgroups of Households (ratio of mean values)



Notes: "2008-ARRA" represents the baseline revised to include the effects of ARRA.
Source: Authors' estimates

CONCLUSION

Our aim was to provide an appraisal of the effect of ARRA on the distribution of household income. The only channel of influence that we analyzed was the employment channel, i.e., the additional employment created by ARRA, the likely earnings of the newly employed individuals, and the changes in household income stemming from the additional earnings. Such an exercise is a comparative-static exercise, i.e., it ignores other changes in economic conditions that are bound to affect employment, earnings, and income. It is also, by its very nature, speculative. We have attempted to ground our speculations on what appears to us as the best available information and methods, but it is quite likely that several of the estimates presented here will be revised in the future as better information becomes available.

Our estimates of job creation by the ARRA over the period 2009–2011 under four scenarios fell in the range of 6.1 to 8.8 million jobs. Quite fortuitously, two of our scenarios produced an estimate that was virtually identical to the estimate of 6.2 million jobs made by the Council of Economic Advisors. Given that the decline in employment since the onset of the current recession until March 2009 amounted to 6.5 million and that further job losses appear to be certain during the period of projection, we concluded that the job creation effect of ARRA is primarily a (partial) replacement of lost jobs. If borne out, this would surely be a welcome development for millions of Americans struggling to find a job. However, millions who could work would still be left out from productive employment, resulting in substantial economic hardship, as well as human and social costs.[24]

We estimate that the likely impact of ARRA on median household money income will be remedial. It might offset the decline that we think has occurred in 2008. While this might temper middle class income woes, it is unlikely to restore any semblance of robustness to middle class incomes. The level of median household income in 2007 was 1.3 percent below the level attained in 1999. While the magnitudes differ, this finding holds for the bottom two quintiles also—their average money income after incorporating the effects of ARRA is likely to be lower than in 1999 and 2000. In sum, the bottom 60 percent of households are unlikely to see any notable improvement in their money income as a result of ARRA. As for the top two quintiles, it seems that they are unlikely to suffer any setbacks in their relative or absolute income. Finally, we found that it is unlikely that the ARRA will have any palpable effect on redressing the substantial gaps in money income that exist between nonwhites and whites, single–female headed families and married couples, and less-educated and college graduates.

Our analysis points toward the necessity of a comprehensive employment strategy that goes well beyond the ARRA. The need for public provisioning of various sorts (ranging from early childhood education centers to public health facilities to "greening" of public transportation), coupled with the severe underutilization of labor naturally

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[24] This job creation is roughly one-quarter of the size of the employable pool of workers in January 2009 (28 million), or our best estimate of the potential pool of workers in 2011 (23.5 million) (includes CBO's baseline unemployment and an estimate of involuntary part-time workers and marginally attached workers).

suggests an expanded role for public employment as a desirable ingredient of an alternative strategy.

Government policies and priorities have to be radically refashioned to place the country on a sustainable and equitable growth path. The unfolding logic of the current crisis should be seen as an opportunity to push for a different set of institutional and economic arrangements that put people before profits. As history has shown, the required momentum for such a transformation is unlikely to come from the benevolence of rulers alone—irrespective of how well intentioned they might be. It can only come through popular mobilization and collective action.

APPENDIX A. STATE FISCAL STABILIZATION AND STATE FISCAL RELIEF

The results presented in the main text are based on the assumption that the fiscal stimulus imparted by ARRA excludes the funds in the Act for ameliorating the projected shortfalls in state and local budgets. We made this assumption because our framework is purely designed to assess the impact of ARRA on employment and income relative to, respectively, January 2009 and calendar year 2008. In a fully articulated macroeconomic model that includes the expected reductions in aggregate demand due to the fiscal contraction at the subnational level, it is necessary to also include the funds set aside in the Act that could play a compensating role. The estimates of job creation by the administration and the CBO (see figure 1, main text) are based on including the latter amount in the fiscal stimulus. Our aim in this appendix is to present, purely for illustrative purposes, how the key estimates of the changes in employment and median household income presented in the main text of the report would be altered as a result of including the funds in the fiscal stimulus.[25]

Table 2A. Fiscal Stimulus with State Fiscal Funds (2009–2011)

