# Strategies for Assisting Low-Income Families

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## Introduction

Most Americans aspire to join the middle class, but many are failing to do so. In 2011, there were 36 million working-age (25 to 55), able-bodied[1] adults in the United States whose low wages or insecure attachment to a job in combination with their family responsibilities put them in a low-income household. By low-income we mean a household in the bottom third of the income distribution. For one reason or another—lack of a job or low wages—they have failed to achieve the American dream. In this paper we look at who they are, why their incomes are low, and what might be done to help them climb the ladder and join the middle class. Throughout the paper we compare them to their more fortunate counterparts, those in the top two-thirds of the income distribution. In 2011, the upper two-thirds had an average income of approximately $65,000 while bottom-third households had only $14,000.

We focus on short, intermediate, and longer-term policies that might improve the economic prospects of low-income households. In the short-run, what they most need is jobs. In the intermediate term, even if they were employed, many of them would not earn enough to support a family unless their wages were boosted by programs such as the Earned Income Tax Credit (EITC) or a higher minimum wage. In the longer-term, they need better education and stronger families. Accordingly, we look at each of these four paths to moving more low-income households into the middle class, showing what each might achieve based on new estimates of the impact of each strategy on annual earnings.

We look first at who is a part of this bottom third group and why their incomes are so low. Our data are for 2011 (the most recent year available) and come from the Census Bureau's annual survey of households in the U.S. We begin the paper with a focus on total household income. After showing that most income comes from earned sources, we then focus entirely on annual earnings adjusted for family size.[2] One reason we do so is because the evidence suggests that earnings are more accurately reported in the data than income.

Using these data, we estimate how a return to full employment would affect their earnings. We also estimate how increasing the minimum wage to $9.00 an hour, improving education, and increasing marriages or cohabiting relationships among single parents would affect their economic circumstances.

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[1] Adults are considered to be "able-bodied" if they did not receive any type of disability income in the previous year.
[2] See appendix. Note that the family size adjustment causes the income reported to be lower than the non-adjusted figures for any family with more than one person and is one reason that our average income figures are lower than in some other reports.

In summary, we find that low-income households are disproportionately female, minority, and young. Most of these households have minor children at home, and many are headed by single parents. Their low incomes are partly due to their low wages, but even more to a lack of employment. Sixty percent of bottom-third household heads don't work at all or work less than full time, while only 40 percent work full time (40 hours a week for 50 weeks a year or 2000 hours in total). In the upper two-thirds, 86 percent of household heads work full time. Another reason for the greater success of the upper two-thirds is that they are more likely to have two earners in the family. In short, and not surprisingly, a scarcity of second earners combined with a shortage of work hours and low pay rates keep the bottom third out of the middle class. However, the most important reason by far for the low incomes of these households is a lack of work. They are less likely to be employed and work fewer hours when they do hold a job. We refer to this as the "work gap."

We then do a series of simulations to determine what might help the bottom third improve their prospects and find that some of the work gap is related to the high unemployment rates that existed in 2011. Were the economy to return to full employment, the earnings of these low-income households would increase by 15 percent and the relative earnings gap between them and the upper two-thirds would narrow considerably. This 15 percent increase reflects the impact of a stronger economy on both the availability of work, including full-time work, and higher pay. While a full-employment economy will help this group of low-income households substantially, it will not move them very far up the ladder.[3] Larger improvements in their economic status will require that they work more (even when jobs are available), obtain more education, and/or live in families with more working-age adults and/or fewer dependent children.

Even when the economy is at full employment, a work gap remains. Some individuals have trouble finding work even when jobs are plentiful because of factors such as a lack of education or skills, health problems, or a prison record. In addition, some of the work gap appears to be voluntary. Based on their own reports, many of these low-income individuals have retired early (before age 55), have returned to school as adults, or are keeping house, even though, according to the data, these activities clearly leave them and their households with a low income (less than $26,000). They may be supplementing their low incomes by drawing down their savings or by getting help from friends or relatives. They are also much more dependent than more affluent households on government assistance. Overall, one quarter of their income comes from non-earned sources, especially government programs such as unemployment insurance, welfare, veteran's benefits, disability payments to children in the household, and educational assistance. It is possible that the availability of such non-earned income has encouraged or permitted them to work less than they otherwise would. However, we believe based on other research that such effects are relatively modest.[4]

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[3] Our definition of full employment is the level of unemployment that Congressional Budget Office (CBO) predicts will prevail at the end of the current recession, projected to be 5.4 percent in 2020.

[4] The increase of unemployment benefits during the recession has been estimated to reduce employment by about a quarter of a percentage point, for example. See Levine (2013) and Rothstein (2011).

We also find that a higher minimum wage would have very small effects on this group. When we ask what would happen to the annual earnings of low-income households if all of the workers in these families earned at least $9 an hour, as recently proposed by President Obama, we find that the higher minimum wage would increase their annual earnings from $11,047 to $11,828, or by 7 percent[5], although by more than this if a higher minimum wage encouraged employers to adjust their pay practices for employees earning more than the new minimum and not just for those currently earning less than $9 an hour.[6] It is worth noting that 36 percent of low-income households contained at least one person earning less than the minimum wage. Other policies, such as a generous EITC and child care assistance may be even more helpful because they more strongly encourage (or facilitate) work in addition to supplementing income (or reducing household expenses).

Lack of education is clearly a problem for these low-income households. However, when we estimate the effects of increasing the high school graduation rate from 77 percent to 90 percent, we find that average household earnings improve by only 3 percent.

These households would also tend to move up the ladder if more of them had two earners. A surprising number of them have a second working-age adult in the household who was not employed at all in 2011. We find that if these adults were employed, low-income household earnings would rise by 22 percent. This effect would be even larger if fewer of these households were single parents and thus had another potential earner in the household. For example, when we increased marriage or cohabitation between single mothers and unrelated men who—based on their age, education, and race—looked like appropriate partners, we were able to increase the incomes of all low-income households by 4 percent.

The above estimates of the effects of a lower unemployment rate, a higher minimum wage, fewer high school dropouts, and more earners per family focus on the effects on the earnings of the entire group of bottom third households. The effects on the group specifically targeted (households with below minimum wage earnings, households with high school dropouts, and single mother households without a second earner) are far larger (see Figure 1).[7]

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[5] If we just focus on households that have at least one worker earnings less than $9/hr, our intervention raises average household earnings from $11,361 to $13,533 – a 19% increase.

[6] This does not include any effects of a higher minimum wage in both encouraging more people to work or in discouraging employers from hiring the less skilled. Based on other research, we believe both effects would be small, as well as potentially offsetting.

[7] Note that, since improving the labor market is expected to impact all low-income households, we do not show a target group for the full employment simulation.

**Figure 1: Strategies For Raising Low-Income Household Earnings**
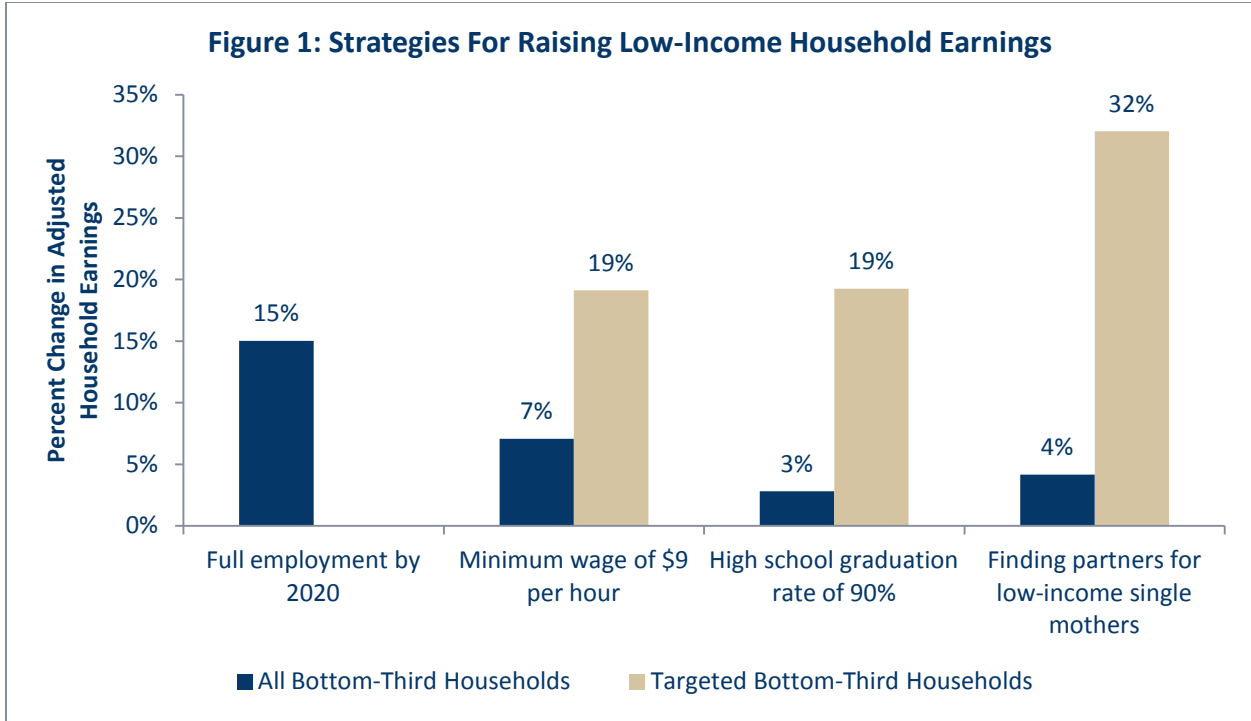


These estimates also do not take into account the likelihood that behavior may change in response to some of these impacts. For example, a higher minimum wage may induce more people to work. The presence of a second earner may cause the household head to work less, and so forth. Where such responses are likely to be important, we report on their likely magnitude in the sections that follow.

## Who is The Bottom Third?

This group of low-income households is large and diverse. It includes all able-bodied (non-disabled) adults between the ages of 25 and 55 who live in a household in the bottom third of the income distribution.[8] They are all current and potential breadwinners—the people whom, based on their age and health status, we might expect to be in the work force. We study them by constructing an up-to-date portrait of the bottom third using data gathered during the Census Bureau's March 2012 Current Population Survey (CPS). Our sample provides us with a snap shot of low-income households in 2012 and their incomes in the prior year (2011). It provides insights into how they are faring in the post-recession economy and what we might do to help them.[9]

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[8] Respondents are considered to be "able-bodied" if they did not receive disability insurance. We define "households" to be either families with children, childless married or cohabitating couples, or individuals who live on their own. To be considered a part of our sample, a household must contain at least one able-bodied, working-age (25-54) adult. For more information on how we identified households in the bottom-third of the income distribution, see the appendix.

[9] Our sample consists of 49,686 households that have at least one non-disabled, working-age (25-54) individual for a total of 153,741 people. Of these, 16,406 households and 52,687 individuals fall in the bottom-third of the household income distribution.

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Approximately 36 million working-age adults lived in these low-income households in 2012. Nearly all lived below 200% of the federal poverty line.[10] A majority of them were women, and over half were minority (Table 1). Compared to their more affluent counterparts in the upper-two-thirds of the income distribution, members of low-income households were younger, less educated, and much more likely to be single parents. They were more likely to live in households with minor children, and typically had more children to support and fewer hands to help them. In fact, while children slightly outnumbered adults in bottom-third families, the reverse was true among upper-two-thirds families.

**Table 1: Demographic Characteristics of Able-Bodied, Working-Age Adults**

|  | Adults in bottom-third households | Adults in upper-two-thirds households |
|---|---|---|
| **Gender** |  |  |
| % female | 54% | 50% |
| **Race** |  |  |
| % White | 45% | 70% |
| % Black | 17% | 9% |
| % Hispanic | 30% | 12% |
| % Other | 8% | 8% |
| **Age** |  |  |
| % 25-29 (inclusive) | 21% | 15% |
| % 30-39 (inclusive) | 36% | 30% |
| % 40-49 (inclusive) | 30% | 35% |
| % 50-54 (inclusive) | 13% | 19% |
| **Educational Attainment** |  |  |
| % less than high school | 23% | 5% |
| % high school diploma | 36% | 24% |
| % some college | 27% | 28% |
| % college degree | 11% | 28% |
| % higher degree | 3% | 15% |
| **Family Structure** |  |  |
| % live alone | 17% | 13% |
| % married | 48% | 65% |
| % parents | 53% | 44% |
| % single parents | 18% | 5% |

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[10] Approximately 84% of bottom-third households lie below 200% of the federal poverty line, while 36% live in poverty.

In short, we find these adults living in low-income households to be a demographically diverse group that nevertheless systematically differs from their more affluent counterparts in the top two thirds of the income distribution. They are younger, less well-educated, more likely to have children, and less likely to be married.

### *The Economic Circumstances of the Bottom Third: Income and Earnings*

Figure 2 shows that the median income of households in the top two-thirds was more than three times higher than the comparable income of bottom one-third households. Both figures are adjusted for family size, as explained in the appendix. Not only are these bottom third households doing badly relative to the rest of the population, but in absolute terms, their financial situation looks dire. For example, an individual who worked full-time at the minimum wage would earn $14,500 annually—only slightly greater than the median income for bottom-third households.

