How Income Changes During Unemployment: Evidence from Tax Return Data*

Laura Kawano†
Office of Tax Analysis
U.S. Department of the Treasury

Sara LaLumia‡
Department of Economics
Williams College

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Abstract

We use a panel of tax returns spanning 1999 to 2011 to provide new evidence on household experiences during unemployment. A period of unemployment is associated with roughly a 20% reduction in annual household wage earnings. Unemployment insurance compensates for half of these wage losses. Households also partially compensate by using a variety of income sources. Distributions from retirement accounts increase in the short run. Self-employment income and disability insurance payments increase over longer periods. More generous UI benefits crowd out wage income and are associated with increased distributions from retirement accounts. This combination of responses is consistent with UI benefits lengthening unemployment spells.

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†Postal Address: 1500 Pennsylvania Ave. #4217-A, Washington, D.C., 20220. Work Telephone: 202-622-5186. Email: Laura.Kawano@treasury.gov

‡Corresponding author. Postal Address: 24 Hopkins Hall Drive. Williamstown, MA 01267. Work Telephone: 413-597-4886. Email: Sara.Lalumia@williams.edu.

Designing policies to help workers after job loss requires information about the extent of financial hardship they face. Numerous studies have documented an immediate negative impact of job loss on an individual's earnings, with most estimates suggesting a 10% to 25% decline in wage income, as well as persistently lower wage income for several years (Jacobson, LaLonde and Sullivan 1993, Farber 1997, Stevens 1997, von Wachter, Handwerker and Hildreth 2008, Couch and Placzek 2010). Consumption also declines as a result of job loss, but by much less than wage income (Dynarski and Gruber 1997, Stephens 2001). Unemployment insurance (UI) compensation can facilitate consumption smoothing but, to the extent that this smoothing is incomplete, households may turn to other income sources. Understanding which income sources are utilized, and how the reliance on such funds is related to the UI system, has important public policy implications.

This paper uses individual tax return data spanning 1999 to 2011 to provide further evidence on how income evolves over the course of unemployment. We provide new estimates of the wage losses associated with unemployment, and explore the extent to which households use non-wage income sources to smooth consumption through an unemployment spell. In this paper we consider capital gains realizations, self-employment income, distributions from retirement accounts, and disability insurance income. In a companion paper (Kawano and LaLumia 2014) we examine the labor income earned by spouses of the unemployed. Considering these different dimensions of compensatory behavior broadens our understanding of how households cope with unemployment. This topic is of particular interest in the wake of the Great Recession, and our analysis compares responses before and during this era of high unemployment.

We construct a panel of income tax returns for households that have evidence of an unemployment spell. We rely on UI compensation being taxable income and thus reported on a tax return to identify unemployment. We estimate fixed effects regressions comparing income amounts in years with UI benefit receipt to income amounts in other years. We find that unemployment spells are associated with substantial declines in household- and individual-level

wage income, equivalent to about 17% of pre-unemployment household earnings and about 23% of pre-unemployment individual earnings. Wage losses are the largest for those who suffer their first job loss during the Great Recession. Next, we consider the use of non-wage income sources during unemployment.[1] We find that UI benefits, on average, compensate for half of lost household-level wages. Other non-wage income sources together compensate for an additional 11% of lost wage income. The largest short-run response to unemployment is an increase in distributions from retirement accounts. Households display an increased propensity to realize capital gains, but we do not detect a significant increase in net capital gains. Income from self-employment increases for several years after unemployment. We find some evidence of long-run transitions into the disability insurance system in the years following unemployment, consistent with individuals turning to this alternative safety net program after they exhaust UI benefits. Although wage income losses during unemployment are larger in the Great Recession, we find that the reliance on non-wage income sources is fairly consistent before and after the Great Recession. These differences may reflect the extensions and enhancements to the UI system that were implemented during this period.

We also consider the extent to which the UI system distorts household responses to unemployment spells. Naturally, when unemployment duration is longer the income losses associated with unemployment will be larger.[2] We find that more generous UI programs crowd out annual wage income. Increasing the dollar value of the state-specific maximum weekly UI benefit amount by 10% is associated with about a 0.6% reduction in annual household-level wage income upon initial entry into unemployment. The crowd-out of annual

[1]This analysis complements previous research, also using tax return data, showing that job loss is associated with an increased probability of taking a penalized early withdrawal from an IRA (Amromin and Smith 2003). Researchers have used other data sources to show that unemployment is associated with increased informal transfers from family members (Schoeni 2002, Bentolila and Ichino 2008), with increased borrowing by households in the middle of the wealth distribution (Sullivan 2008), and with an increased probability of refinancing a home (Hurst and Stafford 2004).