	Amount (millions)	Share (percent)
Outlays and tax cuts	530,964	79.1%
Outlays	241,376	35.9%
Purchases of goods and services	119,519	17.8%
Transfers to persons and subsidies	121,857	18.1%
Tax cuts	289,588	43.1%
State Fiscal Stabilization Fund	50,987	7.6%
State Fiscal Relief	89,651	13.3%
TOTAL	671,602	100.0%

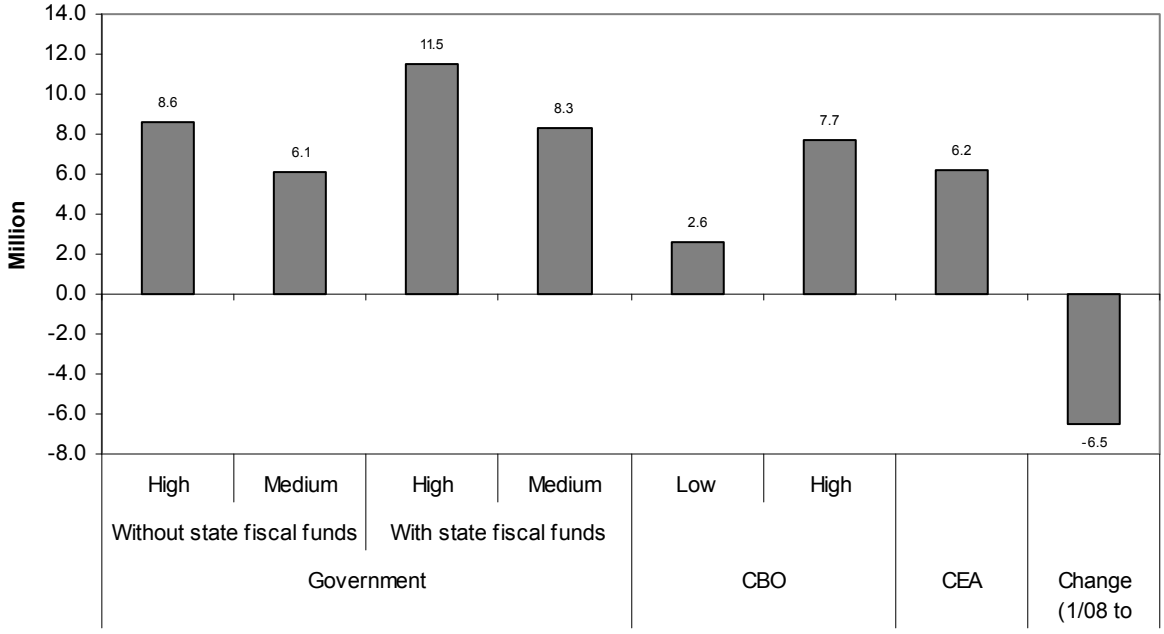
Source: Authors' calculations

With the addition of the funds, the size of the fiscal stimulus for 2009–2011 increases from approximately $531 to $672 billion, or by 26 percent (table 2A; note that the tables and figures in the appendix are numbered so as to facilitate easy comparison

[25] The full set of estimates and discussion will be available in a forthcoming working paper.

with those in the main text. Table 2A in the appendix can be compared with table 2 in the main text, etc.). Much of the increase is due to the increased Medicaid funding (State Fiscal Relief). We treated this as a form of general aid by the federal government to state and local governments, and assumed it to have a multiplier of 1.9 ("high") or 1.3 ("medium"). The remainder of the increase is mainly due to the enhanced funding for public education (State Fiscal Stabilization). We considered this as an increase in the final demand for the government industries in the input-output table, consistent with our approach to government purchases of goods and services.[26]

Figure 3A. Estimates of Job Creation with State Fiscal Funds, 2009–2011 (in millions)



As we would expect, the additional employment resulting from ARRA is higher when State Fiscal Funds are included in the fiscal stimulus (figure 3A).[27] In fact, the

