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ABSTRACT

Distributions of marginal labor income tax rates for unemployed household heads and spouses are estimated for three benefit and tax rule scenarios: actual rules under the American Reinvestment and Recovery Act, rules as they would have been if they had not been changed since 2007, and rules as they might have been with a bigger fiscal stimulus. About three million unemployed, with a variety of tax situations, had more disposable income while unemployed than they would have by accepting a job that paid 80-100 percent of their previous one. The number would have been less than one million under 2007 rules, and about eight million under a bigger stimulus. Tax obligations and foregone unemployment insurance about equally erode the rewards from retaining a job, or starting a new one.

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Food stamps, unemployment insurance, and other subsidies to persons who are unemployed and otherwise with low incomes, have recently been made more generous and available in more situations. Did extra transfers help prevent a deeper recession, or did it amplify and prolong it? Economists cannot fully answer these questions without examining the incentives of persons receiving the transfers. The purpose of this paper is to quantify the number of people who recently had essentially no short-term financial reward from working, and how that number might have been different if safety net program rules had been made more generous, or if they had remained what they were in 2007.

American economists often discuss the unemployment insurance (hereafter, UI) system and its moral hazards as if the penalty for accepting a new job were about 50 percent of compensation,[1] which would suggest that the financial reward to working would be positive and significant in all but a few rare circumstances. At the same time it is commonly noted that the average weekly unemployment benefit of about $300 barely exceeds the compensation from a full-time minimum wage job, and for this reason alone UI is almost always inferior to a real paycheck. These claims are incorrect because they ignore payroll taxes, income taxes, and other safety net programs. The tax arithmetic suggests that many UI participants would, even under 2007 rules and even ignoring all safety net programs aside from UI and the personal income tax, keep about 30 percent – and maybe as little as ten percent – of the compensation generated by accepting a new above-minimum-wage job because taxes typically took as much of the reward from working as foregone unemployment benefits did. These thin margins essentially disappeared under the American Recovery and Reinvestment Act of 2009 (hereafter, ARRA).

Even when helping the poor is a primary policy motivation and the wage elasticity of labor supply is low, optimal tax theory frowns on labor income tax rates that equal or exceed one hundred percent (as long as work is not socially harmful) because at a one hundred percent rate

[1] Chetty (2008) estimates the U.S. UI replacement rate as 50 percent for the purposes of demonstrating that it might be slightly less than optimal. See also Fujita (2010).

there is no longer a tradeoff between efficiency and government revenue. From a positive point of view, economists expect that employment rates will be low, if not zero, in groups of people who are aware that they receive no financial reward from working. These are a couple of more reasons to quantify the prevalence of marginal tax rates that are near or exceed one hundred percent.[2]

The paper begins with a brief overview of the major safety net programs affecting the financial reward to working. The first quantitative results are 2009 marginal tax rates and their components for some of the more common tax situations encountered by American workers and their families. The rates are calculated for three scenarios: actual benefit and tax rules, benefit and tax rules as they would have been if they had not been changed since 2007, and benefit and tax rules as they might have been in a bigger stimulus. The following section considers the rich and complicated variety of possible tax situations in order to arrive at estimates of the number of household heads and spouses with little or no financial reward to accepting a new job. A "demand shocks and job search gambles" section shows how job acceptance rewards are nonlinear in the amount of a job offer, and the final section concludes.

An Overview of the Major Tax and Subsidy Rules Affecting the Returns to Job Acceptance

Households pay three types of personal income taxes. The first type I refer to as regular federal personal income taxes, by which I mean the taxes on line 44 of federal form 1040, before various credits.[3] The second type is federal personal income tax credits (considered below form

[2] Behavior in the neighborhood of 100 percent tax rates would be especially interesting if it were true that (a) when tax rates are lower and more typical of their historical values, the amount of unemployment were *insensitive* to the amount of the UI benefits and (b) unemployment would be high if unemployment paid better than working. To see this, try drawing a graph of the relationship between unemployment and the size of UI benefits that satisfies the properties (a) and (b): it must turn or jump sharply toward high unemployment as the benefit approaches the amount of pay from working.

[3] As noted below, I assume that households take the standard deduction and do not have much asset income, so the alternative minimum tax (AMT) is not relevant. Because my analysis focuses on lower and middle income households that have marginal tax rates exceeding 70 percent, and the AMT applies at income thresholds well above the median, this assumption is accurate.

1040's line 44), of which I consider the major ones: the Earned Income Tax Credit, the Child Tax Credit, the Additional Child Tax Credit, and the Making Work Pay Tax Credit. The third is state (and/or local) personal income tax. These taxes vary with household calendar year income, household composition, and income composition.

The unemployment insurance (UI) program offers weekly cash benefits to people who have lost their jobs and have as yet been unable to find and start a new one. Each week they receive a portion of their prior job's pay until they start working again, or they stop looking for work, or their benefits are exhausted. That portion is about 44 percent (plus bonuses discussed below), up to a cap of $400 per week.[4] UI benefits are subject to personal income taxes, but not payroll taxes.

Any time that an unemployed person starts a new job, some of the compensation from that job goes to the treasury due to the employment-related taxes and due to the person's dropping off unemployment compensation and welfare rolls. The remainder of the compensation is available to enhance disposable income for the worker and his family. The part of compensation that goes to treasury revenue is a "tax" or job-acceptance penalty in the sense that it is not available to enhance the worker's disposable income. Sometimes this paper refers to job-acceptance penalty rates, which express the job acceptance penalty as a percentage of compensation of the job being accepted or, when noted accordingly, as a percentage of another measure of pay for the job being accepted.[5]

In some cases, the treasuries' combined gain from job acceptance exceeds the compensation from that job, in which case job acceptance *reduces* disposable income and the job-acceptance penalty rate exceeds one hundred percent.

Thin Margins Before the Recession: Examples from Common Tax Situations

When an unemployed person is presented with an opportunity to work, the short-term financial gain from accepting that opportunity depends on the degree to which compensation on

[4] Appendix Table 3 of Council of Economic Advisers (2011) reports an average replacement rate of 46 percent for September 2010, but this includes federal additional compensation (my 44 percent refers to the base replacement rate before adding federal additional compensation).
[5] This paper makes no distinction between accepting a new job and starting a new job.

the new job net of taxes and work expenses exceeds unemployment compensation net of taxes. Table 1 illustrates some of the arithmetic. The first column displays the additional payroll taxes (employer and employee) owed as a consequence of accepting the job, expressed as a fraction of the pre-tax, after fringes, compensation (hereafter PTAF) from that job.[6]

Hundreds of federal personal income tax situations are possible, and their rich variety is considered later in the paper. In order to help the reader appreciate the quantitatively important factors, Table 1 begins with three common situations. The first two have the same regular personal income tax rate: 15 percent federal bracket plus three percent state and local income tax.[7] The relevant rate here is a marginal rate in the sense of comparing taxes paid when accepting the job with taxes paid when remaining unemployed.

Table 1's second column records personal income taxes, leaving the Earned Income Tax Credit (EITC) and taxes on UI benefits until later columns. The third column displays possible implicit tax rates from EITC rules. The EITC is a federal income tax credit of a few thousand dollars per year paid to families with positive but low earned income (that is, wages or salaries) for a calendar year. Holding constant family composition, the EITC specifies a schedule relating the credit amount to family earnings for the year. As annual earnings increase from zero to about $9,000,[8] the credit increases. Above that, there is a range of incomes over which the credit is constant. For still higher incomes (above the maximum earnings cited above), the credit is phased out: more earnings means less credit. The maximum amount of the credit depends on family size and composition.

Depending on his earned income for the remainder of the year, and the earned income of his spouse, an unemployed person can have one of three marginal tax rates from the EITC: zero from the plateau or fully-phased-out portions, 21 percent for the phase-out portion, and minus 34 percent for the phase-in portion.[9] These three possibilities are shown separately as panels in

[6] Employer FICA contributions are not included in PTAF.
[7] A three percent state and local income tax rate can be interpreted as someone in a 3 percent state bracket and taking the standard deduction on his federal return, or someone in a somewhat higher state bracket and taking a federal income tax deduction for his state taxes.
[8] In tax year 2009, the maximum credit was reached at annual earnings of $6,000, $9,000, and $12,600 for families with zero, one, or 2+ children, respectively (United States Internal Revenue Service various issues). Adjusting for inflation, we find these amounts are about $300 greater than they were in 2007.
[9] A few other brackets are possible, such as 16 for households with one child. A work decision may span multiple brackets as well; all of these possibilities are considered below.

Table 1. The final expense column reflects out-of-employee-pocket costs of full-time employment, such as costs of commuting to work, assumed equal to $50 per week (e.g., $5 per one-way trip).[10]

The next three columns display foregone UI and related benefits. Suppose for the moment that an unemployed person has the opportunity to return to work on a job that pays as well as his previous job, which paid no more than $900 per week (so that UI benefits are below the cap). Before the ARRA, accepting the job would stop his unemployment benefits, which amount to 36 percent of PTAF after personal income taxes (for someone in the 18 percent bracket).

The combination of taxes, employment expenses, and foregone after-tax UI amounts to 78 percent of PTAF in 2007 for someone with a zero marginal EITC. Another possibility is that the unemployed person's household was on the phase-out portion of the Earned Income Tax Credit (EITC), so that its combined penalty was 99 percent of PTAF, under 2007 tax and UI rules. Arguably the tax code provided more help to unemployed people than the unemployment insurance system itself. A possibility shown in the third panel is that the unemployed person's household was on the phase-in portion of the Earned Income Tax Credit (EITC), in which case they must be in the zero percent personal income tax bracket, so that its combined penalty was 34 percent of PTAF under 2007 tax and UI rules.