[2]This effect could be mitigated if longer time spent searching for a job eventually produces a higher-quality match, but evidence suggests that the wage gains from longer search times are minimal (Addison and Blackburn 2000).

wage income is greater during subsequent spells for households that experience multiple unemployment spells. If forward-looking individuals anticipate UI receipt during a potential future unemployment spell, they may engage in less precautionary saving under a more generous UI system. We find relatively little evidence that more generous UI crowds out non-wage income realization during unemployment. In fact, we find that more generous UI is associated with larger retirement distributions.

To the best of our knowledge, tax return data have not previously been used to estimate changes in income associated with unemployment.[3] A major advantage of these data is that they measure most income sources with a very high degree of accuracy. Many survey respondents (for example, more than one quarter of CPS respondents) do not provide any information about wage income, and their wages are imputed (Lillard, Smith and Welch 1986, Bollinger and Hirsch 2006). Even when willing to report wages, recall is not perfect. Workers who have been laid off recall a job paying about 5% more per year, on average, than it actually did (Oyer 2004). In contrast, wage income on a tax return is never imputed and is verified by third-party information returns, the W-2 forms that employers file on behalf of their employees. Approximately 99% of the wage income that should be reported to the IRS is in fact reported (Slemrod 2007). The presence and amount of unemployment compensation is also measured more accurately in tax return data. We show that 96% of all UI payments are captured in tax returns. In contrast, comparisons of data from multiple sources show that many unemployment spells, particularly short ones, are unreported in survey data (Mathiowetz and Duncan 1988) and that only about 70% of aggregate dollars spent on UI are reported (Meyer, Mok and Sullivan 2009).

Our results contribute to the literature estimating the wage losses experienced by displaced workers.[4] These estimates have relied on administrative data from state unem-

[3]Hilger (2014) uses tax return data to examine the impact of a father's job loss on a child's college attainment and early adult earnings.

[4]Kletzer (1998) defines displaced workers as individuals with an established history of labor force attachment, who have lost jobs for structural reasons such as plant closures or layoffs, and who are unlikely to return to their pre-unemployment jobs. Similarities between

ployment offices (e.g. Jacobson et al. 1993, Couch and Placzek 2010, Schoeni and Dardia 1996, Kodrzycki 2007), on Social Security earnings histories (e.g. von Wachter, Song and Manchester 2009, Davis and von Wachter 2011), on retrospective survey data from the Displaced Worker Survey (DWS) supplement to the Current Population Survey (e.g. Farber 1997), or on longitudinal data from surveys such as the PSID (e.g. Stevens 1997). Generally, these studies find wage losses between 10–30% of annual earnings with effects that persist for several years after displacement. In an effort to reconcile estimates from different sources, von Wachter et al. (2008) match DWS and UI administrative data for workers in California. They find that the DWS survey data suffer from recall errors, and that the larger estimates from administrative data are more reliable. Our paper also contributes to the literature on potential distortions created by the UI system. Models of job search predict that more generous UI reduces search effort, lowering the probability of exiting from unemployment. Atkinson (1987) and Krueger and Meyer (2002) review empirical work establishing that more generous UI programs increase unemployment durations.[5] Other authors have found that more generous UI benefits crowd out the reliance on personal savings during unemployment (Gruber 2001), the accumulation of savings prior to unemployment (Engen and Gruber 2001), and the 401(k) contributions of younger workers (Love 2006).

The paper proceeds as follows. Section 1 describes the construction of our dataset, including discussion of the coverage of UI income within tax return data. Section 2 outlines our empirical strategy. Section 3 presents the main empirical results, including a comparison of how unemployment-related income shocks compare across the Great Recession and earlier years. Section 4 presents evidence on how UI recipients in tax return data compare to UI recipients in the Survey of Income and Program Participation. We also present survey-based comparisons of UI recipients and non-recipients. Section 5 concludes.

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the definition of displaced workers and the eligibility requirements for UI suggest that our sample of UI recipients is comparable to displaced worker samples studied previously.

[5]Estimates of the elasticity of unemployment duration with respect to UI benefit generosity range from 0.5 to 0.8 (Meyer 1990, Chetty 2008, Kroft and Notowidigdo 2011).