**Figure 2: Median Household Income**



*Income adjusted for household size
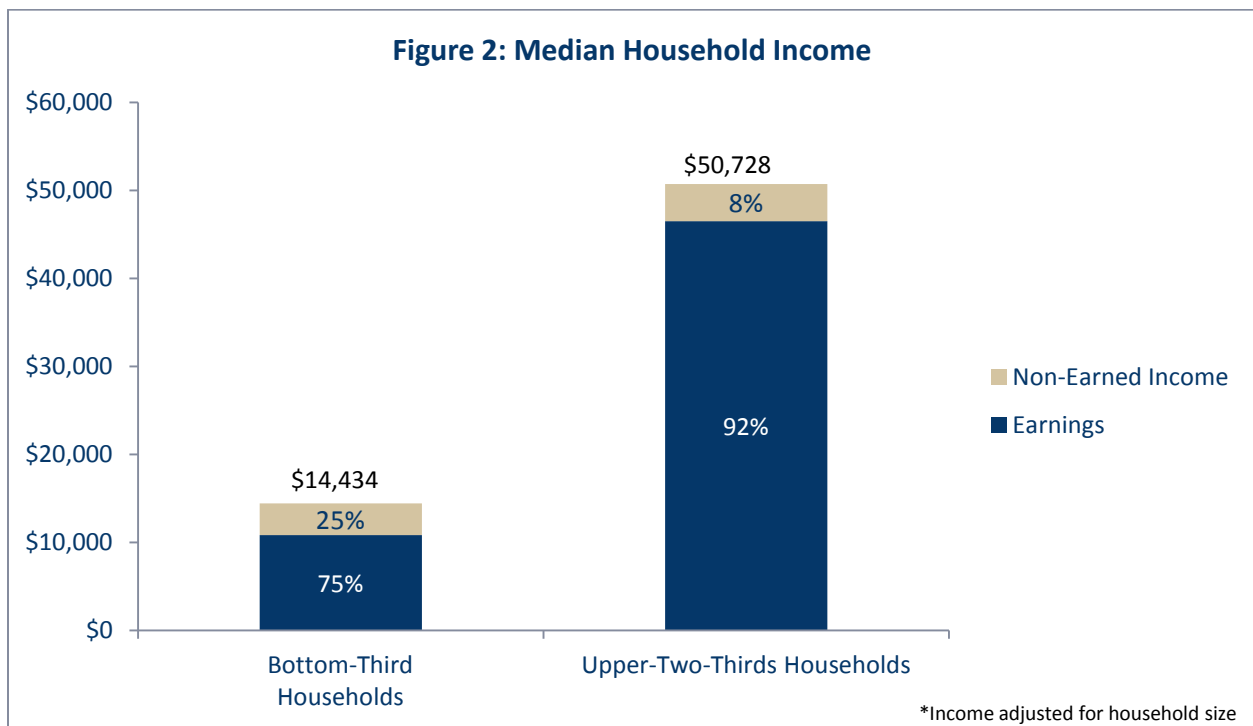
The income gap between these two groups of households is being driven primarily by differences in earnings. With 92 percent of income for the upper two-thirds typically coming in the form of salaries and wages, it is clear that the financial success of the affluent is a story about high earnings, not just smart investments. In contrast, we can see that among bottom-third households, 25 percent of income comes from non-earned sources. The composition of non-earned income is also markedly different between the two groups. While bottom-third households typically derive over half of their non-earned income from unemployment compensation, social security, educational assistance, and child support, 61 percent of upper-two-thirds non-earned income comes from rent, interest, and dividends (Appendix Table 1).

Turning to earnings, the proximate causes of the bottom-third's earnings deficit are readily apparent: they suffer from poor hourly pay rates and a shortage of work hours.[11] Figure 3 shows that employed upper-two-thirds household heads and non-heads[12] earned more than twice as much per hour as their bottom-third counterparts in 2011.

**Figure 3: Median Hourly Earnings for Employed Heads and Non-Heads**
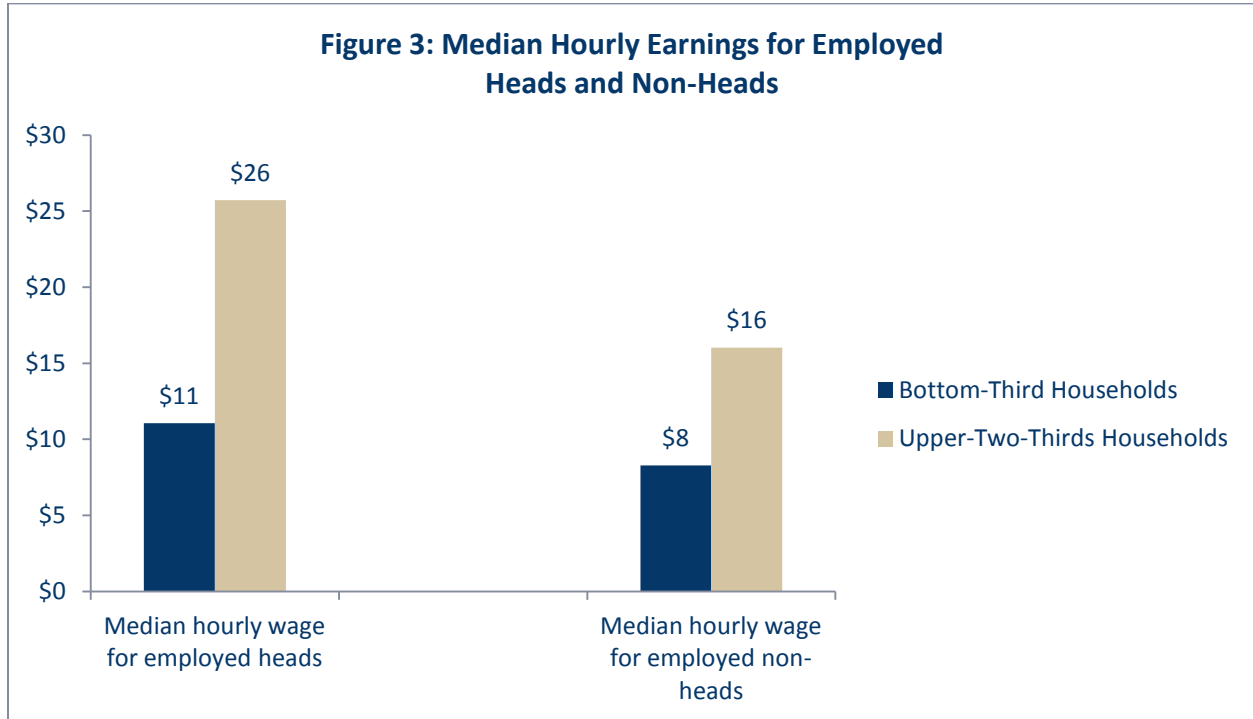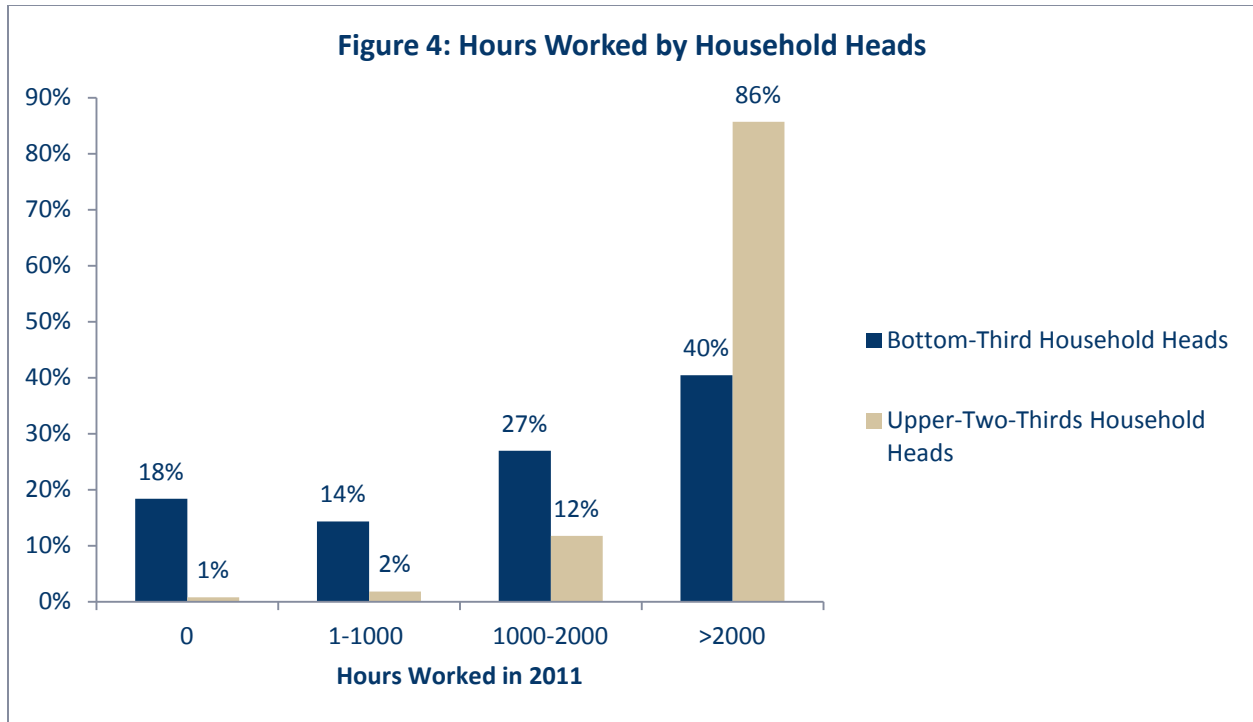


But poor pay is only a part of the story; the members of low-income households also work substantially less than their more affluent peers. A stunning 86 percent of upper-two-thirds household heads work 2000 hours or more per year, [13] as compared to only 40 percent of bottom-third heads (Figure 4). One reason they may work less is because their earnings prospects are so poor. [14]

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[11] Because we adjust household income to account for household size (see appendix for further details), differences in the sizes of bottom-third and upper-two-thirds households might also account for the observed income gap. However, both bottom-third and upper-two-thirds households contain three individuals on average.

[12] We define non-heads to be able-bodied individuals between the ages of 25 and 54 (inclusive) who are not household heads. A household head is usually the highest earner in the family with a few exceptions. See appendix for more details.

[13] Note that 2,000 hours translates into working an average of 40 hours a week for 50 weeks a year.

[14] Research by labor economists indicates that employment can be quite sensitive to earnings, especially for low-income workers. Best estimates suggest that, for low-income taxpayers who are eligible for the Earned Income Tax Credit, a 10 percent increase in after-tax wages increases employment rates by 3 to 12 percent. In contrast, changes in after-tax wages appear to have a small or negligible effect on the hours worked by employed low-income workers. For an in-depth review of the most recent literature on labor supply elasticities, see CBO (2012).

**Figure 4: Hours Worked by Household Heads**

Legend:
- Bottom-Third Household Heads
- Upper-Two-Thirds Household Heads

Values (Hours Worked in 2011):
- 0: 18% / 1%
- 1-1000: 14% / 2%
- 1000-2000: 27% / 12%
- >2000: 40% / 86%

Since household heads are almost always the largest earner in a household,[15] the fact that nearly a fifth of bottom-third heads did not work at all in 2011 raises questions about how they are surviving. This question is further heightened by the fact that roughly one third of these non-working heads lived in households that had no reported income in that year. We can only surmise that they must be relying on their savings or on help from friends or relatives. Another 6 percent were non-working parents who were supported by a second earner. The majority of them (58 percent) lived in a household that was relying entirely on non-earned income, with the biggest sources being Social Security, unemployment benefits, and public assistance.[16]

The low incomes reported by households with non-working heads may, in part, be a product of under-reporting in the CPS. Studies have shown that self-employment earnings and non-earned income levels are under-reported in most major surveys, including the CPS.[17]

In addition to under-reporting public monetary transfers, the CPS tends to miss private income transfers from family, friends, or other households (Weinberg, 2004). It appears that private monetary transfers are a particularly important source of income for poor families. Ethnographic research has shown, for

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[15] This is by construction, although there are a few exceptions to this rule. See the appendix for more details.

[16] These numbers may appear large at first, but it should be remembered that they represent proportions of the 18% of working-age heads who didn't work. About 6% of all bottom-third households have no income and 13% live only off of non-earned income.

[17] According to one analysis, recent years of CPS data may miss as much as half of welfare benefits, a quarter of unemployment benefits, and a quarter of supplemental security income (Meyer, Mok, and Sullivan, 2008). These estimates are comparable to those produced by the Urban Institute, which, for instance, found that the percentage of average monthly TANF/AFDC caseloads captured in the CPS hovered between 54 and 60 percent for the years 2000-2005 (Wheaton, 2007).

instance, that many low-income single mothers receive a sizeable portion of their income from non-resident fathers, family members, friends, and boyfriends (Edin and Lein, 1997). While under-reporting of government and private transfers may lead to the understating of CPS income levels, it appears that the CPS more accurately captures household earnings.[18]

Even with income under-reporting, it seems clear that non-working household heads are not, on average, living the "good life." The obvious follow-up question is: why are they not working? Interestingly, working and non-working household heads do not differ markedly in terms of age, education, and ethnicity (Table 2). Rather, it appears that they differ mostly in terms of their living arrangements. Non-working heads of bottom-third households are nearly twice as likely as working household heads to live alone, and rates of single motherhood are markedly higher for non-working heads than for working heads.