All of this assumes that the new job offer has the same PTAF as the previous job did, but presumably a significant fraction of persons laid off are not offered new jobs that pay as well. If instead the previous job paid 20 percent more (but still less than $900 per week), then the combined penalties would be 85 percent rather than the 78 percent shown in the table for a person in the zero marginal EITC range.

Work has long-term costs and benefits that are not considered here. For example, workers may forgo schooling as a result of working, or obtain training on the job. Some of the payroll taxes paid while working may, in effect, be returned in old age as a consequence of

[10] For the moment, I assume that childcare costs are zero.

public pension benefit formulae.[11] Workers are sometimes sustain long-term injuries while at work.

For Many, the ARRA Erased the Financial Rewards from Going Back to Work

Even without these wage cut or EITC phase-out scenarios, the UI and related bonuses provided by the 2009 American Recovery and Reinvestment Act were enough to essentially erase the financial reward to working for millions of unemployed people. The Act's Federal Additional Compensation (FAC) provision paid a $25 weekly bonus to UI beneficiaries ($21 after taxes in the 18 percent bracket), and guaranteed that the bonus would not make them ineligible for Medicaid. At $600 PTAF, FAC by itself is another 3% of PTAF.[12] For unemployed persons who had health insurance on their previous job and were continuing it through the COBRA provision, the ARRA had the federal government pick up 65 percent of the tab, which is roughly 30 percent of PTAF. The "2009, actual" rows of Table 1 show how the combined penalties under the ARRA were about 100 percent of PTAF.

PTAF – compensation before taxes but after fringes – is a familiar salary benchmark but has limited economic meaning because it is neither employer cost nor the employee benefit of working. The final two columns of the Table convert PTAF percentages into percentages of total worker production under two alternative assumptions. The 1.077 column assumes that the only fringe is employer FICA equal 7.65 percent of PTAF. In order to consider the financial rewards to accepting a job that offers health insurance, the final column adds employer contributions for

[11] Feldstein and Samwick (1992) examine this effect and find that the youngest age group, which make up the bulk of my 100-percent-plus penalty rate groups, obtains an expected benefit of working ranging from 0.7 to 1.7 percent of PTAF in the form additional social security wealth (6 percent annual discount rate). If their study were updated to the present to reflect future policy uncertainty (Holst 2012) and the increasingly likely possibility of future means-tests of Social Security and Medicare, this benefit would be even less, and perhaps negative, which is why my calculations treat it as zero.

[12] In 2007 (before the recession began), the $600 PTAF was at the 43rd percentile of weekly earnings among household heads and spouses with positive earnings during the survey week. Note that unemployment is more common among less skilled groups, and that alternative weekly earnings amounts are considered later in the paper according to their prevalence.

health insurance (assumed to be 65 percent of the total weekly cost of $251) to get total compensation.[13]

Thanks to these two ARRA provisions on top of previous UI rules, an unemployed person whose new job opportunities did not offer health insurance might well determine that continuing unemployment provides more disposable income. As suggested by the 96 percent entry in the final column, even someone offered a job with the same pay and health insurance as his previous job may nonetheless find essentially no short-term financial gain to starting it as long as the UI and ARRA add-ons continued.

Bigger Stimulus, No Incentives

Christina Romer (one of the architects of the ARRA), Joseph Stiglitz, Paul Krugman, Ken Rogoff, Mark Zandi, and other noted economists have said that the ARRA was not ambitious enough to get the recovery going and thought it should have been bigger.[14] We will never know exactly what provisions would have been included in a hypothetical "bigger stimulus," but it is clear that the ARRA's architects thought that protecting the most vulnerable also served as an "automatic stabilizer," increasing employment and GDP. Thus, it is worth considering a bigger stimulus with more protection for the poor and vulnerable.[15]

Table 2 lists the additional safety net expansions included in my model of bigger stimulus. The ARRA exempted $2,400 of UI from 2009 federal personal income tax; my hypothetical stimulus exempts $7,400. The ARRA's Federal Additional Compensation (FAC) paid a weekly $25 bonus to UI recipients and exempts the FAC from Medicaid eligibility tests; my hypothetical stimulus adds another $50 per week and exempts all UI from SNAP and

[13] Note that, when expressed as a share of total compensation, my penalty rates reflect the combined effect of taxes and subsidies on incentives as measured by the slope of the household budget constraint between non-work time and disposable income. For the purposes of analyzing the value of insurance, one might want to express penalty rates as a ratio to the disposable income when working (rather than total compensation when working), because this ratio would better reflect the relative consumption of the unemployed (OECD 2007). For either purpose, the value of fringe benefits should be included.

[14] See Summers (2008) and Romer (2012).

[15] Paul Krugman has been explicit about the role of safety net expansions in a bigger stimulus "…one more channel through which government spending could provide a fairly quick boost to the economy: more aid to distressed individuals, by means of a temporary increase in the generosity of unemployment insurance and other safety net programs. There was some of this in the original stimulus, but not enough …." (Krugman 2012, 216)

Medicaid income formulas. The ARRA subsidized 65 percent of COBRA payments by UI recipients; my hypothetical stimulus subsidizes 90 percent. The ARRA increased the SNAP maximum benefit 13.6 percent, on top of a 8.5 percent increase that went into effect six months earlier; my hypothetical stimulus increases it another 20 percent.

Some of the results are shown in Table 1, but recall that the table assumes no Medicaid or SNAP participation. The bigger stimulus fully erases the short-term financial reward from accepting a $600 weekly job – even one providing health insurance – except for a slim reward that remains for unemployed persons on the phase-in part of the EITC (see the last row of the table).

Program eligibility rule changes between 2007 and 2009 need to be considered for the purpose of calculating changes in marginal tax rates over time. However, this paper's purpose is merely to estimate the number of persons with large marginal tax rate levels in 2009, so for simplicity all of the calculations pertain to 2009 program eligibility rules.

Job Acceptance Penalties and Layoff Subsidies

Because Table 1 is based on comparisons of disposable income when unemployed to disposable income when employed, its job acceptance penalties are also layoff subsidies for persons working at firms that do not accrue UI tax liabilities on their next layoff. Ratner (2012) estimates that 24.3 percent of employers are in that position because they pay either the minimum or maximum UI tax rate.[16] Table 1 tells us that, for employees with health insurance in such firms who are in the 15 percent federal personal income tax bracket, governments plus forgone employment expense would replace 108 percent of the PTAF lost due to a layoff, which is 80 percent of the job's total compensation.[17] Under 2007 rules, the 2009 layoff subsidy rate would have been 78 percent of PTAF rather than the actual 108 percent. Under a bigger stimulus, *a layoff would increase the joint after-tax income of employer and employee*.

[16] His percentage is probably an underestimate, because he assumes that UI tax rates are uniform within state-by-industries.

[17] If someone is receiving the COBRA subsidy, then he must have been laid off from a job providing health insurance, which is why the text refers to the last column of Table 1, rather than the second-to-last.

Ratner (2012) also estimates that the average employer would be liable for about 60 percent of the regular state UI benefits received by the next layoff, which makes the percentage 79 for those employers that are not at the minimum or maximum rate (hereafter, experience-rated firms). 52 percent of total UI benefits paid in 2009 and 2010 were regular state benefits, so I assume that 41 percent (= 60*0.52/0.757) of the UI benefits that would be received (after layoff) by the estimated 75.7 percent of employees whose layoff would accrue as an additional UI tax liability for their former employer. When the employer liability is subtracted from the former employee's UI benefit, the entries in the "UI" and "Combined" columns of Table 1 are reduced by 18 percentage points.[18] In the top panel, for example, the combined penalties are reduced to 60, 90, and 118 percent of PTAF from 78, 108, and 136 percent, respectively.[19] Thus, among employees at experience-rated firms and not on the phase-out portion of the EITC, the 2009 layoff subsidies are large under actual or 2007 rules, but less than one hundred percent (but see below on the added employment expenses associated with childcare).

Estimates of the Number of People with Incentives Erased

Table 1 helps illustrate the relative quantitative importance of tax, credit, and subsidy provisions to the financial rewards to working, but it does not contain all of the possible scenarios faced by unemployed persons in 2007 or in 2009. Among other things, the 2009 rows of Table 1 apply to persons with a $600 weekly job offer, and considers only a 15 percent federal personal income tax bracket.

[18] 0.18 = 0.44*0.41. Federal Additional Compensation was federally funded and therefore did not create a liability for former employers. In order to calculate the adjustment to the final column of the table (the second-to-last column is not relevant for layoff penalties because the job before layoff is assumed to have health insurance), scale the 18 percentage points by the factor at the top of the column to get a subtraction of 14 percentage points.

[19] In subtracting 18 percentage points from all of Table 1's rows, we are holding constant the duration of unemployment benefits. The ARRA did not affect the duration of benefits, but, between 2007 and 2009, other legislation increased the maximum duration of benefits from 26 weeks to up to 99 weeks. One way to examine the effect of benefit duration on the layoff subsidy for an employee an at experience-rated firm would be to subtract an additional 17 percentage points from the "UI" and "combined" columns of Table 1's "2007, actual" rows (0.17 = 0.44*60*(1-0.52)/0.757). For example, the combination of the ARRA and UI duration extensions was to increase the layoff penalty for employees in experience-rated firms who are in the 15 percent federal personal income tax bracket from 34 to 82 percent of PTAF.