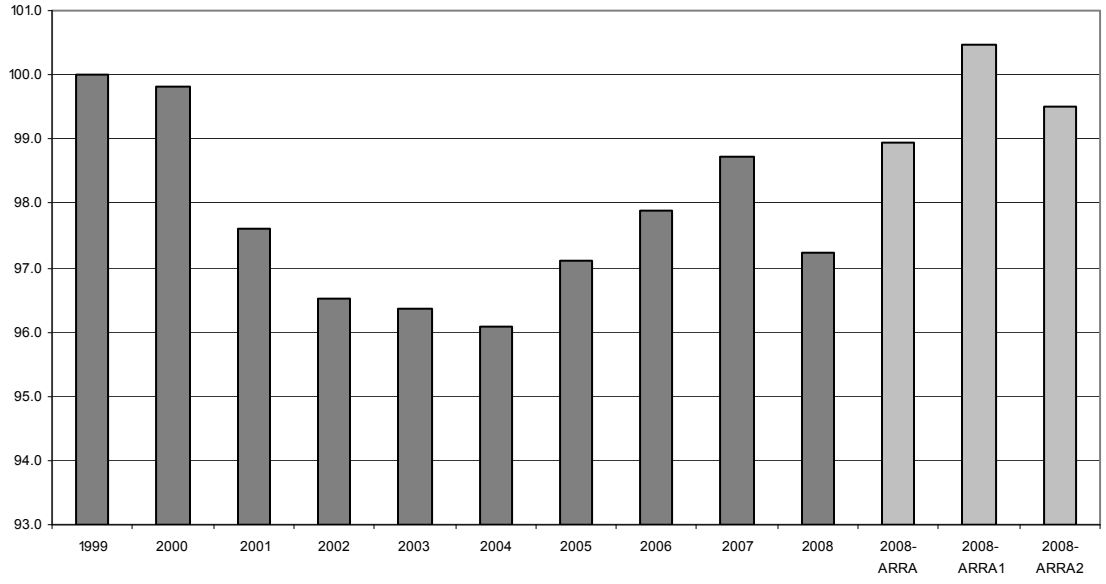
[26] In comparison, Romer and Bernstein (2009) treated State Fiscal Relief by assuming only 60 percent is used to increase government purchases. The remaining is allocated between prevention of tax increases (30 percent) and of states' withdrawal from their rainy day funds (10 percent), which are assumed to occur in their baseline calculation.

[27] We include here only the estimates under the "government" assumption regarding the final demand generated by government purchases because the "private" assumption generates very similar results.

increase in employment relative to when State Fiscal Funds are excluded in the fiscal stimulus is, in percentage terms, similar to the increase that occurs in the size of the fiscal stimulus when State Fiscal Funds are included—approximately 25 percent. The cost per job created by the State Fiscal Funds was about 9 percent lower than the cost associated with the outlays included in the main text. The slightly lower cost can be explained by the difference in the mix of transfers and government purchases: the outlays included in the analysis are almost equally split between the two, while transfers make up about two-thirds of the State Fiscal Funds. In line with other models, our model also features a higher employment multiplier for transfers than government purchases.

In comparison with the employment situation at the start of the recession, the high-end estimate of employment generated by the ARRA with State Fiscal Funds was about 0.03 percent higher and the low-end estimate was 0.01 percent higher. Given that further job losses are likely during the period of projection, we think it is reasonable to maintain roughly the same conclusion arrived in the main text: the effect of ARRA on aggregate employment will be mostly (a partial) replacement of lost employment.

Figure 5A. The Effect of ARRA with State Fiscal Funds on Median Household Income



Notes: 2008-ARRA represents the estimate shown in the main text (figure 5); 2008-ARRA1 represents the estimate with fiscal funds included and high values assumed for multipliers; 2008-ARRA2 represents the estimate with fiscal funds included and medium values assumed for multipliers.
Source: Authors' calculations

The higher level of employment resulting from the inclusion of State Fiscal Funds will, as one would expect, boost household income, relative to the situation when fiscal funds were excluded, via increasing the amount of earnings assigned to the newly employed. This expectation is confirmed in the results shown in figure 6A. If we include all the State Fiscal Funds and assume high values for employment multipliers, median household income will be 3.3 percent higher than in the baseline (bar labeled "2008-ARRA1"). In this case, the forecasted decline in 2008 will be overcome fully and household income will return to a level that is 0.5 percent higher than in 1999. Under the less unrealistic assumption of medium values for employment multipliers, median household income will be about 2.3 percent higher than in the baseline and 0.5 percent lower than in 1999.

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