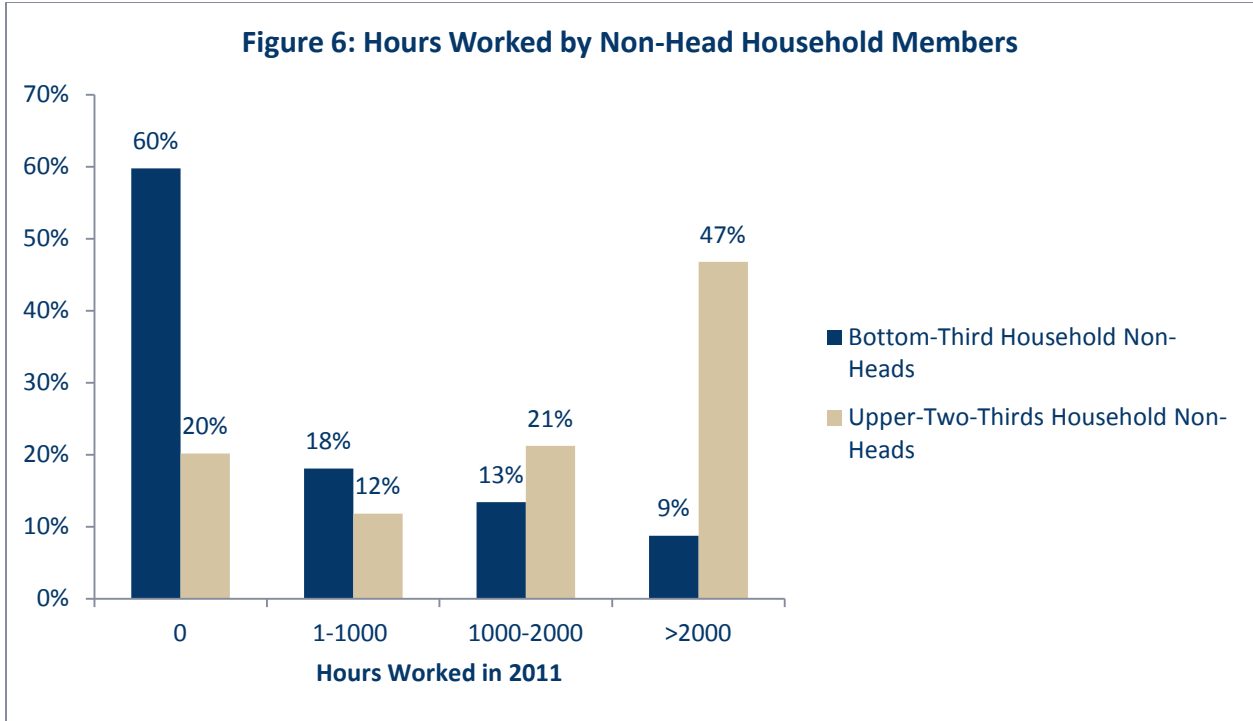| Table 2: Comparing Working and Non-Working Heads of Low-Income Households | | |
|---|---|---|
| | Working Household Heads | Non-Working Household Heads |
| *Selective Demographics* | | |
| % female | 45% | 60% |
| % under age 30 | 19% | 20% |
| % high school diploma or less | 57% | 53% |
| % minority | 54% | 52% |
| *Living Arrangements* | | |
| % live alone | 22% | 43% |
| % married | 44% | 21% |
| % single mother | 19% | 27% |
| *Income Characteristics* | | |
| Average Total Household Income* | $15,607 | $4,888 |
| % Earnings | 88% | 7% |
| % Non-Earned Income | 12% | 93% |

*Income adjusted for household size

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[18] According to a study conducted by Bound and Krueger (1991), more than 40 percent of CPS respondents reported earnings that were within 2.5 percent of their employer-reported Social Security earnings records. Other studies have confirmed that wages and salaries tend to be much better reported in the CPS than non-earned income (Census Bureau 2013). Meyer and Sullivan (2003), however, note that this earnings accuracy may not extend to the bottom of the income distribution. Since self-employment tends to be concentrated at the top or bottom of the income distribution, and since self-employed earnings tend be under-reported (Meyer and Sullivan, 2003), the CPS may understate the earnings level of the poor. Nonetheless, the fact that reported earnings appear to be more accurate than CPS reported incomes bolsters our decision to focus on household earnings.
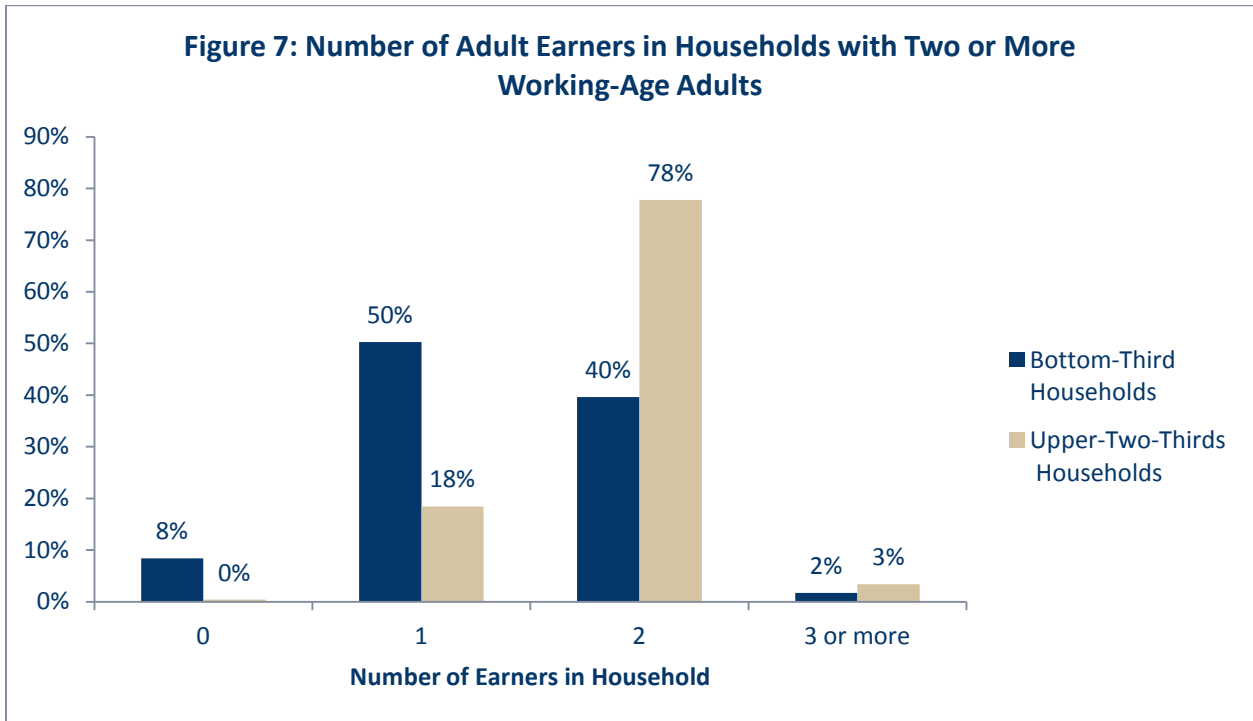
Figure 5 displays self-reported reasons for not working in 2011. Note that although we have removed from our sample anyone who qualifies for disability programs (SSDI and SSI), some heads may still be temporarily ill or disabled, be waiting to be certified, or have a condition that does not qualify for such assistance.

**Figure 5: Reasons Why Bottom-Third Heads Did Not Work in 2011**
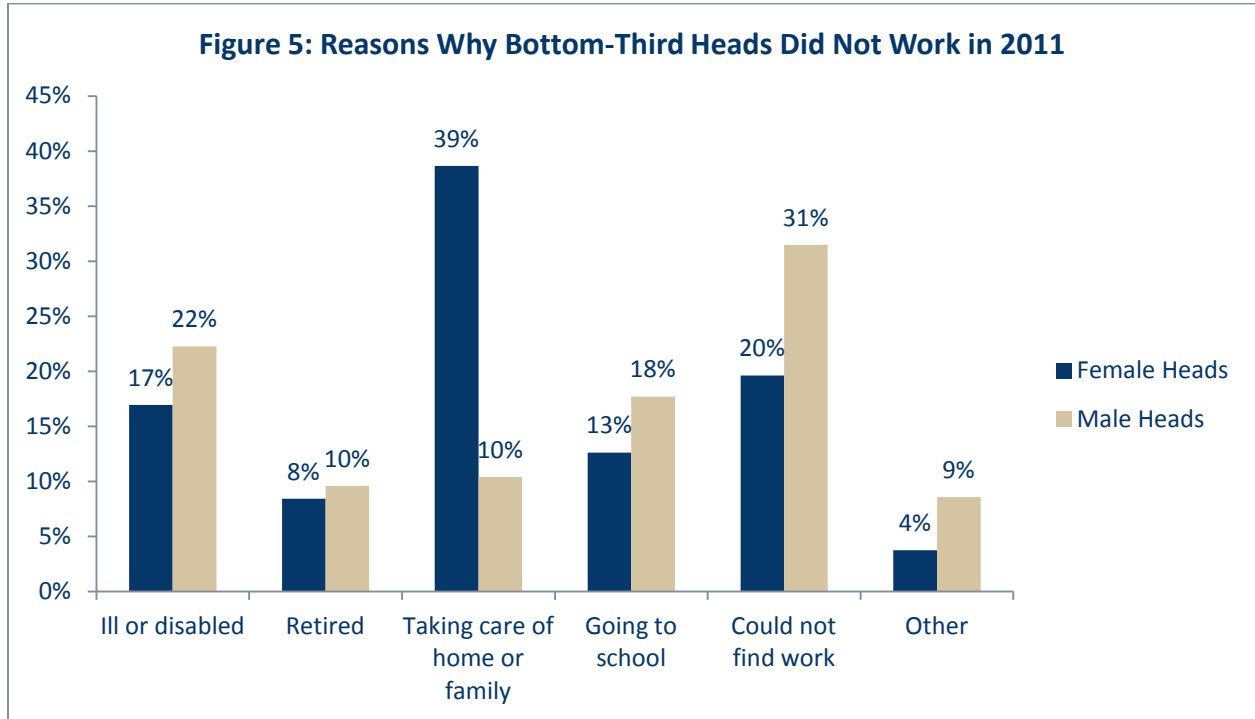


More important, perhaps, than the lack of hours worked by bottom-third heads is the shortage of *earners* in bottom-third households. Approximately 60 percent of prime-age bottom-third non-heads did not work at all in 2011, as opposed to only 20 percent of prime-age non-heads in the upper two-thirds (Figure 6).

**Figure 6: Hours Worked by Non-Head Household Members**



Bottom-Third Household Non-Heads
- 0: 60%
- 1-1000: 18%
- 1000-2000: 13%
- >2000: 9%

Upper-Two-Thirds Household Non-Heads
- 0: 20%
- 1-1000: 12%
- 1000-2000: 21%
- >2000: 47%

Hours Worked in 2011

Driving home this point, Figure 7 shows that 81 percent of upper-two-thirds households that had at least two working-age members also enjoyed the support of at least two working-age earners,[19] while only 42 percent of comparable bottom-third households could say the same.

**Figure 7: Number of Adult Earners in Households with Two or More Working-Age Adults**



Bottom-Third Households
- 0: 8%
- 1: 50%
- 2: 40%
- 3 or more: 2%

Upper-Two-Thirds Households
- 0: 0%
- 1: 18%
- 2: 78%
- 3 or more: 3%

Number of Earners in Household

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[19] A working-age earner is an individual who has positive earnings, is between the ages of 25 and 54, and reports not receiving any disability income in 2011.

In sum, it appears that a scarcity of second earners, a shortage of work hours, and low pay rates combine to keep the bottom-third out of the middle class. Although low wages are one reason for the low incomes of the bottom third, our analysis suggests wages are not nearly as important as the lack of employment.

According to our simulations (Figure 8), if every employed low-income household head worked full-time (i.e., 40 hours a week for 50 weeks a year, or 2,000 hours), average low-income household earnings would rise by roughly $3,700—a 34 percent increase.[20] We estimate that the second most important reason for their low incomes is lack of employment. If we assume that all bottom-third heads become workers, their earnings would rise by 18 percent. Low hourly pay is also important but less so than whether people are employed and how many hours they work. If we raise every household head's earnings to at least $12 an hour, it increases average household earnings by 14 percent.

Our estimates are based on the assumption that wages do not affect employment and that employment does not affect wages. In the real world, neither is true. A higher wage may cause individuals to work more since the reward for working compared to the alternatives are greater. (At the same time, they will earn more income at whatever level of effort they make, possibly reducing the incentive to work.) The causation may also go in the other direction. More employment, by increasing experience, may improve people's hourly earnings. The very high rates of long-term unemployment that have been experienced in the aftermath of the Great Recession may, for example, dampen the earning ability of those who have lost their jobs. Although these interactions between wages and hours worked should not be neglected, we doubt that they would change the above story about the relative importance of the two in any fundamental way.



Figure 8: Sorting Out the Reasons for Low Earnings Among Heads of Low-Income Households

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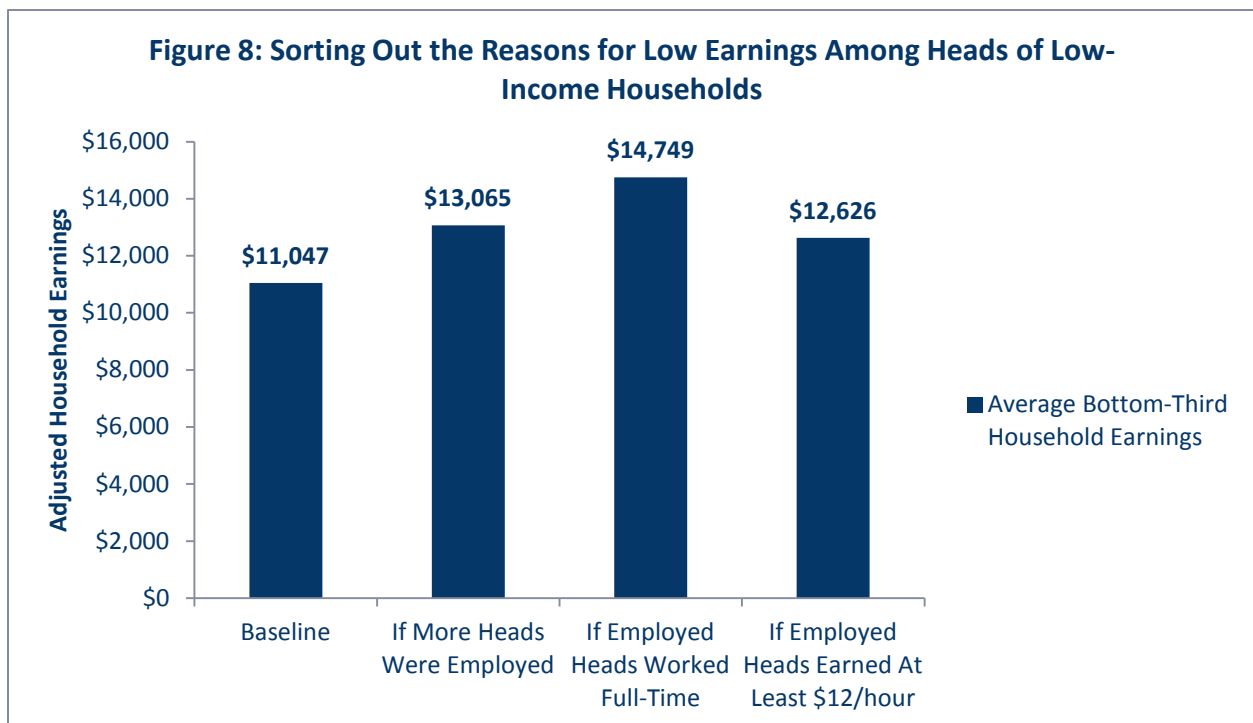
[20] The details of these simulations will be found in the appendix.