We know that recently unemployed household heads and spouses are unlikely to be on the phase-in portion of the EITC because, with the exception of persons laid off near January 1, their calendar year income includes earnings from the previous job. Moreover, among the general population of tax return filers, it is much more common to be on the zero marginal EITC or phase-out portions of the EITC schedule than on the phase-in portion (Meyer 2007). The top two panels of Table 1 therefore deserve the most weight, but still it would be nice to have quantitative estimates of the numbers of households in these different situations.

In order to estimate the distribution of what people in 2009 might have earned if they had been working full-time, I began with the March 2008 Current Population Survey Annual Demographic File. I selected non-elderly household heads and spouses who work full-time in 2007, and calculated their PTAF average weekly earnings during the weeks at work in 2007, rounded to the nearest $100.

For each PTAF weekly earnings amount 300 through 2,000, married versus unmarried, number of children (truncated at 2), with and without employer health insurance, and alternative assumptions about the ratio between the offer wage and previous wage, I calculated three incentive-related parameters: (a) total compensation from accepting a job offer, including the value of employer-provided health insurance and (as a negative) $50 of weekly employment costs, (b) the net weekly gain or loss of disposable income from working including taxes and subsidies, and (c) the replacement rate as one minus the net gain as the ratio to total compensation.

Subsidies include UI, FAC, the COBRA subsidy, SNAP, and Medicaid using, unless otherwise noted, the benefit and eligibility formulas in place in 2009 after the ARRA was in place.[20] See also Table 3. The dollar value of Medicaid participation is taken as one-half the amount the program spends on medical care per non-elderly non-disabled participant, times the number of family members who are calculated to be Medicaid eligible on the basis of weekly income. The dollar value of employer-provided health insurance is taken to be $63 per week per

[20] I assume a single adult Medicaid income-eligibility threshold for the entire nation of 84% of the federal poverty line, which is the cross-state average of state-specific thresholds, weighted by each state's population in 2010. I assume a single Medicaid income-eligibility threshold for all children (age 18 and under) of 141% of the federal poverty line, which is the cross-state average of state-specific thresholds for children aged 1-5 (many states have different thresholds for infants and for older children), weighted by each state's population in 2010.

family member, of which 65 percent is paid by employer or, for unemployed people on COBRA, by the federal government pursuant to the ARRA.[21] Taxes include the federal EITC, Child Tax Credit (CTC), Additional Child Tax Credit (ACTC), and Making Work Pay Tax Credit (MWPTC). In order to calculate personal taxes and credits, I use the actual personal income tax schedules for a household taking its standard deduction and assume that: the work decision interval is 16 weeks, the person was unemployed six weeks and employed 30 weeks during the remainder of the calendar year, employees with health insurance pay 35 percent of the premiums and those payments are excluded from the payroll and personal income tax bases, and the spouse (if any) earns $600 weekly PTAF throughout the calendar year.[22] For example, this scenario might represent a person who worked during the first part of 2009, was laid off July 31, and received his first job offer to start working September 14, at which point he considered accepting the job or remaining unemployed for the last 16 weeks of the calendar year.[23] Appendix I displays the calculation details for two example tax situations.

For a person with a $600 weekly job offer and living in a household with weekly income above 141 percent of the poverty line even when not working and in the 15 percent federal personal income tax bracket, the results are already shown in Table 1 because the table excludes SNAP and Medicaid and his household is ineligible for those programs. But I also made the calculations for other hypothetical households and then matched the results on PTAF weekly earnings, marital status, etc., with the March 2008 CPS respondents (employed during 2007) noted above. For the CPS respondents without health insurance from their employer (e.g., they participated in a spouse's plan), zero COBRA subsidy benefits were assigned. Unless otherwise noted, I assume that all households passing the income-eligibility test for SNAP or Medicaid also pass the asset test for that program and thereby participate in the program.

[21] Crimmel (2010) finds that the average family health insurance plan purchased through employers cost $13,027 per year.

[22] State personal income taxes are taken as three percent of federal taxable income. Note that, for simplicity, Table 1 did not exclude health insurance premiums paid by employee from taxable income (the rest of the paper does account for the exclusion). The exclusion has no effect on rates for persons considering a job that does not offer health insurance. Otherwise, at $600 weekly PTAF, the payroll, PIT, and EITC percentages in Table 1 are reduced by a factor of 0.86 (e.g., from 15.3 percent to 13.2 percent).

[23] Also note that the mean (median) duration of unemployment during the recession peaked 23 (13) weeks higher than it was when the recession began, respectively (Federal Reserve Bank of St. Louis 2012).

Distributions of Job Acceptance Penalty Rates

Table 4 shows the distribution of job acceptance penalty rates conditional on layoff and program participation for each of the three scenarios.[24] Entries in top half of the table show how many non-elderly people who, if they held the same job as they did in 2007 and then were laid off in 2009, would find that the revenue for public treasuries resulting from their accepting a job like their previous one be 0-69 percent of the total compensation from the new position, 70-79 percent, 80-89 percent, 90-99 percent, and 100+ percent, respectively.[25] For example, 5.0 million would see that 90-99 percent of the compensation from their new job would enhance treasury revenue by adding to treasury revenue or subtracting from safety net program expenditures. The other 1-10 percent would add to the worker's disposable income. Of that 5.0 million, only 2.8 million would have had job-acceptance penalties in the 90-99 range if the 2007 tax and subsidy rules had been in place.

Many people do not find the same job as they had prior to layoff. Studies of displaced workers find that a few find higher-paying jobs, but that on average the new job pays about 17 percent less than the prior one.[26] The bottom half of Table 4 therefore considers penalties for accepting a job paying 17 percent less than the previous one (but with the same health insurance status). For example, under actual tax and benefit rules, 5.0 million workers were in a position that a layoff would give them more net income while unemployed than they would get by accepting a position paying 17 percent less.

Many people were never presented with these job acceptance incentives because they were not laid off during the recession. According to JOLTS, 40.4 million layoffs occurred in 2009 and the second half of 2008, although many of these layoffs were not household heads and spouses. I multiplied the monthly JOLTS layoffs by monthly CPS data on the fraction of persons unemployed 0-4 weeks who were non-elderly heads or spouses to calculate a monthly

[24] Appendix II discusses empirical participation rates and presents sensitivity analysis.
[25] Sample respondents with average weekly earnings greater than or equal to 2,050 were assigned to the 0-69 percent category without calculating an exact value for their penalty rate. They were less than 8 percent of the sample, and even less when weighted by their propensity to experience unemployment in 2009.
[26] Ruhm (1991), Schoeni and Dardia (1996), and Topel (1990) each find average percentage wage changes of about -17. Jacobson, LaLonde and Sullivan (1993) find the average percentage to be a bit more negative: -25.

estimate of the number of heads and spouses laid off.[27] The total of those layoffs for 2009 and the second half of 2008 was 23.3 million.

The heads and spouses represented on the various rows of Table 4 are not equally likely to experience unemployment during the recession. In order to quantify this likelihood, I estimated a probit model using the March 2010 CPS respondents who were non-elderly household heads and spouses and worked full-time in the prior year. The dependent variable was whether the respondent experienced any unemployment during 2009 and the independent variables were indicator variables for having employer health insurance, being married with spouse present, having 0, 1, or 2+ children, and for weekly cash earnings (rounded to the nearest 100 and, to keep cell sizes nonzero, truncated below at 300 and above at 2,100).

The probit estimates were used to predict unemployment probabilities to each of the respondents in my March 2008 CPS sample cited above. Those likelihoods varied across the penalty rate groups shown in Table 4: the lowest penalty group's likelihood was 70 or 80 percent of the overall average likelihood (depending on the year and the assumed ratio of offer to prior earnings) while the 100+ group's likelihood was almost triple the average. In order to allocate the 23.3 million layoffs among the penalty rate groups, I multiplied these likelihoods by the absolute numbers shown in Table 4 and show the results in Table 5.

Table 5's entries are interpreted as the number of times that household heads and spouses experienced the various penalty rates, or would have experienced them under alternative scenarios. Table 5 estimates that 1.9 million non-elderly heads and spouses actually laid off from their jobs in 2009 or late 2008 had 90-99 percent penalties for accepting a job with the same wage as on the prior job (top panel), and accepting job that paid 17 percent less would have a penalty rate in that range for 2.8 million (middle panel).[28] An estimated 4.0 million had penalties of at least 90 percent for accepting a job with the same wage as on the prior job.

The 4.0 million result would have been only 1.8 million if 2007 tax and subsidy rules had been in place: the new tax and subsidy rules between 2007 and 2009 increased by 2.2 million the

[27] The JOLT layoffs for month *t* are merged with the CPS fraction for month *t*+1.
[28] The job offers considered in the top and middle panels are assumed to have the same health insurance offering as the previous job did. Recall that the previous job's health insurance offering determines eligibility for the COBRA subsidy.

number of non-elderly household heads and spouses facing penalty rates of at least 90 percent. Those are 2.2 million people with essentially all of the reward to working erased by the new tax and benefit rules.[29] 2.2 million is significant when compared to the total 4.6 million increase from 2007 to 2010 in the number of non-elderly household heads and spouses who were unemployed (Mulligan 2012).

The middle panel of Table 5 categorizes unemployed household heads and spouses by their penalties for accepting a job that paid 17 percent less than the previous job and had the same health insurance offering. The actual 2009 tax and benefit rules pushed penalty rates above 90 percent for 3.2 million household heads and spouses for whom penalties would have been less than 90 percent under the 2007 rules. 5.1 million had their rates pushed above 80 percent by the 2009 ARRA rules. With millions household heads and spouses having their work incentives essentially eliminated by the ARRA, perhaps it is surprising that "only" 4.6 million household heads and spouses were added to the unemployed over that timeframe.

The bottom panel of Table 5 categorizes unemployed non-elderly household heads and spouses by their penalties for accepting a job that paid the same as the previous job, but did not offer health insurance. The scenario is relevant because more employers dropped health insurance during the recession than initiated it, and some of the changes in the industry composition of employment were in the direction of industries without employer-provided health insurance (White and Reschovsky 2012). For respondents that received health insurance on their previous job, the penalty rates in the bottom panel are different than they are in the top panel because total compensation includes the value of the health insurance offer. Four million unemployed would be penalized at least 100 percent for accepting such a job, 3.6 million of which were in that situation because of the ARRA's new tax and benefit rules.

The final column of Table 5 shows how many household heads and spouses would have had their work incentives erased by a bigger stimulus, *in addition to* those whose incentives were erased by the actual stimulus. An additional 4.4 million would have had incentives (for accepting a job with the same wage) fully erased. An additional 7.1 million would have their

[29] The differences between any two scenarios shown in the table are net differences and in principle do not reflect the number of people who would have the tax rate under one scenario but do not have it under the other. However, less than 5 percent of the CPS respondents had a larger penalty rate under 2007 rules, so essentially everyone either stays in the same penalty rate category under the two scenarios or are in a lower one under 2007 rules.

incentives largely erased – that is, acceptance penalties pushed beyond 90 percent of total compensation. Thus, assuming that the actual ARRA had some depressing effect on the labor market by erasing incentives, the breadth of that effect would have been two or three times larger with a bigger stimulus.

Tables 1-5 include a full-time employment-related expense of only $50 per week, which can be interpreted as a commuting cost ($5 for each one-way trip). But workers with young children have significantly greater employment-related expenses, and are also especially likely to have job acceptance penalty rates (as calculated above) between 90 and 99 percent. Because 90 percent of workers with children in the 90-99 percent penalty rate bracket have a net short-term financial gain from working of less than $60 per week (all of them have less than $90), any reasonable estimate of their childcare costs would push penalty rate estimates for most of these families over 100 percent.

Estimating childcare costs for each family type is beyond the scope of this paper, but it is easy to show how the results vary with assumed values for childcare costs. For example the OECD estimated that out-of-pocket childcare costs in the United States were about $80 per week per young child in 2005.[30] If I assume that costs for older children are $8 per week, and include childcare costs among the employment expenses, then 3.1 million household heads and spouses had a penalty rate of at least 100 percent for accepting a job with the same pay as the previous one (compare to 2.0 million in Table 5, which assumes zero childcare costs). 3.7 million had a penalty rate of at least 100 percent for accepting a job that pays 17 percent less.

Characteristics of the Unemployed with Penalty Rates of at Least 100 Percent

Table 6 displays characteristics of unemployed persons with job acceptance penalty rates of at least 100 percent under the three scenarios. The top row shows that 8 percent of all non-elderly household heads and spouses receiving UI in 2009 had job-acceptance penalty rates of at least 100 percent. The top row also shows that 1 (26) percent of the same population would have

[30] As part of their estimates for families with two small children, OECD (2007, Figure 4.2B) shows out-of-pocket costs of 27 percent of the average wage, which they take to be $593 per week (80 = 0.27*593/2).

had job-acceptance penalty rates of at least 100 percent under 2007 (bigger stimulus) tax and subsidy rules, respectively.

Persons moving between lower-paying jobs are more likely to have job-acceptance penalty rates of 100 percent or more.[31] At or above median weekly earnings (about $700), the likelihood is quite low, even under bigger stimulus. Young persons, persons with less schooling, non-whites, and persons with more children are more likely to be in the top penalty-rate group. Women and unmarried people are also more likely to be in the top penalty-rate group.

Table 7 displays the nine tax situations represented among the unemployed for whom I estimate a penalty rate of 100 percent or more relative to accepting a job in 2009 with the same pay as the previous one, under actual tax and subsidy rules. Eight of them receive Medicaid when unemployed and, among those, some of them also receive Medicaid for their children when working (in which case the Medicaid does not contribute to the job acceptance penalty). Nevertheless, penalty rates would still be close to one hundred percent even without Medicaid because Medicaid is not all that valuable as compared to the total compensation from going back to work.

In seven of the nine tax situations, food stamps (SNAP) are received when not working. However, the amount of the benefit is low because UI income counts as household income for the purposes of calculating the SNAP benefit. SNAP would contribute more to penalty rates for unemployed persons not receiving UI.

Most of the tax situations feature low personal income tax rates because the household would be in the zero percent bracket if it remained unemployed. Thus, part of the income from accepting a new job goes untaxed by the personal income tax. However, accepting a job can reduce a household's earning income tax credit (EITC), as it does for eight of the nine tax situations shown in Table 7, because the some of the earned income from the prior job was received during calendar year 2009 and was enough to put the household on or near the phase-out range for the EITC. Ironically, the earned income tax credit can contribute to the penalty for earning additional income by way of accepting a new job.

[31] The propensity for 100+ percent penalty rates is not always monotone in income because, in some ranges, more income pushes a household onto the phase-out range for the EITC, SNAP, and/or Medicaid, and the additional marginal taxes are enough to put the total over 100 percent.

All nine tax situations involve a previous job, and a job offer, that does not offer health insurance. Thus, the COBRA subsidy is not received and total compensation is simply PTAF (that is income before taxes and after fringes) plus employer payroll taxes.

Because a number of the tax situations involve persons laid off from a job paying $250-349 per week (almost half of persons earning in that category have penalty rates of 100+ percent for accepting a job with the same pay and more than three-quarters have penalty rates of at least 90 percent), my quantitative results depend on estimates of the number of non-elderly household heads and spouses in that situation. The 2008 CPS Annual Demographic file used in my analysis says that 6.4 percent of non-elderly household heads and spouses employed some time during 2007 had average weekly earnings in that range, and those persons worked 6.1 percent of the aggregate weeks in 2007. By comparison, the 2007 monthly CPS Merged Outgoing Rotation Group (CPS-MORG) files, which in combination measure earnings during twelve weeks of 2007 (one in each month), shows that 8.2 percent of employed non-elderly household heads and spouses were earning $250-349 during the survey week. Thus, the CPS-MORG estimates do not suggest that I have overestimated the number of persons earning in that range.[32]

Distributions of Layoff Subsidy Rates

As above, I consider two layoff subsidy scenarios. In one scenario, representing 24.3 percent of the 2007 workforce, the layoff subsidy is identical to the job acceptance penalty calculated for the top panel of Table 4 because the layoff does not create an additional UI tax liability for the employer. The second scenario applies to employees at experience-rated firms: their layoffs create an additional UI tax liability equal to 41 percent of their pre-tax UI benefit (not including FAC). For the second scenario, the layoff subsidy rate is calculated by reducing the numerator of the job acceptance penalty rate by the amount of the additional UI tax liability. As noted above, the adjustment for persons with $900 or less weekly PTAF amounts to a

[32] Weekly earnings can vary during the calendar year, so that the distribution of point-in-time weekly earnings can be wider than the distribution of calendar year average weekly earnings. Both earnings concepts are relevant for estimating job acceptance penalty rates: the point-in-time measure may better reflect the amount of a job offer whereas the annual average better reflects income for personal income tax purposes.

subtraction of 18 percentage points from the job acceptance penalty rate expressed as a percentage of PTAF.[33]

I estimate the distribution of layoff subsidy rates by taking the respondents appearing Table 4's distribution and randomly assigning them one of the two scenarios with probability 0.243 and 0.757, respectively.[34] The results are shown in Table 8. Under 2007 tax and subsidy rules, about 100,000 employed household heads would have their layoff subsidized one hundred percent or more – that is, a layoff would not reduce (and might increase) the employee's income after subsidies and taxes (both employer and employee).[35] 2009 tax and benefit rules increased that number to 1.2 million, and the bigger stimulus would have increased it to more than nine million.[36]

About one million would have had layoff subsidy rates of 90 percent or more under 2007 rules. The ARRA added 2.4 million to this total, and a bigger stimulus would have added another 16 million.

It is sometimes argued that workers are ignorant, or at best slow to learn about, the incentives they face, in which case they may not have known if their job acceptance penalty rate exceeded one hundred percent. Measuring worker knowledge is beyond the scope of this paper, but layoff subsidy rates are informative about this knowledge because workers during the recession typically experienced a layoff before they faced a decision to accept a new job. Assuming people notice whether their living standards rise, fall, or stay constant, workers with 100 percent layoff subsidy rates would, as unemployed people who had recently experienced a

[33] Those with PTAF greater than $900 per week receive the $415 maximum UI benefit and the subtraction is $170 from the subsidy rate's numerator.

[34] The random assignment assumes that a person's job acceptance penalty rate is uncorrelated with the fraction of his UI benefits that add to his former employer's UI tax liability. The correlation could be positive to the extent that high skill workers (they tend to have lower job acceptance penalty rates) are more likely to work at firms paying the minimum or maximum UI tax rate. On the other hand, the correlation could be negative to the extent that high job acceptance penalty rates are associated with longer unemployment spells and thereby greater receipt of federally funded UI benefits (federally funded benefits are not charged back to former employers, and begin after the first 26 weeks of unemployment).

[35] Note that layoff subsidy rates typically vary among employers at the same employer because employees have unique tax situations. To the extent that layoffs are affected by layoff subsidy rates, they may depend more on the average subsidy rate among employees rather than a specific employee's rate.