Finally, it is impossible to tell from these data whether the lack of employment and work hours among bottom-third households is the result of scarcity of jobs (including full-time jobs), lack of interest in work, or inability to work. As we have seen, many report that they are going to school, taking care of others, or temporarily ill or injured. Others have dropped out of the labor market because they are discouraged and don't believe they can find work. In the next section, we address this issue in more detail.

### Cyclical vs. Structural Problems for the Bottom Third

The so-called "Great Recession" (2007-2009) has been particularly rough for those at the bottom of the income distribution. Official poverty rates, which jumped from 12.5 in 2007 to 15.1 percent in 2010, have increased most among the economically disadvantaged, particularly single mothers, low-skilled adults, and minorities (Sawhill and Monea, 2009; Gabe, 2012; Mishel et al., 2012). Although unemployment rates climbed for most occupations and demographic groups during the recession years, minorities and the less-educated experienced the greatest job losses (Hout and Cumberworth, 2012). The long-term unemployment rate—that is, the percentage of the labor force that has been unemployed for more than six months—reached a post-World War II high of 4.5 percent in 2011, with the long-term unemployed constituting over 40 percent of the unemployed population (Burtless, 2011). Unfortunately, a sluggish economic recovery has done little to alleviate suffering at the bottom. Despite gradually falling unemployment rates, earnings and employment have stagnated or declined during the last few years, especially among low earners (Sum and McLaughlin, 2011; Sum et al, 2012).

In addition to a cyclical problem, there appears to be a structural component to the lack of work among these bottom third earners. As we have seen, they work far less than their more advantaged counterparts. This "work gap" could be related to a lack of demand for their services or to a lack of work effort on their part, or more likely to some combination of the two. In the next section, we make a rough attempt to sort out the two, asking: how much would a return to full employment affect this group?

## What To Do?

The obstacles facing low-income households are large. What could be done to help them climb the ladder and join the middle class? In this section we consider four possible strategies: improving the job market by lowering the unemployment rate, making work pay, increasing educational attainment, and strengthening families.

### Improving the job market

The first, and most obvious, step towards boosting bottom-third earnings is getting unemployed individuals in low-income households back to work. Nearly a quarter of non-working bottom-third household heads say that their primary reason for not working in 2011 was their inability to find a job. This number likely understates the number of non-working heads who would have worked if given the

opportunity, since high levels of unemployment often lead discouraged job seekers to exit the labor force and pursue non-work alternatives (Levine, 2013; Zandweghe, 2012).[21]
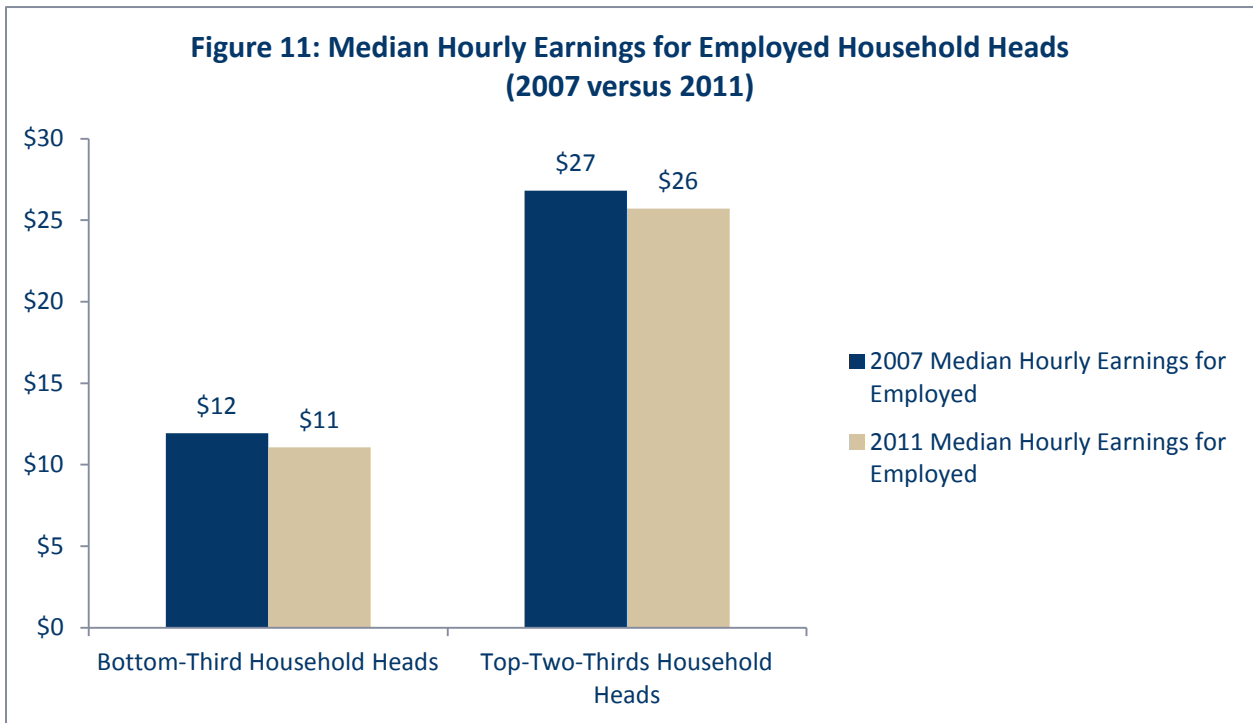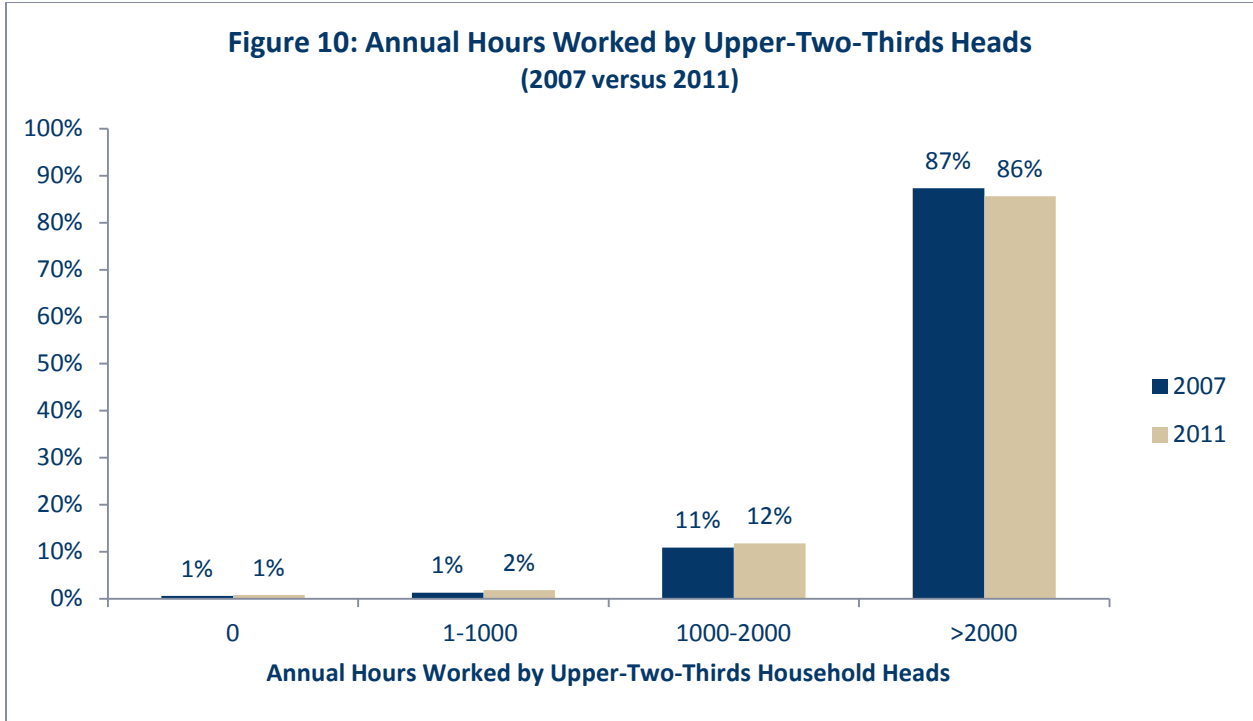
Because weak aggregate demand is the driving force behind today's high unemployment rate, hastening the post-recession recovery would be one of the most effective strategies for getting low-income households back to work.[22]

As a first step in assessing how much of the earnings gap is due to the cyclical components of the recession, we examine how average annual hours worked and average hourly earnings for bottom-third and upper-two-thirds household heads varied between 2007 and 2011 (see Figures 9-11).



**Figure 9: Annual Hours Worked by Bottom-Third Heads**
**(2007 versus 2011)**

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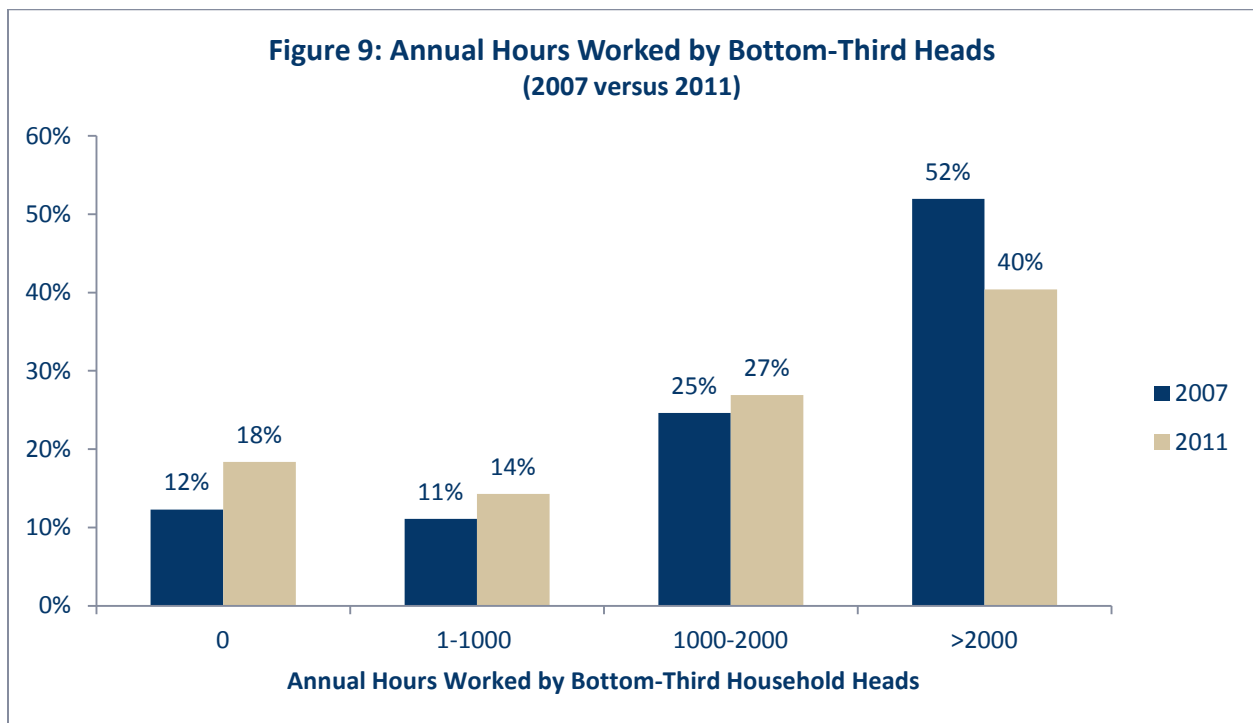
[21] The U.S. Bureau of Labor Statistics (and the CPS dataset) define discouraged workers as: "Those persons not in the labor force who want and are available for work, and who have looked for a job sometime in the prior 12 months, but were not counted as unemployed because they had not searched for work in the 4 weeks preceding the survey." Based on this definition, Zandweghe (2012) estimates that the number of discouraged workers jumped from under 400,000 to more than 800,000 during the Great Recession.
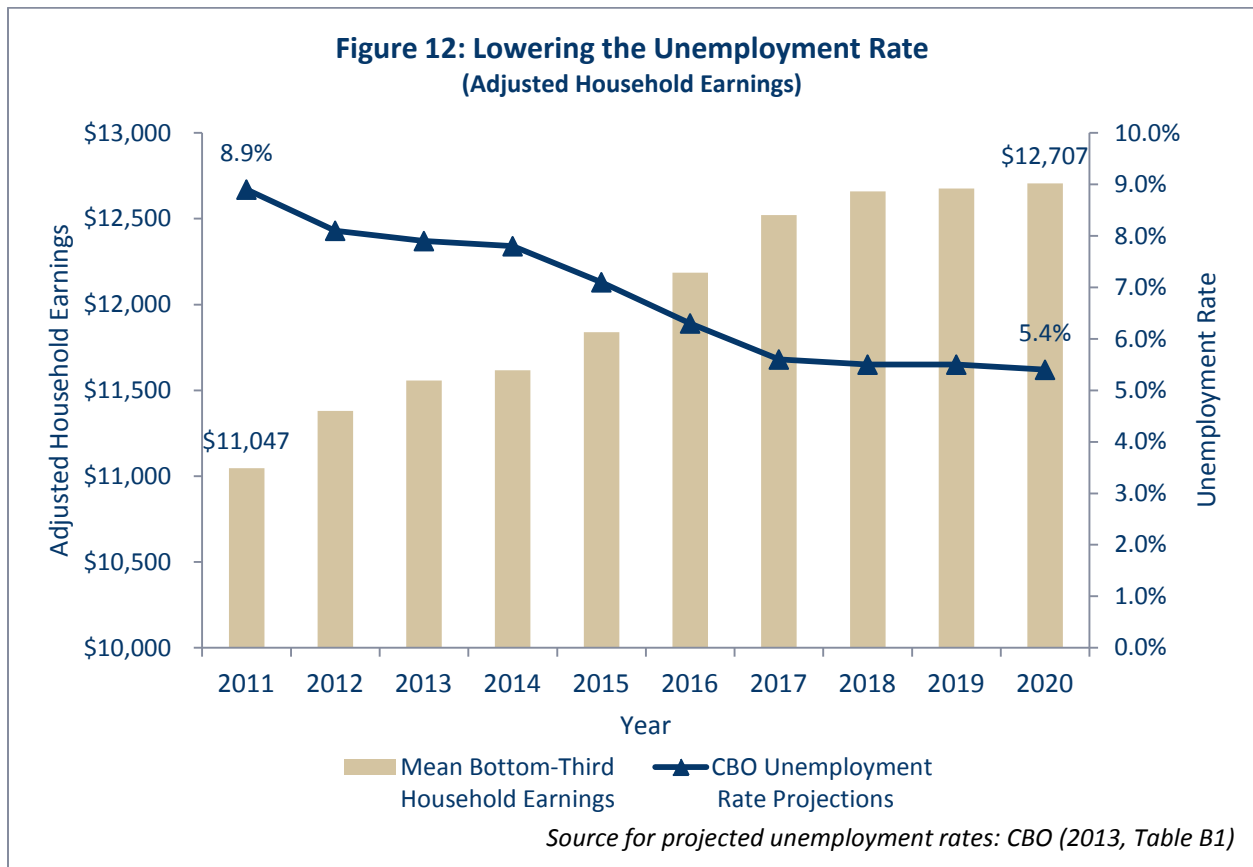
[22] According to recent estimates produced by the Congressional Budget Office (CBO), roughly two-thirds of the increase in unemployment between 2007 and 2011 was driven by falling aggregate demand (CBO, 2012). Levine (2013) reviews the literature on cyclical unemployment during the Great Recession and arrives at a similar conclusion. Declines in aggregate demand may also account for up to half of the drop in labor force participation that occurred during the Great Recession (Daly and Hobijn, 2012). Also, see Burtless and Looney (2012); Lazear and Spletzer (2013).