[36] Although the fraction of layoff subsidy rates above 100 percent (Table 8) is less than the fraction of job acceptance penalty rates above 100 percent (Table 5), the absolute numbers in Table 8 can be larger because of the large number of household heads and spouses who were employed and thereby potentially laid off.

layoff, have noticed that fact and may find it easier to guess that their job acceptance penalty rate would also be in the neighborhood of 100 percent.

Demand Shocks and Job Search Gambles

For a person who formerly earned $600 per week without health insurance, Figure 1 displays the short-term impact on disposable income – net of taxes and subsidies – from accepting a job (also without health insurance) as a function of the amount of the job offer and household composition.[37] Not surprisingly, a better job offer adds more to disposable income than lesser offers do – notice that each of Figure 1's schedules slope up. More important is the fact that the schedules cross zero. By definition, rejecting a job offer has zero impact on disposable income, so that the disposable income maximizing choices form a hockey-stick-shaped envelope in Figure 1: beginning at the left with the horizontal axis and following the relevant schedule as it rises above the horizontal axis.

Demand shocks to the person's occupation, industry, or nation would cause movements along the relevant schedule in Figure 1, as an adverse demand shock would reduce offer wages. Changes in the generosity of safety net programs cause the schedules to shift: the ARRA shifted them down, and make unemployment less unattractive relative to work at a given offer wage. ARRA and demand shocks thereby interact to affect unemployment: unemployment is a more likely result of an adverse demand shock if experienced under the ARRA than if the same demand shock were experienced under 2007 tax and subsidy rules (see also Sargent and Ljungqvist (1998)).

Assuming for the moment that people maximize disposable income, the convex shape of the hockey stick indicates a possible demand for gambles with respect to job offers. Consider the schedule for an unmarried person with two children. Obtaining and accepting a job offer no better than the previous one – $600 per week without health insurance – would reduce disposable income and could thereby be truncated at zero loss by rejecting it. As a result, even a 10 percent

[37] For the purposes of these calculations, a married person obtaining health insurance through her spouse's employer is without health insurance, because any health insurance offered by a job is not valued. Figure 2 shows results for a person whose prior job and offer job both provide health insurance.

chance of getting a job that pays $200 more than the previous one has more expected disposable income than a 100 percent chance of getting a $600 job.

People do not generally maximize disposable income, as many of them value their time and might choose a situation in which they had more free time and less disposable income. This possibility can be illustrated in a diagram like Figure 1's by comparing any of its financial reward schedules to a horizontal schedule representing the value of non-financial benefits of not working (relative to working).[38] Worker choice can be modeled as the maximum of the financial reward schedule and the horizontal non-financial benefit schedule, which is again a convex hockey-stick-shaped enveloped that suggests a possible demand for gambles with respect to job offers.

The amount of the subsidy to gambles with respect to job offers depends on where the financial reward schedule crosses the horizontal non-financial benefits schedule. If they crossed far outside the reasonable range of job offers, the demand for job-offer gambles would likely be minimal. Thus, the fact that the stimulus law changed the (horizontal axis) crossing point from quite a low wage to wages much closer to what the unemployed earned on their previous job suggests that the stimulus law may have increased the demand for job-offer gambles and might thereby help explain why many job vacancies had multiple job applicants. In other words, the stimulus law subsidized the job search practice of applying for jobs that have many applicants.

Conclusions

Before the recession began, going from unemployment back to work did not pay that well for someone eligible for unemployment benefits, but almost always paid a little something, with at least twenty percent of compensation from a job going toward enhancing the new employee's disposable income above what it was during the spell. Despite its inclusion of a "making work pay" tax credit and its expansion of the "earned income tax credit," the ARRA increased

[38] This schedule could in principle be negative to the degree that people obtain non-financial benefits from working. Job training is one such possibility. However, when the non-financial benefits from working become large enough that the employee pays the employer, that is usually measured as "school attendance" rather than "employment."

marginal tax or "job acceptance penalty" rates for the vast majority of the unemployed and essentially erased the short-term financial benefits from working for two to three million non-elderly and unemployed household heads and spouses. About five million had their job acceptance penalty rates increased above 80 percent by the ARRA.

Layoffs have also long been subsidized by unemployment insurance and other safety net programs, but again typically public treasuries would pay for less than 90 percent of the compensation lost from a layoff, while employer and employee had to absorb the rest. When the ARRA was in full force, over three million workers could be laid off with a subsidy of 90 percent or more, and another five million with a subsidy rate of 80 to 89 percent. A bigger stimulus would have put as many as 30 million workers in that situation.

To the degree that unemployment responds to the financial incentives for working, the ARRA and other programs assisting the unemployed interact with demand shocks in determining the number unemployed: an adverse demand shock increases unemployment more under the ARRA than it would if the same demand shock were experienced under 2007 tax and subsidy rules.

None of the job acceptance rate results hinge on the increase of the duration of unemployment benefits from 26 to 99 weeks, which was achieved by legislation separate from the ARRA (United States Department of Labor 2011). I count each unemployed person only when they are laid off; the results here reflect the level of benefits delivered by tax and subsidy programs to unemployed persons beginning to receive UI. UI and other program eligibility rule changes are not considered in this paper but are important for quantifying changes in marginal tax rates between 2007 and 2009, and comparing such changes across demographic groups.[39]

My findings of large, even confiscatory, job acceptance penalty rates are not the result of "cliffs" in transfer program formulas in which many dollars of benefits are lost for earning a particular marginal dollar (Yelowitz 1995) because I look at the consequence of more "discrete" decisions of accepting a job, or initiating a layoff, that change calendar year income by thousands of dollars. Instead, my large rates reflect the *combination* of tax and subsidy rules, especially unemployment insurance. Not surprisingly, my rate estimates exceed those of

[39] See Mulligan (2012) and Mulligan (2013).

previous studies of transfer program marginal tax rates that omit unemployment insurance (Holt and Romich 2007) and exceed those of previous studies of unemployment insurance that ignored taxes (Chetty 2008).[40] But taxes, unemployment insurance, and other transfer programs have recently contributed significantly to the living standards of the poor and unemployed (Sherman 2011), so we cannot have a full understanding of the magnitude of marginal tax rates without considering the safety net broadly.

I have likely somewhat under-estimated the number of people with marginal tax rates in excess of one hundred percent because I have omitted a number of other possible sources of implicit taxes. They include other means-tested cash assistance programs such as Disability Insurance, TANF and Supplemental Security Income; means-tested housing subsidies; means-tested tuition assistance; and means-tested energy assistance programs. They also include court-enforced wage garnishment associated with the collection of delinquent consumer, tax, and child support debts.

At the same time that incentives to retain and accept jobs were erased for millions, millions were laid off from their jobs and remained unemployed for an extended duration. I estimate that 2.3 million additional non-elderly household heads and spouses were laid off in 2009 than would have been laid off if the 2000-2007 average number of layoffs had persisted through 2009. The number of unemployed household heads and spouses were about 5 million greater than normal. In other words, the extraordinary numbers of persons laid off and unemployed are of roughly the same magnitude as the numbers of persons having their incentives essentially erased by the ARRA. The fact that more persons would have had incentives erased if the ARRA had been more generous to the unemployed suggests that it is possible that a bigger stimulus would have resulted in more unemployment than the actual stimulus did.

It is beyond the scope of this paper to quantify the impacts that the large penalties for work from the ARRA (or other legislation) had on the labor market for people laid off during the

[40] A number of studies, such as Kotlikoff and Rapson (2007) and Congressional Budget Office (2012) have examined marginal tax rates of taxes and transfer programs without considering unemployment insurance. Their rates may be appropriate for quantifying long-term incentives, incentives for supplying hours per week, or job acceptance incentives for persons ineligible for unemployment insurance, but unemployment insurance must be considered for business cycle purposes, especially the recent business cycle during which most unemployment insurance benefits were not financed by the employers making the layoffs.

recent recession. Nor do I attempt to determine whether increasing marginal tax rates beyond 100 percent matters more or less than increasing them beyond, say, 70 percent. But even before obtaining such estimates we should not expect that a labor market would function normally while the private benefit to working was zero or negative. For this reason, transfer programs with one hundred percent marginal tax rates have often been criticized in the past. For example, in arguing for welfare reform, James Tobin noted in 1965 that,

> "[A 100 percent tax rate] does just that, causing needless waste and demoralization. …It is almost as if our present programs of public assistance had been consciously contrived to perpetuate the conditions they are supposed to alleviate." (Tobin 1965, 890)

Appendix I: Sample Incentive Calculations

When household heads and spouses (employed some time during 2007) are stratified by their average weekly earnings (rounded to the nearest $100), marital status, number of children, and receipt of health insurance from their employer, the most common situation (representing 1.9 percent of the sample) is married with no children earning $750-849 per week plus health insurance. I take health insurance costs to be $3,257 per family member per year, which is $125 per week for this person's family.[41] I assume that, when employed, the employee pays 35 percent of that cost, which is $44 per week, and the employer the other 65 percent. I take such a person's weekly total compensation to be $939, which is $800 PTAF plus employer contributions for health insurance (65 percent of the $125 = $81) and social security (7.65 percent of the $800, excluding the $44 employee health insurance premium from the payroll tax base). Employee payroll taxes are taken as 7.65 percent of the $800, excluding the $44 employee health insurance premium, for a total of $58 per week.

Because of spousal earnings (assumed to be $600 per week throughout the year), this person's household does not qualify for Medicaid or SNAP even when the person is unemployed. He does qualify for the COBRA subsidy when unemployed, which is worth $81 per week. Unemployment insurance is 44 percent of the $800 PTAF plus the $25 FAC, which is $377 per week. Holding constant personal income taxes and credits for the moment, this person's weekly penalty for working is $624, which is a $50 employment expense plus $58 employee payroll taxes plus $58 employer payroll taxes plus $377 foregone UI plus $81 foregone COBRA subsidy. His total compensation (including employer contributions of health insurance and social security) is $939, so his penalty rate is 66.5 percent plus personal income taxes and credits. If in a personal income tax bracket of 13 percent (federal and state combined), that would put his combined penalty rate at about 79 percent.

[41] Crimmel (2010) reports the average annual cost of a family plan provided through employers to be $13,027, which I divide by four to estimate per-person costs. Note that I count families with more than two children as having just two children, which means that no family in my sample is assigned an annual health insurance cost of more than $13,027.

With the exception of Table 1, my results are based on "exact" calculations of personal income taxes and credits under alternative job acceptance decisions, rather than assuming a particular tax bracket. For the example person discussed above, his 2009 family income is $62,179 (net of contributions for health insurance) if working 30 weeks during the year, as compared to $68,246 if working 46 weeks during the year.[42] UI income is excluded for the purpose of calculating personal income tax credits. In 2009, the first $2,400 of UI income is excluded for the purpose of calculating the regular personal income tax. The family has a $11,400 standard deduction plus two personal exemptions of $3,650 each. Using the tax tables for IRS form 1040, this household's 2009 regular personal income tax is $7,676 ($6,559) when the example person works 46 (30) weeks, respectively.[43] Its EITC is zero either way. Its Making Work Pay Tax Credit (MWPTC) is $800 either way. Thus, the 16 week work decision adds $1,117 to total personal income tax and credits, which is $70 per week or 7.4 percent of total compensation.[44] This person's total penalty rate is therefore 73.9 percent: the 7.4 personal income tax penalty plus the 66.5 percent combined penalty noted above.

As a second example, take a married person earning $300 a week with two children and a spouse earning $600 per week. The former spouse does not receive health insurance on the job, and has a $157 weekly unemployment benefit while unemployed (44 percent of $300 plus the $25 FAC). Even when this person is out of work, family income is $757 per week and thereby well above the poverty line: the family is not eligible for Medicaid or SNAP. When the person is employed, his reward relative to unemployment is his $300 PTAF minus $23 payroll taxes minus his $50 employment expense minus his forgone $157 UI benefit: a net of $70 per week before personal income taxes and credits.

[42] The spouse is assumed to earn $31,200 for the year, and the person's annual UI income is a minimum of $2,262 because he is unemployed a minimum of 6 weeks. Under the 30-weeks-worked scenario, an additional $6,032 of UI is received plus the $22,680 earnings after HI for the 30 weeks. With 46 weeks worked, the person's annual earnings is $34,788. Due to rounding, these do not add to the amounts in the text.

[43] State personal income tax is taken to be three percent of federal taxable income, which is the subtraction of the standard deduction, personal exemptions, and the UI exclusion from total income PTAF net of employee health insurance contributions. The federal income tax and credits can also be calculated using the 2009 calculator available at http://www.dinkytown.net/java/Tax10402009.html.

[44] The household is in the 15 percent federal PIT bracket, but about half of the PTAF it generates by the work decision goes untaxed: its health insurance contributions and the part of earnings that is less than or equal to its UI benefit.

Family taxable income is $15,254 when the person works 30 weeks during the year, as compared to $19,000 when working 46 weeks.[45] The family straddles the 10 percent and 25 percent federal tax bracket: as noted in Table 7 (bottom row) the average dollar of taxable income resulting from the 16 week work decision results in $0.13 dollars of additional regular personal income tax liability (state and federal), or a total of $602. Regardless of whether the person works 30 or 46 weeks, the family gets the full MWPTC, CTC, and ACTC.

Family annual earned income is $40,200 and $45,000 when the person works 30 or 46 weeks, respectively. The EITC for a married household with two children is phased out at a 21 percent rate between family earned income of $21,450 and $45,300: every dollar of family earned income generated by the person's work decision is implicitly taxed $0.211 by the EITC for a total of $1,013.[46] When combined with the regular personal income tax, the work decision adds $1,615 to the family's annual personal income taxes, or $101 per extra week worked. These extra taxes exceed the extra $70 pre-personal-income-tax cash flow generated by working: his net-of-tax reward for working is -$31 per week. This person's weekly total compensation is $333, so his job acceptance penalty rate is 110 percent (= 1 – (–31/333)), as shown in the last row of Table 7.

Appendix II: Imperfect Take-up

The marginal tax rates in Tables 4-8 are for unemployed persons who participate in the relevant programs, especially unemployment insurance and the federal personal income tax. Scholz (1994) finds that 80-86 percent of persons eligible for the EITC in 1990 received it, Blumenthal, Erard and Ho (2005) find 89 percent in 1988, and take-up rates are presumed to have increased after 1990 as the EITC has become more generous. Almost 85 percent of unemployed persons aged 25-64 received UI in 2009 (Mulligan 2012, Figure 3.1), and the

[45] The spouse is assumed to earn $31,200 for the year, and the person's annual UI income is a minimum of $942 because he is unemployed a minimum of 6 weeks (none of this UI is taxable due to the 2,400 exclusion). Under the 30-weeks-worked scenario, an additional $2,512 of UI is received ($1,054 of this is taxable) plus the $9,000 earnings for the 30 weeks. With 46 weeks worked, the person's annual earnings is $13,800. The exemptions and standard deduction total $26,000 (the family has a $11,400 standard deduction plus four personal exemptions of $3,650 each).

[46] Even if the person were unemployed for the entire calendar year, the family would still be on the phase-out range because the spouse earns $31,200 for the year.

recipiency rate is presumably greater among unemployed household heads and spouses who were laid off from their prior jobs (rather than quitting or being fired for cause) and whose unemployment spells were not yet long enough to have exhausted their benefits. For these reasons, I suspect that take-up for UI and federal income tax credits exceeds 90 percent.

My results also include the COBRA subsidy for persons on UI who chose to stay on their former employer's plan. The estimates above, based on perfect take-up, imply that 40 percent of unemployed household heads and spouses would be receiving that subsidy because they had been receiving health insurance on their prior job rather than receiving it through a spouse, the government, or another source. United States Treasury data suggest that only 20-25 percent of those receiving UI received the COBRA subsidy in 2009 (Mulligan 2012, 81). Table 9 therefore repeats the calculations for Table 5 except that a random half of those in the March 2008 CPS sample receiving health insurance from their employer are assumed (a) not to participate in COBRA if and when they are laid off and (b) be offered a job that has health insurance (or if it has the insurance, the employee does not value it because he can obtain coverage through his spouse).

The non-participation adjustments have an ambiguous effect on the number of unemployed with high job acceptance penalty rates, which are ratios of penalty amounts to total compensation. On one hand, persons with health insurance from a former job forgo a benefit, appearing in the numerator, by not taking the COBRA subsidy. On the other hand, non-participation suggests that health insurance is not a valued part of total compensation, which appears in the denominator.[47] These two exactly cancel for the purpose of determining whose penalty rate exceeds 100 percent – that is persons whose acceptance rate numerator exceeds its denominator – because non-participation subtracts the same amount from both numerator and denominator, unless Medicaid is an alternative to COBRA in which case the subtraction from the denominator is greater. Also recall from Tables 6 and 7 that almost all of the unemployed for whom I estimate a penalty rate of 100 percent or greater would not receive the COBRA subsidy even with perfect take-up because they did not receive health insurance on the previous job. In any case, the results in Tables 5 and 9 are similar.

[47] Also note that persons with health insurance from a former job are more likely to have had higher paying jobs and thereby appear in Table 5's lower penalty rate categories.

Table 1. Short-Term Financial Penalties for Accepting a New Job

UI participants who are heads of household or spouse, offered $600 weekly on new job

Without participation in any other subsidy program. Rates are also layoff subsidies from an employee's point of view.

		Penalties as Percentages of PTAF foregone (after PIT):								Combined Penalty as % of Comp.	
		Taxes and Expenses									
Tax & UI Rules	EITC position	Payroll	PIT	EITC	Empl. Exp.	UI	FAC	COBRA subsidy	Combined	Compensation/PTAF 1.077	1.348
2007, actual	fully phased out	15%	18%	0	8%	36%	0	0	78%	72%	58%
2009, actual	fully phased out	15%	18%	0	8%	36%	3%	27%	108%	101%	80%
2009, bigger	fully phased out	15%	18%	0	8%	44%	13%	38%	136%	126%	101%
2007, actual	phase-out range	15%	18%	21%	8%	36%	0	0	99%	92%	73%
2009, actual	phase-out range	15%	18%	21%	8%	36%	3%	27%	129%	120%	96%
2009, bigger	phase-out range	15%	18%	21%	8%	44%	13%	38%	157%	146%	116%
2007, actual	phase-in range	15%	0%	-34%	8%	44%	0	0	34%	31%	25%
2009, actual	phase-in range	15%	0%	-34%	8%	44%	3%	27%	64%	60%	48%
2009, bigger	phase-in range	15%	0%	-34%	8%	44%	13%	38%	84%	78%	62%

Notes: PTAF = compensation before taxes but after fringes, which include employer FICA

PIT = personal inc. tax federal and state combined, including federal tax credits. State personal inc. tax assumed to contribute 3 percentage points

EITC = Earned Income Tax Credit

Empl. Exp. = Full-time employment expense such as commutting cost, assumed to be $50 per week

FAC = Federal Additional Compensation

Weekly COBRA expense assumed to be $251, assuming that health insurance was obtained from the prior job.