**Figure 10: Annual Hours Worked by Upper-Two-Thirds Heads**
**(2007 versus 2011)**



Annual Hours Worked by Upper-Two-Thirds Household Heads

**Figure 11: Median Hourly Earnings for Employed Household Heads**
**(2007 versus 2011)**

Although there are some changes in the hourly earnings, it appears that most of the "action" occured on the hours worked front.[23] Moreover, it is clear that low-income heads were affected by the recession more than upper-two-thirds heads.

Next, we use regression analyses to predict how average household earnings and average hours worked by low-income household heads would vary with the unemployment rate. These simulations seek to tease out the cyclical effects of the recession from the structural barriers that prevent the low-income households from working.[24] Figure 12 plots predicted mean household earnings against CBO unemployment rate projections.



**Figure 12: Lowering the Unemployment Rate**
**(Adjusted Household Earnings)**

*Source for projected unemployment rates: CBO (2013, Table B1)*

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[23] Note that, between 2007 and 2011, median hourly earnings dropped by roughly 7% for employed heads of low-income households and 4% for employed heads of upper-two-thirds households. Regression analyses conducted by the Economic Policy Institute (EPI) similarly show that wages in the bottom of the earnings distribution are most sensitive to changes in the unemployment rate (Mishel et al., 2012).

[24] We predict average household earnings and annual hours worked using a two-stage model wherein we first impute work probabilities to individuals, and then predict annual earnings (or annual hours worked) conditional on working. See appendix for details.

If the unemployment rate fell to 5.4%, as the CBO predicts, bottom-third mean household earnings would rise by 15%.

The above simulation captures the effects of unemployment on both average hourly earnings and hours worked. We next explore how a lower unemployment rate would affect just annual hours worked (Figure 13).

### Figure 13: Lowering the Unemployment Rate
#### (Annual Hours Worked)



Source for projected unemployment rates: CBO (2013, Table B1)
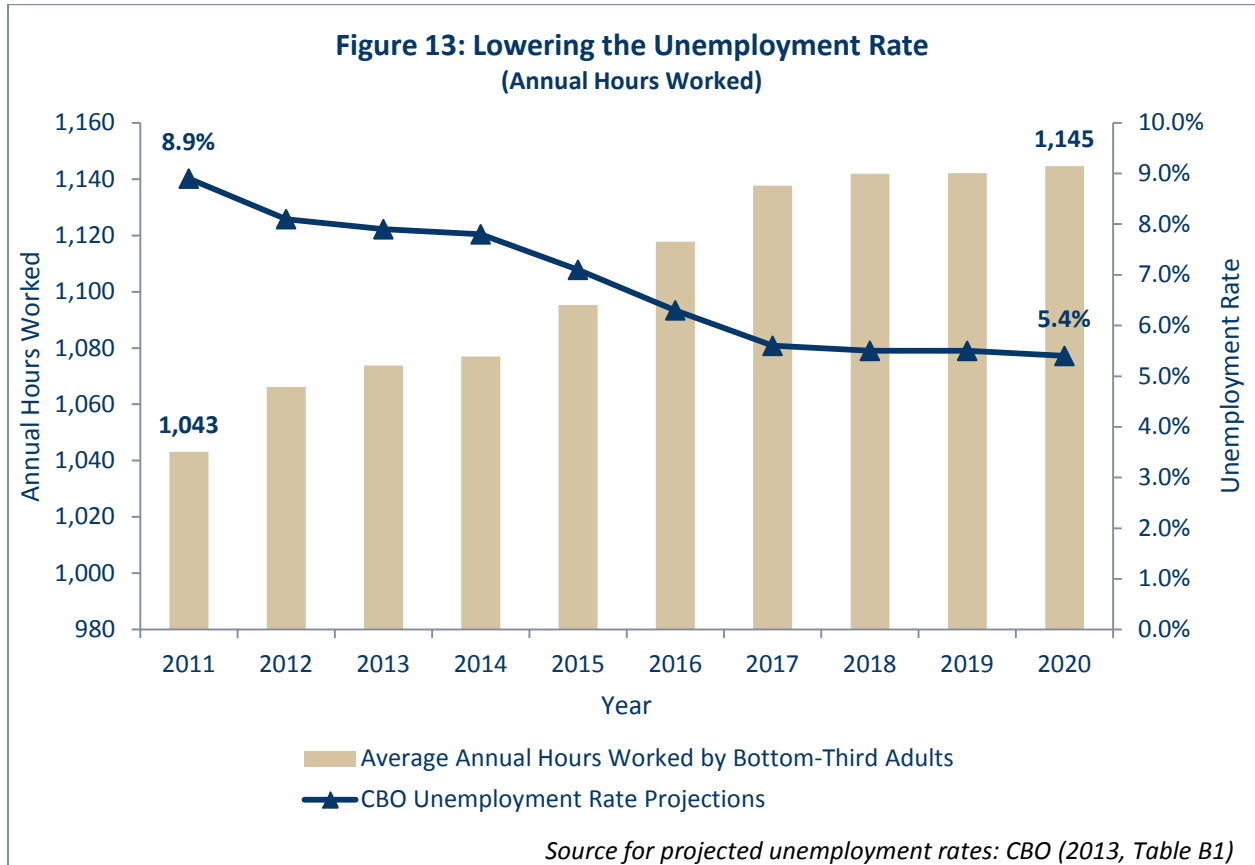
A 2020 unemployment rate of 5.4% would cause average annual hours worked by the bottom third to increase by 101 hours, or 10 percent. However, the gap in hours worked between the two groups is reduced only slightly and remains very large with adults in the upper two-thirds still working almost twice as much as adults in bottom-third households (see Appendix Figure 1).

In sum, it appears that reducing the unemployment rate would improve the average earnings of bottom-third households. However, our results also suggest that much of the difference in hours worked between bottom-third and upper-two-thirds households is structural in nature. There is still a very large work gap between the two even at full employment. While improving the state of the economy is an important first step to helping bottom-third households climb the income ladder, a tighter labor market will only carry low-income households so far. The structural reasons for the bottom third's lack of employment also need to be addressed if we want to see significant gains in bottom-third earnings. As noted earlier, higher wages might induce more adults in these households to work, so we now turn to how to make work more rewarding for them.

*Making Work Pay*

President Obama has proposed increasing the minimum wage to $9 an hour. What effect would this have on low-income households? A simple simulation of what would happen to their earnings if we increased everyone's wage to at least $9 an hour shows that the effects would be very modest (Figure 14).



Figure 14: Minimum Wage Simulations
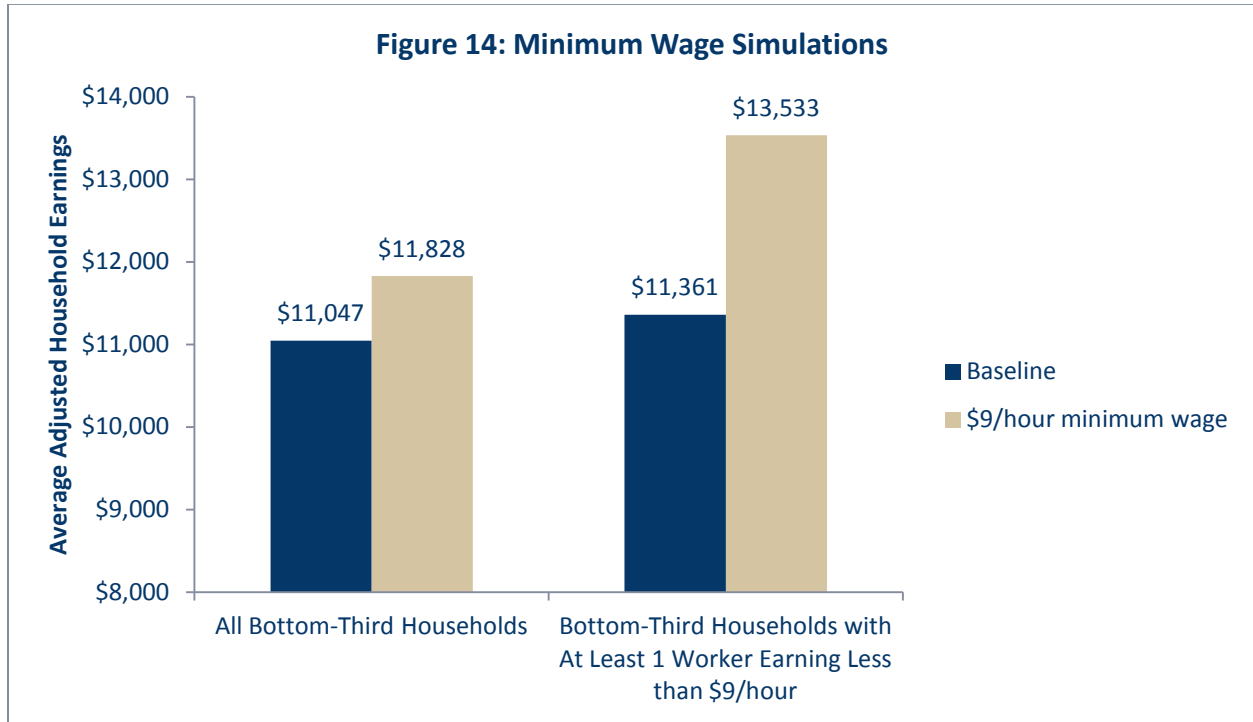
The earnings of such households would rise from $11,047 to $11,828, or by only 7 percent. We believe this estimate is a conservative one, however. First, higher wages make work more attractive to low-income households. Second, a higher minimum wage would likely cause employers to pay workers just above the new minimum somewhat higher wages than before. These two effects could be partially offset by the dampening effect of higher wages on business costs and on employers' willingness to hire very low-skilled workers.[25] Moreover, it is important to note that raising the minimum wage would be a financial boon for households that are supported by sub-$9/hour earners, raising their household earnings by approximately 19%.

There are other ways, in addition to a higher minimum wage, to make work more rewarding. One is the Earned Income Tax Credit (EITC), which serves as a wage supplement for low-income families. In an earlier paper, Isabel Sawhill and Adam Thomas showed that the EITC is particularly well-targeted to low-

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[25] Empirical evidence regarding the disemployment effects of the minimum wage is mixed. Some economists have found that minimum wage increases have no impact on employment (Card, 1992a, Abowd et al., 2000) or may, in some cases, actually increase the level of employment (Katz and Krueger, 1992; Card and Krueger, 1994). Many studies, however, find that raising the minimum wage by 10 percent reduces employment among teens and young adults – the age group for which minimum wage impacts are likely to be the most discernible – by between one and five percent (Neumark and Wascher, 2007; Sawhill and Thomas, 2001). For an exhaustive review of the most recent minimum wage literature, see Neumark and Wascher (2007).

income families, with an estimated 90 percent of EITC benefits going towards households in the bottom-third of the income distribution (Sawhill and Thomas, 2001). Because families with children receive the largest benefits,[26] the program has been particularly effective at reducing child poverty. In 2011 alone, the EITC lifted 3.1 million children above the poverty line (Marr et al., 2013).

One of the advantages of the EITC is that it not only supplements people's earnings but also encourages work.[27] Sawhill and Thomas (2001) estimate that every additional $1 spent on the EITC generates $1.30-$1.50 of additional earnings because of the way in which the program encourages employment. Since our analysis indicates that a lot of bottom-third households contain adults who are not working very much, this feature of the EITC is particularly appealing.