Tax and UI percentages apply to any weekly earnings level less than or equal to $900; the others refer to $600/week.

If health insurance is also part of the offered job, Compensation/PTAF is 1.348, otherwise 1.077

Table 2. Helping the Poor and Vulnerable with a Bigger Stimulus

Increase UI's exclusion from personal income tax
Increase Federal Additional Compensation from $25 to $75
Increase COBRA subsidy rate from 65% to 90%
Increase SNAP maximum benefit by an additional 20 percent
Exclude UI from SNAP and Medicaid income tests

Table 3. Tax and Subsidy Programs Included in Distribution Estimates

Program Name	Benefit modeling
Unemployment Insurance (UI)	44 percent of prior weekly earnings PTAF up to $415 cap (population-weighted average of state caps)
Federal Additional Compensation (FAC)	ARRA $25 weekly UI bonus
COBRA subsidy	Participants must be unemployed persons who had health insurance on prior job. ARRA pays 65 percent of COBRA cost.
SNAP	Benefit based on household income during the unemployment spell. Maximum benefit depends on family size and calendar time and is phased out at 30 percent rate.
Medicaid	Benefit based on household income during the unemployment spell: children are eligible at 141% of FPL and adults at 84% (population-weighted average of state thresholds). Benefit is valued at $41.31 per week per eligible family member.
Regular federal personal income tax	Standard deduction and exemptions are taken based on calendar year, family size, and marital status (head of household or married filing jointly). Form 1040 tax tables are used to calculate the tax on line 44. UI exclusion is taken when applicable.
Federal personal income tax credits	Child Tax Credit (CTC), Additional Child Tax Credit (ACTC), and Making Work Pay Tax Credit (MWPTC) calculated when applicable.
State and local personal income tax	Assumed to be three percent of income that is taxable for regular federal income tax purposes.
Payroll taxes	Both employer and employee pay 7.65 percent of PTAF

Notes: For all benefit models, family income is taken to be the sum of labor income of both spouses and UI income.
FPL = Federal Poverty Line, based on family size.
PTAF = Earnings before taxes but excluding fringes (and thereby excluding employer payroll tax).

Table 4. 2009 Job-Acceptance Penalty Rates that would Follow a Layoff

millions of non-elderly household heads and spouses employed full-time in 2007 with weekly earnings >=$300

Three different tax & subsidy rules

Accepting a job paying as much as the prior job

tax & subs. rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	70.7	96.0	37.6	96.0	0.0	22.0	96.0	0.0
70-79	20.6	25.3	38.3	58.4	33.1	15.2	74.0	15.6
80-89	1.7	4.6	11.7	20.1	15.5	21.5	58.8	38.7
90-99	2.5	3.0	5.1	8.5	5.5	19.9	37.3	28.9
100+	0.4	0.4	3.4	3.4	3.0	17.4	17.4	14.0

Accepting a job paying 17 percent less than prior job

tax & subs. rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	61.8	96.0	37.0	96.0	0.0	14.3	96.0	0.0
70-79	17.7	34.1	17.9	59.0	24.8	22.6	81.6	22.7
80-89	12.6	16.4	28.1	41.1	24.6	12.3	59.0	18.0
90-99	2.4	3.9	8.5	13.0	9.1	19.5	46.8	33.8
100+	1.4	1.4	4.4	4.4	3.0	27.3	27.3	22.9

Note: Cum. refers to the cumulative number of people with that tax rate or higher.

Table 5. 2009 Job-Acceptance Penalty Rates among Persons Actually Laid Off

millions of non-elderly household heads and spouses

Three different tax & subsidy rules

Accepting a job paying as much as the prior job

tax & subs rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	12.7	23.3	7.5	23.3	0.0	4.8	23.3	0.0
70-79	8.4	10.5	8.6	15.7	5.2	2.6	18.4	2.7
80-89	0.4	2.2	3.3	7.2	5.0	4.9	15.9	8.7
90-99	1.5	1.7	1.9	3.9	2.1	4.6	11.0	7.1
100+	0.2	0.2	2.0	2.0	1.8	6.4	6.4	4.4

Accepting a job paying 17 percent less than prior job

tax & subs. rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	10.6	23.3	7.2	23.3	0.0	3.3	23.3	0.0
70-79	5.3	12.6	3.6	16.1	3.5	3.9	20.0	3.9
80-89	5.2	7.3	7.1	12.5	5.2	2.8	16.1	3.6
90-99	1.3	2.1	3.0	5.4	3.3	4.6	13.2	7.9
100+	0.8	0.8	2.4	2.4	1.6	8.6	8.6	6.2

Accepting a job with the same cash pay, but no health insurance

tax & subs. rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	8.7	23.3	6.6	23.3	0.0	4.0	23.3	0.0
70-79	11.9	14.5	6.9	16.6	2.1	2.6	19.2	2.6
80-89	0.1	2.6	3.4	9.8	7.1	4.4	16.7	6.9
90-99	2.2	2.5	2.4	6.4	3.9	3.9	12.3	5.9
100+	0.3	0.3	4.0	4.0	3.6	8.4	8.4	4.5

Note: Penalties rates are percentages of total compensation, including fringes. Table entries are millions of persons.

Addendum: 4.6 million = 2007-2010 aggregate increase in number of unemployed non-elderly household heads and spouses.

Table 6. Fraction with Job Acceptance Penalty at Least 100%, by Demographic Characteristics
among non-elderly household heads and spouses receiving UI in 2009

	tax & subsidy rules		
	2007	2009	bigger stimulus
All	1%	8%	25%
Weekly earnings when working			
250-349	0%	45%	85%
350-449	0%	5%	91%
450-549	6%	11%	26%
650+	0%	1%	2%
Schooling			
less than HSG	1%	17%	43%
HS grad	1%	9%	32%
more than HS	1%	5%	18%
Age in 2008			
18-34	1%	12%	31%
35-49	1%	8%	24%
50-64	0%	4%	20%
Gender			
Male	0%	6%	21%
Female	1%	10%	30%
Marital Status			
No spouse present	2%	14%	28%
Spouse present	0%	4%	23%
Children			
0	0%	5%	22%
1	0%	9%	32%
2+	3%	12%	27%
Health Ins. on prior job			
No	1%	13%	30%
Yes	0%	0%	17%
Race			
Non-white	2%	11%	29%
White	1%	7%	24%

Table 7. Tax Situations Having 100+% Penalty Rates

UI participants who are heads of household or spouse. Actual 2009 tax rules

Without participation in any other subsidy program. Rates are also layoff subsidies from an employee's point of view.

	Penalties as Percentages of PTAF										Combined Penalty as % of Comp.
	Taxes and Expenses foregone:										
PTAF	Payroll	PIT	EITC	Empl. Exp.	UI	FAC	Medicaid	SNAP	COBRA subsidy	Combined	
Unmarried, no children											
300	15%	5%	7%	17%	44%	8%	14%			110%	102%
Unmarried, 1 child											
300	15%	-2%	0%	17%	44%	8%	14%	13%		109%	101%
400	15%	6%	5%	13%	44%	6%	21%	6%		115%	107%
500	15%	8%	13%	10%	44%	5%	16%	2%		114%	106%
Unmarried, 2 children											
500	15%	4%	17%	10%	44%	5%	25%	10%		129%	120%
600	15%	8%	21%	8%	44%	4%	21%	6%		127%	118%
700	15%	8%	21%	7%	44%	4%	12%	3%		113%	105%
800	15%	9%	21%	6%	44%	3%	10%	1%		110%	102%
Married, 2 children											
300	15%	13%	21%	17%	44%	8%				118%	110%

Notes: PTAF = compensation before taxes but after fringes, which include employer FICA

PIT = personal inc. tax federal and state combined, including federal tax credits

EITC = Earned Income Tax Credit

Empl. Exp. = Full-time employment expense such as commutting cost, assumed to be $50 per week

FAC = Federal Additional Compensation

None of the situations involve jobs providing health insurance.

Table 8. 2009 Layoff Subsidy Rates

millions of non-elderly household heads and spouses employed full-time in 2007 with weekly earnings >=$300

Three different tax & subsidy rules

tax & subs. rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	87.0	96.0	71.7	96.0	0.0	43.1	96.0	0.0
70-79	7.3	8.9	15.7	24.2	15.3	22.3	52.8	28.6
80-89	0.7	1.6	5.2	8.6	7.0	10.4	30.5	21.9
90-99	0.8	0.9	2.2	3.4	2.4	10.8	20.1	16.7
100+	0.1	0.1	1.2	1.2	1.1	9.3	9.3	8.1

Notes: Cum. refers to the cumulative number of people with that subsidy rate or higher.

All three tax and subsidy scenarios assume the actual duration of UI benefits (that is, up to 99 weeks).

Table 9. 2009 Job-Acceptance Penalty Rates among Persons Actually Laid Off

millions of non-elderly household heads and spouses

Three different tax & subsidy rules. Only half of COBRA-eligible taxpayers take up.

Accepting a job paying as much as the prior job

tax & subs rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	10.7	23.3	7.7	23.3	0.0	5.2	23.3	0.0
70-79	10.1	12.5	8.6	15.6	3.0	2.5	18.1	2.5
80-89	0.3	2.4	2.7	6.9	4.5	5.0	15.6	8.7
90-99	1.8	2.1	1.9	4.2	2.1	4.3	10.6	6.4
100+	0.3	0.3	2.3	2.3	2.1	6.3	6.3	4.0

Accepting a job paying 17 percent less than prior job

tax & subs. rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	9.1	23.3	7.4	23.3	0.0	3.6	23.3	0.0
70-79	5.9	14.2	3.4	15.9	1.7	3.8	19.7	3.8
80-89	5.7	8.2	7.0	12.5	4.3	2.9	15.9	3.3
90-99	1.5	2.5	2.8	5.5	3.1	4.7	12.9	7.4
100+	1.0	1.0	2.7	2.7	1.7	8.2	8.2	5.5

Accepting a job with the same cash pay, but no health insurance

tax & subs. rules:	2007, actual		2009, actual			2009, bigger stimulus		
Penalty Rate	number	cum.	number	cum.	cum. vs 2007	number	cum.	cum. vs 2009
00-69	8.7	23.3	7.2	23.3	0.0	5.3	23.3	0.0
70-79	11.9	14.5	7.8	16.0	1.5	3.7	17.9	1.9
80-89	0.1	2.6	2.8	8.2	5.6	3.9	14.2	6.0
90-99	2.2	2.5	2.1	5.5	3.0	3.4	10.3	4.9
100+	0.3	0.3	3.3	3.3	3.0	6.9	6.9	3.6

Note: Penalties rates are percentages of total compensation, including fringes. Table entries are millions of persons.

Addendum: 4.6 million = 2007-2010 aggregate increase in number of unemployed non-elderly household heads and spouses.

Figure 1. The Financial Reward for Job Acceptance

as a function of family composition

(Prior and offer job do not provide health insurance. Prior job paid $600/week)

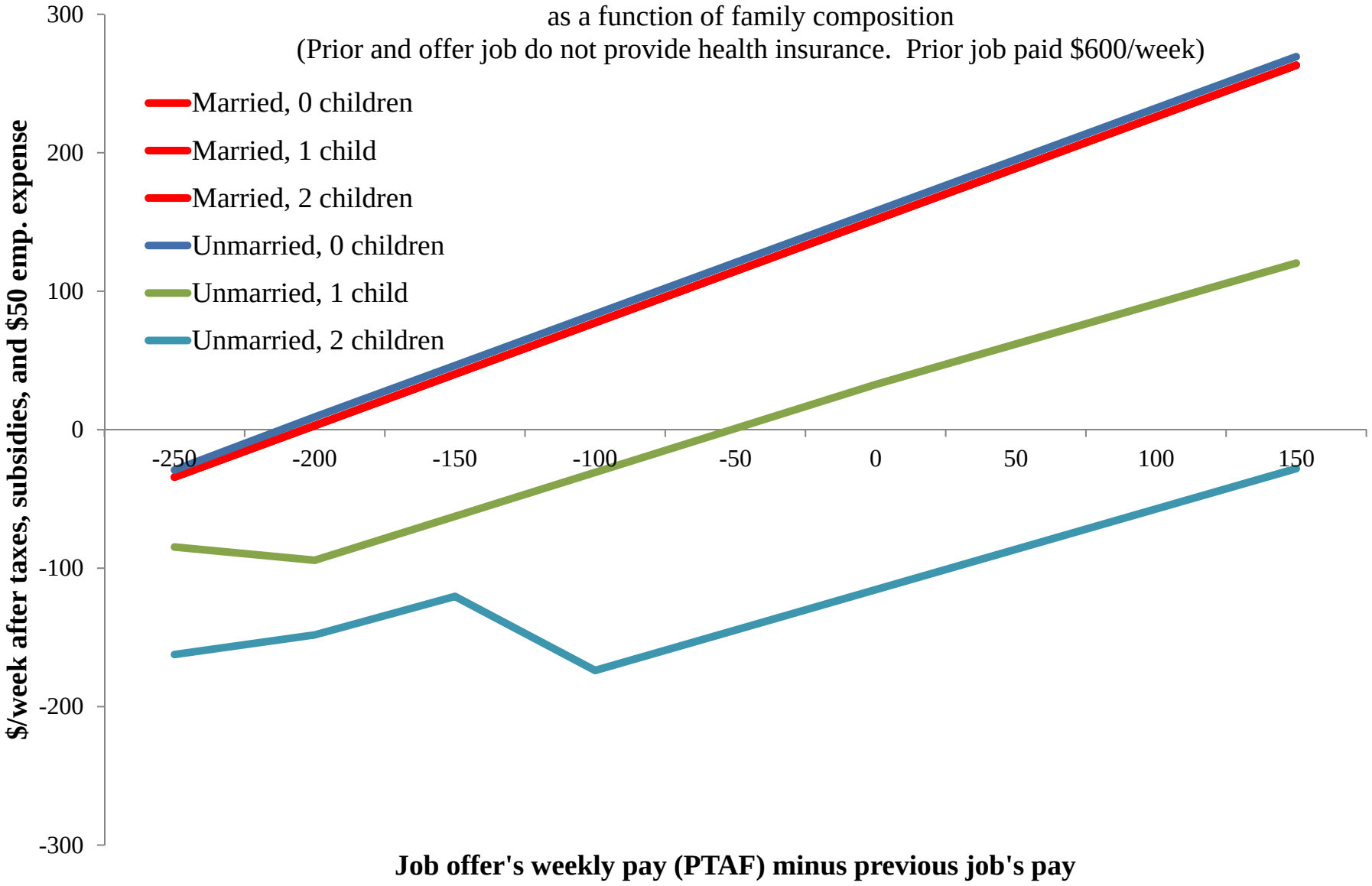
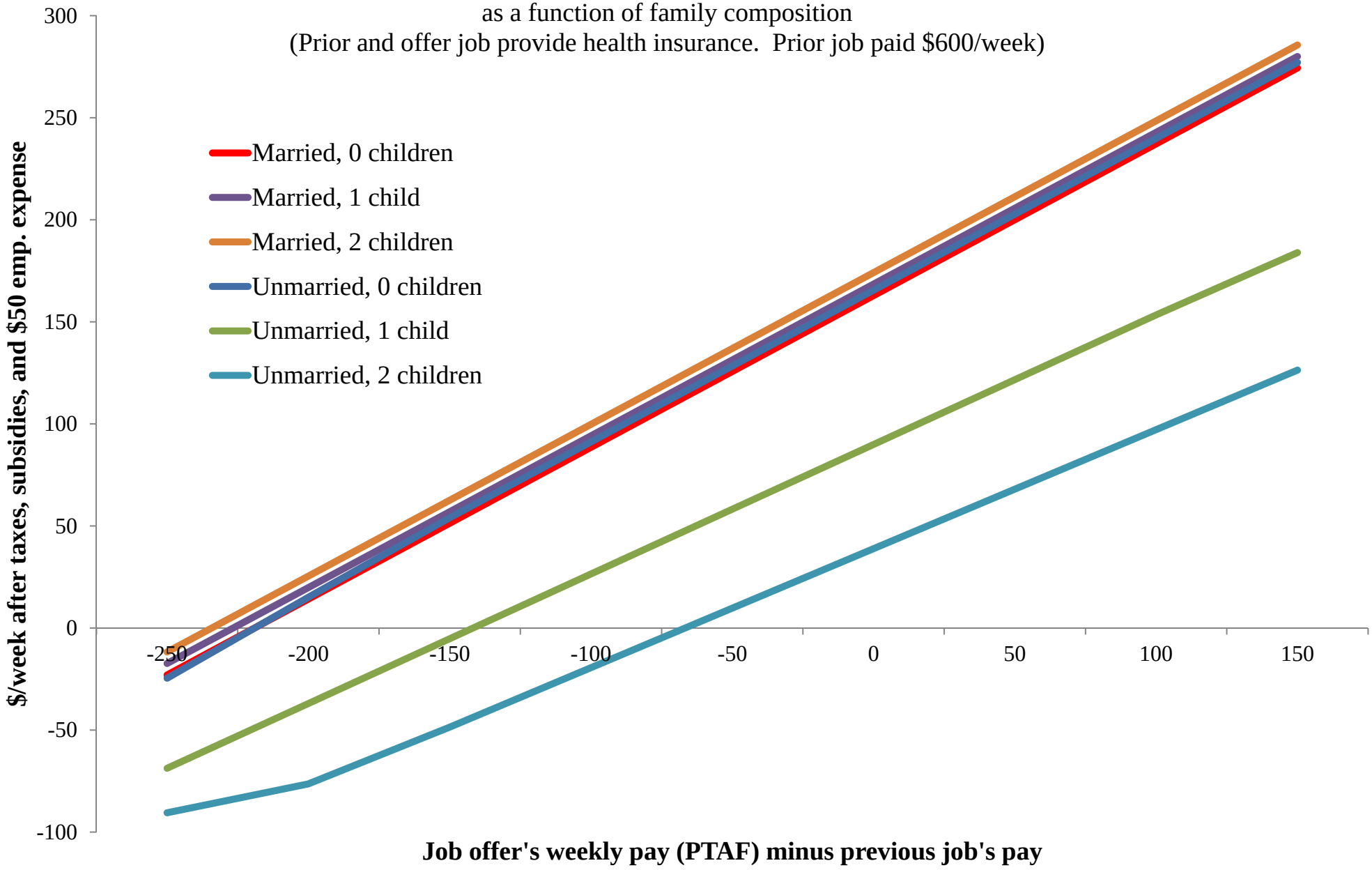


Figure 2. The Financial Reward for Job Acceptance

as a function of family composition

(Prior and offer job provide health insurance. Prior job paid $600/week)



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