Another program that both encourages work and helps lower income families support their children is child care assistance. Research has shown that the labor force decisions of parents, and especially second earners, are sensitive to the costs of child care (Blau, 2003).[28] Because child care payments, on average, consume nearly a fifth of the incomes of poor and lower middle income working families that pay for child care (Sawhill and Thomas, 2001), the labor supply effects of child care subsidization may be even greater among bottom-third parents.

While federal spending on child care assistance totaled $56 billion in 2011,[29] it has been affected by the sequester, which is slated to reduce government funding of the child care and development block grant by $187 million and leave 30,000 children without child care services in 2013 (Sebelius, 2013; OMB, 2013). Without further legislative action by Congress, the Child Tax Credit (CTC), which helped offset child-rearing costs for nearly 21 million households between 2009 and 2011, will also see cutbacks in 2018 (Marr et al., 2013).[30]

### *Improving Education*
The positive relationship between earnings and education has been well-documented (Card, 1999). The best estimates indicate that an additional year of schooling boosts average annual earnings by 10 percent, although the wage premium varies widely at the postsecondary level with such factors as whether a student ever graduates, the selectivity of the school, and the student's field of study (Owen

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[26] In 2013, a low-income, single-parent family with two children could receive as much as $5,372 in EITC benefits (Maag and Carasso, 2013b).

[27] For a review of the literature on the labor supply effects of the EITC, see Hotz (2003).

[28] Best estimates suggest that a 10 percent decrease in the cost of child care increases labor force participation among affected families by 1-3 percent (Grueber et al., 2006).

[29] According to analyses conducted by the Urban Institute, the government funneled $6.1 billion into the Child Care and Development Fund, and spent approximately $50 billion on the child and dependent care tax credits (Isaacs et al., 2012).

[30] In 2001, the Economic Growth and Tax Relief Reconciliation Act (EGTRRA) increased the maximum credit available to families from $500 to $1,000 per child, as well as expanded access by making the refundable portion of the CTC available to employed families with children. The American Recovery and Reinvestment Tax Act of 2009 temporarily lowered the income threshold for the refundable portion of the CTC, allowing more low-income households to benefit from the CTC. In 2012, the American Taxpayer Relief Act extended these changes through 2017. Without further congressional action, these additional provisions will expire in 2018, meaning that the CTC credits will drop to $500 per child and eligibility for the refundable CTC will revert back to its pre-EGTRRA levels (Maag and Carasso, 2013a).

and Sawhill, 2013). Historical trends suggest that the link between education and earnings has tightened. Since the mid-1970s, technological advancements have increased the demand for workers who are well-educated and well-trained. The supply of such workers has not kept pace with the demand. While women are completing college in much larger numbers, men are not.

To assess the extent to which improving educational attainment among the bottom-third would raise household earnings, we simulate the earnings effects of raising the high school graduation rate for low-income adults to 90 percent. We further assume that half of the "new" high school graduates go on to some form of post-secondary education.[31]

We estimate that the earnings gains from boosting high school graduation rates to 90 percent would only increase average household earnings by roughly 3 percent (Figure 15). For those households that are affected by the intervention (i.e., households that have a "new" high school graduate), total earnings are predicted to increase by nearly 20% from a baseline level of $10,224.

**Figure 15: What If We Raised the High School Graduation Rate to 90%?**



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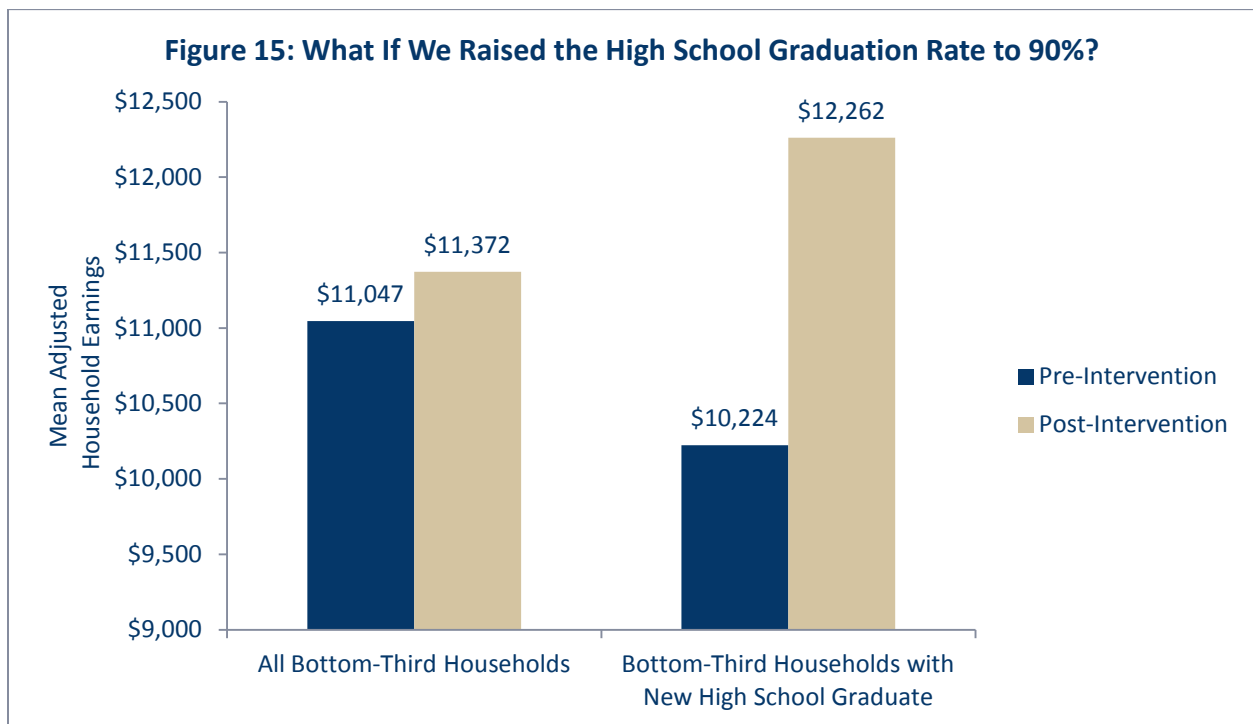
[31] We simulate our high school intervention by boosting the educational attainment levels for a randomly selected subset of low-income adults who were originally high school drop outs. We then use regression analyses to predict their post-intervention earnings. Thus, since we intervene on individuals who are older than the high school age, our simulation here can be thought of as capturing the steady-state effects of a higher high school graduation rate. That is, we simulate what the earnings distribution would look like if, for consecutive generations, the high school graduation rate was 90 percent. For more details on the methodology underlying our simulations, see the appendix of this paper.

**Figure 16: Distribution of Educational Attainment Among Bottom-Third Adults**
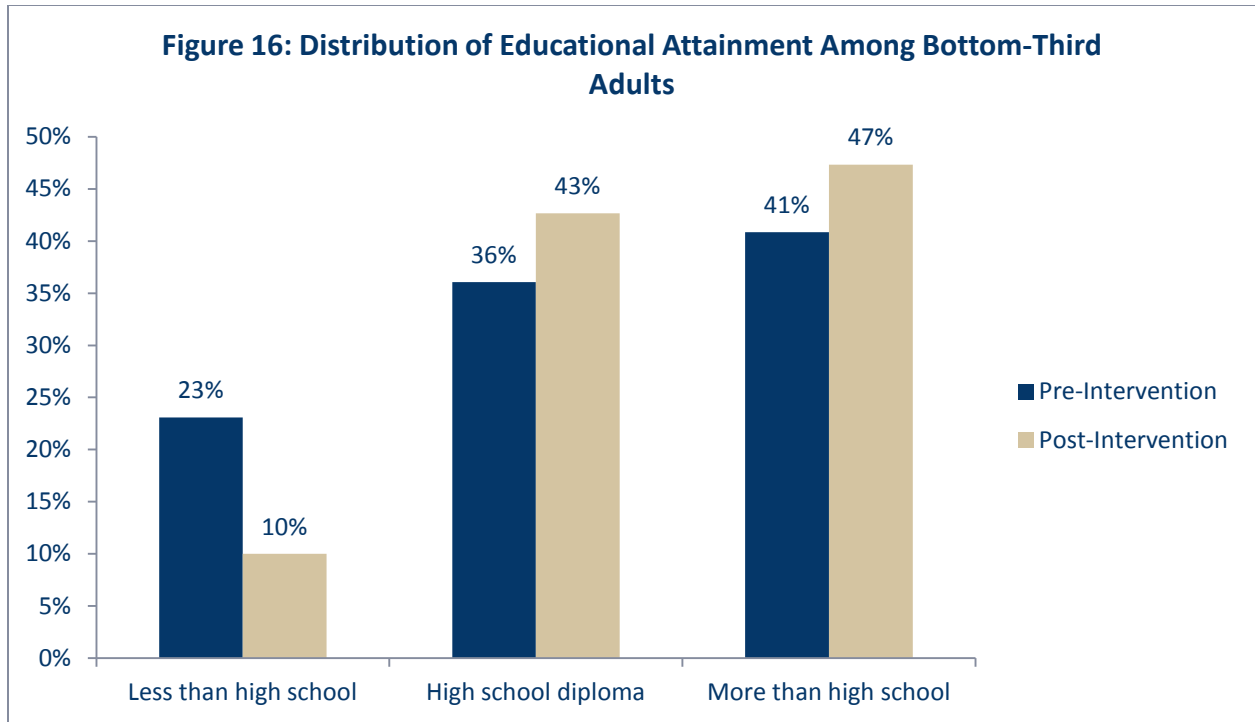


While improving the educational attainment levels of bottom-third adults clearly improves their earnings prospects, reducing the high school dropout rate will not by itself move low-income adults into the middle class. In an economy that increasingly values high-skilled labor, the earnings gains from a high school diploma will likely become even smaller in the future, meaning that helping low-income adults obtain post-secondary education will become even more important.
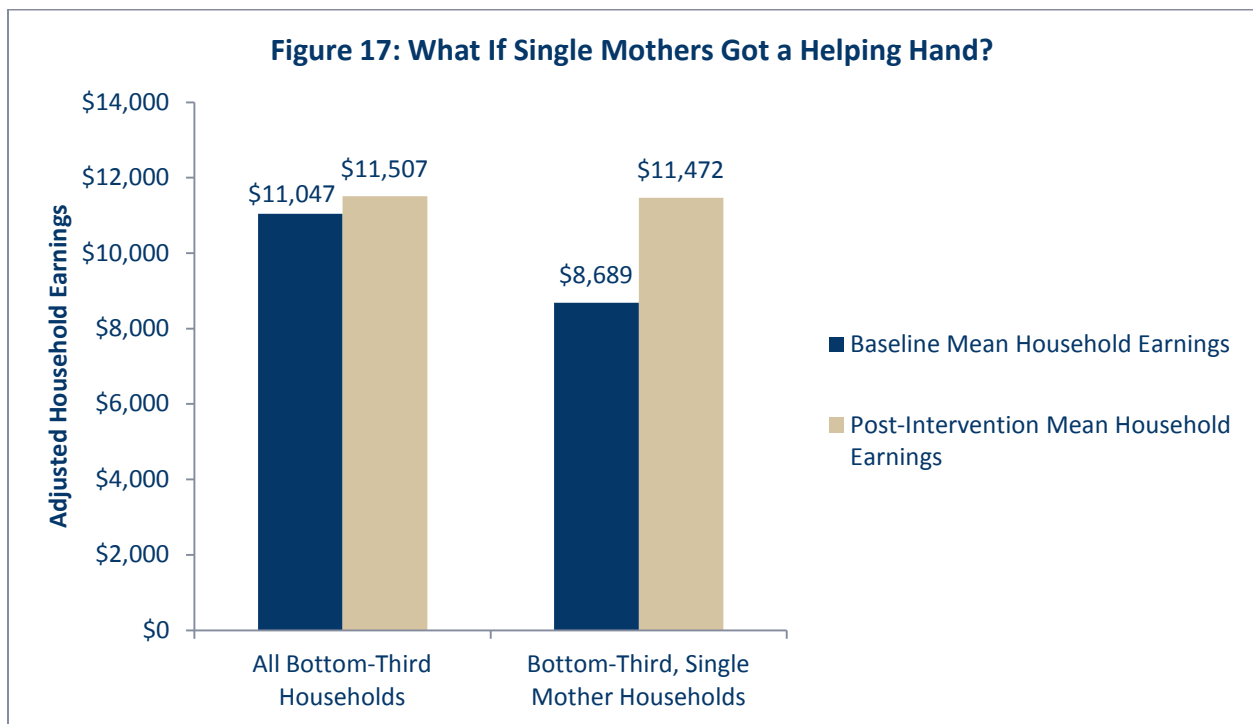
*Strengthening Families*

Long-term trends towards single parenthood have made it even harder for poor families to pull themselves out of the bottom third. Between 1970 and 2009, the share of children living in single parent families leapt from 12 percent to 27 percent (Kreider and Ellis, 2011). This dramatic rise of single parenthood has, in turn, exerted an upward pressure on the poverty rate, since female-headed families are four to five times more likely to live in poverty than married-couple households (Haskins and Sawhill, 2009). Although there is much debate over whether the link between single parenthood and poverty is causal (Thomas and Sawhill, 2005), there is little doubt that adding more earners to a household would boost family income, all else equal. Since low education levels tend to constrain the earnings potential of any single bottom-third household member, poor families may especially benefit from having multiple workers under the same roof.

In an appendix to this paper, we show that increasing the hours worked by *existing* second earners significantly boosts mean bottom-third household earnings (see Appendix Figure 2). However, many bottom-third families are headed by single parents who do not have a second potential earner to lean upon.

To assess the importance of adding second earners to a household, we simulate how low-income household earnings would change if low-income single-mother household heads were paired with unrelated males[32] in the bottom third of the income distribution. Specifically, we match low-income, single mothers to demographically similar unrelated men based on their age (25-29, 30-39, 40-49, 50-54), educational attainment (high school degree or less, some college or more), and race (white, black, Hispanic, and other).[33] Although demographically appropriate unrelated men could not be identified for all single mothers, our simulated intervention reduced the proportion of low-income household heads who were single mothers from 18% to 7%.[34] Note, however, that the simulation does not assume any change in work effort on the part of either the single mothers or single men, who might change their hours of work if married or cohabiting.

According to our simulation, pairing bottom-third single mothers with bottom-third unrelated men would boost bottom-third household earnings by about 4%, but increase the average household earnings of low-income single mothers by roughly 32% (Figure 17).

**Figure 17: What If Single Mothers Got a Helping Hand?**

- Baseline Mean Household Earnings
- Post-Intervention Mean Household Earnings

All Bottom-Third Households: $11,047 / $11,507
Bottom-Third, Single Mother Households: $8,689 / $11,472

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[32] We define unrelated individuals to be survey respondents who live alone, are of working-age (25-54), and are able-bodied.

[33] The methodological details of this simulation can be found in the appendix.

[34] Specifically, we found that there is a shortage of unrelated black males who are demographically similar to black single mothers in our sample. Earlier literature on the same topic has come to similar conclusions (Thomas and Sawhill, 2001).

## Conclusions

We began this project with a belief that the bottom third was primarily hampered by low wages and high unemployment. Both turn out to have significant effects on this group and cause many of them to fall into the bottom of the income distribution. What surprised us was the size of what we have called "the work gap"—the fact that some bottom-third households lack an employed member, a majority lack two earners, and a high proportion work very few hours even when the economy is operating at full employment. These are not, for the most part, people who report that they are unemployed. Instead they are going to school, are early retirees, are temporarily in bad health, or are keeping house. Some of them are living on government assistance or help from friends or relatives. Granted, if work paid better, more people would undoubtedly choose to enter the labor market. But what also seems evident is that many bottom-third households are either underreporting their incomes, have sources of support that are not evident in existing data, are just scraping by, or are truly destitute.

There are any number of things that might help this group. In the short run, a return to full employment would increase their earnings by about 15 percent. They would also be helped by a higher minimum wage, a more generous EITC, or more child care assistance, although these effects would likely be more modest. In the longer run, they need more education and stronger families to make it into the middle class.

## Appendix

This appendix discusses the data underlying our analyses; the process by which we identified bottom-third households and household heads; the adjustments made to hourly earnings distribution; and the methodology used to simulate how changes in the labor supply, national unemployment rate, minimum wage, and family structure impact household earnings.  Finally, we include three additional analyses referenced in the main paper.

## Data

With the exception of the unemployment rate simulations (see below), all analyses and simulations presented in this report are based on data collected in the March 2012 administration of the Current Population Survey (CPS). In addition to containing extensive demographic data on survey participants, the March 2012 CPS asks a series of questions relating to the earnings, income, and work activity of respondents during the previous year (i.e., 2011). All estimates reported in this paper have been mathematically inflated using appropriate individual-level and family-level CPS weights.[35]

## Definition of Low-Income Households

For the purposes of our analyses, a "household" is defined to be either an unrelated individual who lives alone or a family.[36] We treat primary families and related subfamilies that reside together as a single household unit. Our definition of household also takes into consideration cohabitation. Unrelated individuals who identify each other as cohabitating partners constitute a single household, while an unrelated individual who is in a cohabitating relationship with a member of a family is treated as a member of that family.

To identify our sample of low-income households, we first construct a basic measure of household income that reflects the economies of scale in consumption enjoyed by individuals who live in larger households. Specifically, we adjust household pretax money income[37] using the following formula:

$$Adjusted\ Household\ Income = \frac{Household\ Pretax\ Money\ Income}{\sqrt{number\ of\ persons\ in\ household}}.$$

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[35] Because our definition of "household" most closely parallels the CPS' definition of "family," family-level weights are used for all of our analyses of household-level data (e.g., household earnings).

[36] The Census Bureau defines a family to be "two persons or more… residing together and related by birth, marriage or adoption." A related subfamily is defined as "a married couple with or without children, or one parent with one or more single (never married) children under 18 years old, living in a household and related to, but not including, the householder or spouse." Unrelated individuals are "people of any age who are not members of families or subfamilies." (United States Census Bureau, Current Population Survey (CPS) – Definitions).

[37] Pretax money income consists of wages and salaries, self-employment earnings, and non-earned income sources (including government cash transfers), but does not reflect taxes paid, tax credits, or noncash benefits (e.g., food stamps).

Households that contain at least one working-age[38], able-bodied[39] adult are then ranked according to their adjusted household income. We define "low-income households" to be those households that fall in the bottom third of this adjusted household income distribution.

Because we are interested in boosting the hours worked and earnings generated by low-income households, we focus many of our analyses on working-age, able-bodied adults who live in low-income households (henceforth referred to as "low-income adults" or "bottom-third adults"). However, since work expectations may vary between members of a household,[40] we partition our sample of low-income adults into two groups: (1) households heads, who are (typically) the largest earners in their respective households; and (2) non-heads, who are low-income adults that (typically) earn less than the heads of their households.[41]

## Earnings Measurements and Minimum Wage Adjustments

Because the March 2012 CPS does not contain an hourly earnings variable for the entire survey sample, we construct this measure by dividing each respondent's annual earnings by the product of the number of weeks the respondent reported working in the previous year and the usual number of hours the respondent reported working per week in the prior year. While this method of computing hourly earnings is relatively common in the literature,[42] an analysis of the CPS Outgoing Rotation Groups (ORG), which directly asks respondents about their hourly wages, suggests that our constructed hourly earnings distribution overstates the prevalence of sub-minimum wage earners.[43]

Assuming that the direct survey data on hourly earnings is more reliable than our CPS measure, there are two possible reasons for this discrepancy: low-earning respondents could either be (1) underreporting their annual earnings, or (2) over-estimating their annual hours worked. Following the lead of Sawhill and Thomas (2001), we assume that the latter is the primary source of error and correct for this measurement error by first using the CPS ORG to calculate the correct proportion of sub-minimum-wage earners. From the pool of CPS respondents that we estimate to be sub-minimum-wage earners, we randomly select the appropriate number of workers such that, if the earnings of these workers were boosted above the minimum wage, our proportion of sub-minimum-wage workers would

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[38] Adults are considered working-age if they are between the ages of 25 and 54 (inclusive).

[39] Adults are defined as "able-bodied" if they report not receiving any type of disability income in the previous year.

[40] For instance, in a two parent family that cannot pay for child care, it may not be realistic to assume that both parents can work full-time jobs.

[41] Specifically, among married families and cohabiting partners, the partner with the highest earnings is designated to be the head. If neither partner has any earnings, we assign the household head status to the person that the Census Bureau has identified as the head. In single-parent households where the parent does not have a cohabiting partner, the single parent is considered to be the household head. Thus, if a single mother is, for instance, living with a relative who earns more than her, the single mother will nonetheless be designated the household head. Finally, we consider non-cohabiting, unrelated individuals to be their own household heads.

[42] See Sawhill and Thomas (2001), and Rodgers et al. (1993).

[43] Sawhill and Thomas (2001), who derived a CPS measure of hourly earnings using the same method described above, came to the same conclusions when they analyzed the Survey of Income and Program Participation (SIPP) – a dataset which, like the CPS ORG, directly asks respondents about their hourly earnings. Note that, in 2011, the minimum wage was $7.25 per hour.

be consistent with CPS ORG estimates. Selected CPS respondents are then assigned an hourly earnings rate of $7.25 – the federal minimum wage in 2011.[44] In keeping with our assumption that these CPS respondents have correctly reported their annual earnings, but incorrectly reported the number of hours they worked, we recalculate their annual hours worked by dividing their original annual earnings by their new hourly earnings (i.e., 7.25)

## Simulation Methodologies

We now review the methodologies underlying each of the simulations reported in this brief.

### *Thought Experiments*

In this report, we simulated the following three thought experiments:

(1) What if every non-working, low-income household head was employed?
(2) What if every employed, low-income household head worked at least 2,000 hours a year?
(3) What if every employed, low-income household head earned at least $12 per hour?

To implement the first simulation, we use OLS regression analyses to impute annual earnings to non-working household heads. Specifically, we model logged annual earnings as a linear function of work experience, a work experience quadratic term,[45] and a series of race and educational attainment indicator variables. Separate regressions are estimated for men and women, and all models are estimated on samples of low-income adults who have positive earnings. Note, then, that our model assumes that the potential earnings of non-working low-income adults are, conditional on the observed characteristics we control for in the regressions, comparable to the observed earnings of low-income adults who worked in 2011.

In contrast, our second and third thought experiments do not require any imputations since they focus on low-income household heads who worked during the previous year. In our second simulation, all low-income heads who worked less than 2,000 hours in 2011 have their hours worked boosted to 2,000 hours. Post-intervention annual earnings are then computed by multiplying their observed hourly wage rates by 2,000. For our third thought experiment, employed low-income heads who earn less than $12 an hour have their hourly earnings increased to $12 an hour. Post-intervention annual earnings are calculated by multiplying their observed number of hours worked by 12.

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[44] If CPS respondents greatly overstated their annual hours of work, it is possible that the workers we estimate to earn sub-minimum wages actually earn far greater than $7.25 per hour. However, we do not believe that this is the case. After correcting for our over-estimation of sub-minimum-wage earners using the method described above, we find that our earnings distribution replicates both the CPS ORG proportion of sub-minimum-wage earners and the CPS ORG proportion of workers earning between $7.25 and $10 per hour. Thus, it appears that those workers who were labeled as sub-minimum-wage earners actually earn somewhere between $7.25 and $10 per hour.

[45] An individual's work experience is defined to be their age minus their years of schooling minus six. This definition of potential work experience is standard in the literature (Card, 1999).

B

*Minimum Wage Simulation*

To simulate a minimum wage of $9 an hour, we assign $9 hourly earnings to all low-income workers who earn less than $9 an hour. Post-intervention annual earnings are then computed by taking the product of their observed annual hours worked and their new hourly earnings (i.e., 9).

*Unemployment Rate Simulation*

To simulate how household earnings will vary with the unemployment rate, we model expected earnings as a function of the annual unemployment rate. More specifically, we use a two-stage model wherein we first correlate the unemployment rate with the probability that an individual will work, and then use the unemployment rate to predict an individual's annual earnings, conditional on working. Our model specification is as follows:

For individual $i$ in year $t$,

$$(1) work_{it} = \beta_0 + \beta_1 UR_t + \beta_2 UR_{t-1} + \beta_3 D90_i + \beta_4 D00_i + \varepsilon_{it}$$

$$(2) \ln(earnings_{it}|earnings_{it} > 0) = \alpha_0 + \alpha_1 UR_t + \alpha_2 UR_{t-1} + \alpha_3 D90_i + \alpha_4 D00_i + \mu_{it},$$

where $work_{it}$ is an indicator variable for whether individual $i$ worked at all in year $t$; $\ln(earnings_{it}|earnings_{it} > 0)$ is the logged annual earnings of worker $i$ in year $t$; $UR_t$ is the annual national unemployment rate in year $t$; $UR_{t-1}$ is the annual national unemployment rate in the preceding year; and $D90_i$ and $D00_i$ are decade dummy variables that indicate, respectively, whether individual $i$ was surveyed between 1990-1999 or between 2000-2012 (the reference period is 1979-1989). Based on these regressions, we can then predict expected annual earnings by multiplying together (a) the work probabilities predicted from equation 1, (b) the earnings predicted from equation 2, and (c) Duan's smearing estimator, which corrects for the bias that arises when we transform predicted logged earnings into predicted earnings.[46]

To estimate these models, we use March CPS data for 1979-2011.[47] Earnings are adjusted for inflation using the CPI-U-RS. Annual national unemployment rates are drawn from the Bureau of Labor Statistics' unemployment rate series.[48] We use logistic regressions to estimate equation 1 (i.e., our work model), and OLS techniques to estimate equation 2 (i.e., our earnings model). We estimate separate regressions by educational attainment (high school degree or less, some college, bachelor's degree or more), gender (female, male), race (white, non-white), and age (25-34, 35-44, 45-54) for a total of 72 distinct regressions (36 work-decision models and 36 earnings equations). All regressions are estimated on

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[46] Provided that errors from the regression are homoskedastic, Duan's smearing estimator, which we empirically estimate as the mean of the exponentiated (i.e., anti-logged) residuals from our earnings model, can be used to correct for the retransformation bias that occurs when a nonlinear transformation is applied to the dependent variable. For more details, see Duan (1983).

[47] Specifically, we downloaded the 1979-2011 CPS data from IPUMS, which can be accessed at: https://cps.ipums.org/cps/

[48] Accessible at: http://data.bls.gov/timeseries/LNU04000000?years_option=all_years&periods_option=specific_periods&periods= Annual+Data

individuals who (1) are between the ages of 25 and 54 (inclusive), and (2) earn less than $200,000 a year (in 2011 dollars).

Estimated coefficients (and smearing estimators) are then assigned to every member of our 2011 sample of low-income adults according to their demographic characteristics. To simulate a baseline earnings level, we filter the unemployment rate conditions for 2011 through our imported parameters in order to impute expected earnings to all low-income individuals. Predicted earnings are aggregated across members in a household in order to arrive at predicted household earnings, and predicted household earnings are then averaged across bottom-third households in order to derive our 2011 simulated household earnings level.

To simulate how bottom-third household earnings might vary as a result of future changes in the unemployment rate, we import into our dataset (calendar year) unemployment rate projections produced by the Congressional Budget Office (CBO 2013, Table B1). We then filter these unemployment rate projections through our unemployment rate parameters in order to predict bottom-third expected household earnings for 2012, 2013, and so forth. It is important to note that we only change the values for the unemployment rate variable ($UR_t$) and the lagged unemployment rate variable ($UR_{t-1}$). As such, our simulation can be thought of as predicting the earnings that would result from cyclical changes in the economy, while holding constant the characteristics and composition of the bottom-third working-age population. We interpret the percent change between our simulated baseline (i.e., 2011) average bottom-third household earnings and our projected (e.g., 2015) average bottom-third household earnings as the effect of lowering the unemployment rate on average bottom-third household earnings.

### *Education Simulation*

As with the unemployment simulation, we simulate changes in educational attainment by using regression techniques to predict pre- and post-intervention expected household earnings. Like before, we use a two-stage model wherein we first predict individuals' probabilities of working, and then predict individuals' annual earnings, conditional on working. Specifically, we use logistic regressions to model the decision to work as a linear function of experience, experience squared, and a series of race, educational attainment , and family structure indicator variables. Separate regressions are estimated for men and women, and all models are estimated on samples of bottom-third adults. For our earnings models, we regress logged annual earnings on experience, experience squared, and a series of race and educational attainment dummy variables. Separate earnings models are estimated for men and women, and all models are estimated using OLS on samples of bottom-third adults who have positive earnings. Based on these work and earnings regressions, we can then impute expected annual earnings to all bottom-third adults by multiplying together (a) the work probabilities predicted by our work-decision model, (b) the earnings predicted by our earnings model, and (c) the appropriate smearing estimator, which corrects for the non-linear transformation of predicted logged earnings into predicted earnings.

We first use this two-stage model to simulate a pre-intervention average earnings level for bottom-third households. Specifically, expected earnings are imputed to individuals and then aggregated across members in a household in order to arrive at predicted household earnings. Predicted household

earnings are then averaged across bottom-third households in order to derive a baseline household earnings level.

For our post-intervention run, we then calculate the number of high school dropouts that need to be "flipped" to high school graduates in order to boost the high school graduation rate among low-income adults to 90%. From the pool of low-income adults who claim to be high school dropouts, we randomly select the appropriate number of individuals and switch their educational attainment levels from high school dropout to high school graduate. We assume that half of these "new" high school graduates continue on to some form of post-secondary education, and half discontinue their education after graduation. We then filter this new educational attainment profile through the coefficients of our two-stage earnings model (as described in the above paragraph) in order to derive a post-intervention average earnings level for bottom-third households.

Because our simulation retrospectively changes the high school graduation rates for adults who have already gone through high school, we believe that our model is best thought of as a steady state model. That is, our model attempts to simulate what the earnings distribution would look like if, for consecutive generations, the high school graduation rate was 90 percent for low-income adults.

### *Marriage/Cohabitation Simulation*

In this simulation, we seek to pair up members of two subpopulations: (1) low-income, single mothers who are the only working-age, able-bodied adult in their respective households; and (2) unrelated, working-age, able-bodied men who live in the bottom-third of the income distribution. By "unrelated," we are referring to the fact that these men do not live with family members or cohabitating partners – i.e., they live alone.

We use a methodology called "hot deck allocation" to match single mothers with demographically similar unrelated men.[49] First, single mothers and unrelated men are allocated to 32 distinct demographic cells based on their race/ethnicity (white non-Hispanic, black non-Hispanic, Hispanic, and other), age (25-29, 30-39, 40-49, 50-54), and educational attainment (high school diploma or less, some college or more). Within each demographic cell (e.g., white/25-29/high school diploma or less), we randomly assign single mothers to unrelated men who fall within the same race/ethnicity, age, and educational attainment category. When a match is created, both observations are excluded from subsequent matches, meaning that an unrelated male can be assigned to at most one single mother (and vice-versa). Note, then, that the number of possible matches for each demographic cell is determined by the group (i.e., single mothers or unrelated men) with smallest number of individuals.

However, because certain demographic groups are under-surveyed in the CPS,[50] the unweighted data do not reflect the true size or demographic composition of bottom-third single mothers and unrelated men in 2011. So as to ensure that the availability of potential mates for single mothers in our simulation mirrors the availability of potential mates for single mothers in the real world, we use CPS sample

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[49] Note that the Census Bureau uses hot deck allocation to impute missing values in the CPS (Bureau of Labor Statistics, 2006).

[50] Minority men, in particular, are missed by the CPS and other surveys (Thomas and Sawhill, 2002).

weights to generate a synthetic, nationally-representative dataset. More specifically, we sample (with replacement) 10,000 observations from our CPS sample of household heads using CPS individual-level weights, thereby generating a dataset of household heads that is nationally representative of the 2011 population of household heads. We use this synthetic dataset to calculate a pre-intervention average household earnings level for bottom-third households. We then match single mothers with unrelated men using the hot-deck allocation procedure described above. Unrelated men who have been selected for a match are incorporated into the single mother's household, and their earnings are subsequently added to the earnings of the single mother. Average household earnings are then re-computed for bottom-third households, and the percent change between pre- and post-bottom-third household earnings is interpreted to be the effect of our marriage/cohabitation intervention.

## Additional Analyses

The following table and figures were referenced, but not included, in the main report.

### Decomposing Household Income

Appendix Table 1 provides a more detailed decomposition of household income for bottom-third and upper-two-thirds households.

| Appendix Table 1: A Detailed Decomposition of Household Income | | |
|---|---|---|
| | **Bottom-third households** | **Upper-two-thirds households** |
| Median Household Income* | $14,434 | $50,730 |
| % of Total Income from Earnings | 74.9% | 91.7% |
| % Total Income from Non-Earnings | 25.1% | 8.3% |
| *Decomposition of Non-Earnings Income Sources* | | |
| % Unemployment Compensation | 4.5% | 0.9% |
| *Other Government Benefits* | | |
| % Social Security | 6.7% | 1.8% |
| % Supplemental Security | 2.0% | 0.2% |
| % Public Assistance/Welfare | 2.1% | 0.0% |
| % Veterans Benefits | 0.3% | 0.2% |
| % Financial Assistance | 1.3% | 0.2% |
| % Education Assistance | 2.4% | 0.8% |
| *Investments* | | |
| % Interest | 0.9% | 0.9% |
| % Dividends | 0.3% | 0.5% |
| % Rent | 0.3% | 0.5% |
| *All Other Sources* | | |
| % Workers Compensation | 0.4% | 0.1% |
| % Child Support | 2.2% | 0.3% |
| % Survival Benefits | 0.2% | 0.2% |
| % Alimony | 0.1% | 0.1% |
| % Retirement | 0.9% | 1.3% |
| % Non-SSI Disability Income | 0.3% | 0.1% |
| % Other | 0.2% | 0.1% |

*Income has been adjusted for household size

## Lowering the Unemployment Rate

Appendix Figure 1 shows how annual weeks worked by bottom-third and upper-two-thirds adults are predicted to vary with CBO unemployment rate projections.
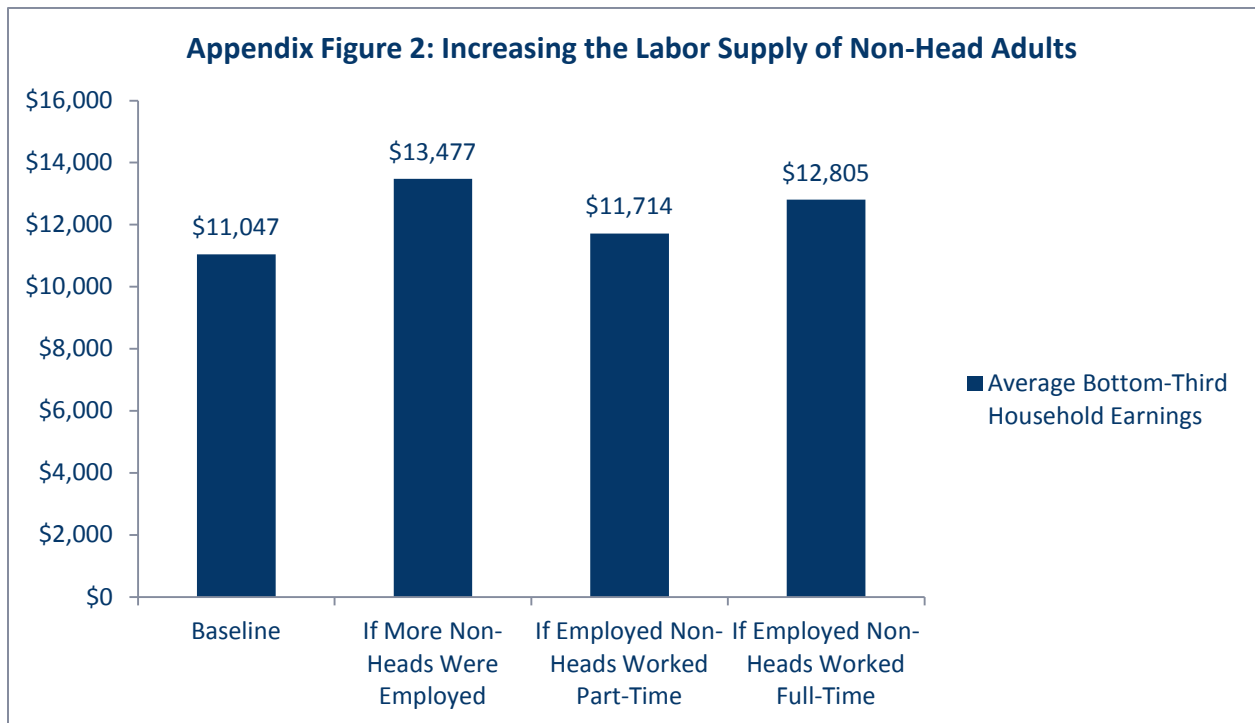


**Appendix Figure 1: Lowering the Unemployment Rate**
**(Annual Hours Worked)**

*Source for projected unemployment rates: CBO (2013, Table B1)*
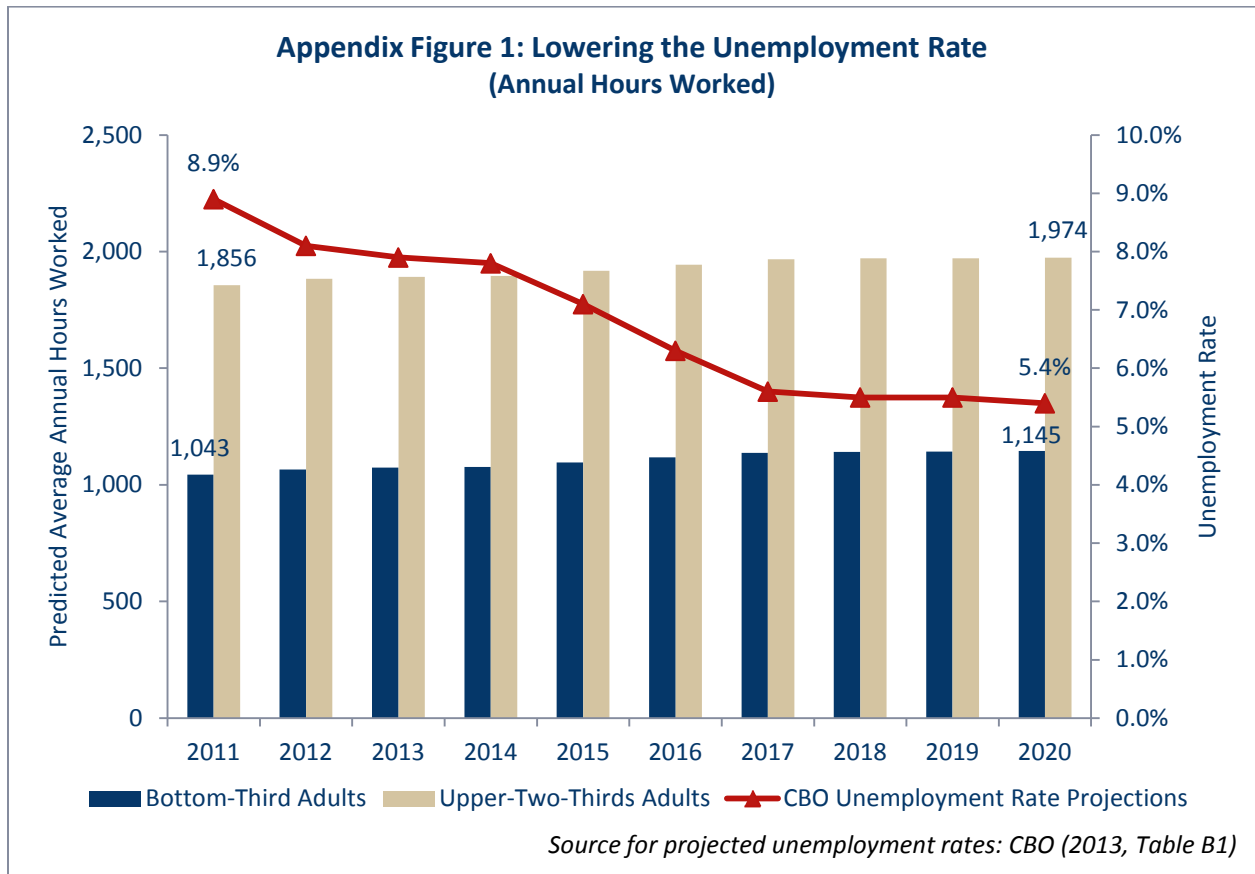
## *Increasing the Labor Supply for Non-Heads of Household*

In the main report, we simulate how adding additional workers to single-mother families could boost the earnings of bottom-third households. Here, we estimate the earnings that could be gained from increasing the labor supply of *existing* non-head adults, while holding family structure constant. Specifically, we simulate the following what-if scenarios:

(1)  What if every non-working, non-head household member worked?
(2)  What if every employed, non-head adult worked at least part-time (i.e., 1,000 hours a year)?
(3)  What if every employed, non-head adult worked a full-time job (i.e., at least 2,000 hour a year)?

The results from these simulations are presented below in Appendix Figure 2.

**Appendix Figure 2: Increasing the Labor Supply of Non-Head Adults**

| Category | Average Bottom-Third Household Earnings |
|---|---|
| Baseline | $11,047 |
| If More Non-Heads Were Employed | $13,477 |
| If Employed Non-Heads Worked Part-Time | $11,714 |
| If Employed Non-Heads Worked Full-Time | $12,805 |

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