1 Data

We use the Continuous Work History Sample (CWHS), collected by the Statistics of Income division of the Internal Revenue Service. The CWHS is a random sample of tax returns, selected on the basis of the last four digits of the primary filer's Social Security number. We construct a panel of tax returns for taxpayers in the CWHS spanning years 1999 to 2011. In addition to the income data and limited demographic data available on a tax return itself (marital status and number of dependent children living at home), we obtain date of birth and gender of the primary and secondary filers from Social Security Administration (SSA) records. We match tax returns with information returns filed by third parties: (1) wage income from employer-provided W-2 forms; (2) unemployment insurance benefits on 1099-G forms filed by state unemployment offices; and (3) disability insurance payments on SSA-1099 forms filed by the SSA. All monetary amounts are converted to real 2011 dollars using the CPI and are winsorized at the 99^{th} percentile of the distribution of positive values.[6]

The presence of UI income indicates that a household experiences a layoff.[7] Tax returns include self-reported UI income at the household level, but we use 1099-G data to assign UI amounts to individuals. We impose several sample restrictions. We exclude filers with addresses outside of the 50 states or Washington D.C., returns filed by dependents, and returns with a filing status other than single, married filing jointly, or head of household. We keep returns with primary filers between ages 25 and 60.[8] About 34% of filing units meeting other sample restrictions receive UI income at some point during the 13-year panel.

We further restrict our sample to households observed entering unemployment, defined as reporting UI income in one year conditional on having no UI income in the previous year.

[6]Our results are robust to winsorizing at the 95% level.

[7]UI income has been fully taxable since 1987. The one exception is that the first $2400 was not taxable in 2009, but total amounts are reported on 1099-G forms.

[8]Our choice of 60 as an upper bound on age reduces the possibility that individuals in our sample are retiring in response to an unemployment spell. Chan and Stevens (2001) find that workers displaced in their 50s have about a 75% chance of returning to work in the two years after job loss, while workers displaced in their 60s return to work at lower rates.

This definition excludes households reporting UI in the first year they appear in the data, as we cannot determine the year in which these unemployment spells began. Approximately 75% of sample households experience just one spell of UI receipt over the course of the panel. We define the first unemployment spell as either the first year with any UI income, if a household reports zero UI income in the next year, or as the first two consecutive years with UI receipt. Over most of our sample period, the maximum duration of UI benefit receipt was 26 weeks. A single spell of UI receipt that began towards the end of one calendar year could involve benefit receipt in two calendar years.[9] When the maximum benefit duration exceeds 53 weeks, as it did in some states beginning in November 2008, a continuous spell could result in UI income receipt in three consecutive years (Rothstein 2011). However, we classify the third and any later years with UI income as subsequent unemployment spells. Using these definitions, approximately 20% of households in our sample experience two unemployment spells. The greatest observed number of entries into unemployment is five. Because our annual data make it impossible to identify cases where a household experiences two or more distinct spells of unemployment during a given calendar year, though, our sample may very well include households with more than five unemployment spells.

An appealing feature of our data is that, unlike survey data, tax return data provide highly accurate coverage of UI income. The solid line in Figure 1 plots the annual amount of all UI payments made, as reported by the Department of Labor. The dotted line with diamond markers plots the imputed annual amount of UI income reported to the IRS. This amount is computed by summing over reported UI amounts for the CWHS sample, and then scaling up to reflect the random sampling of the CWHS.[10] Figure 1 depicts the remarkable quality of tax return data. Between 1999 and 2011, the weighted sum of UI income in all CWHS tax returns accounts for over 96% of total UI payments. The dotted line with square

[9] UI receipt in a single year could represent multiple short spells. SIPP data indicate that, among households receiving UI income at any point during full calendar years observed in the 2001, 2004, or 2008 panels, 20% experience multiple spells of unemployment.

[10] We take the maximum amount of UI reported on either the 1040 or the collection of 1099-G forms associated with a particular filing unit.

markers represents the imputed sum of UI income reported by households that meet all of our sample restrictions. While each sample restriction lowers the share of UI payments captured in the analysis sample, restricting to primary filers 60 or younger has the greatest impact. This age restriction matters the most during the Great Recession. Averaged across all years, the imputed UI income represented in our analysis sample is 64% of all UI payments made.

A potential concern is that UI recipients are not representative of the full unemployed population. We consider this issue in detail in section 4, but here we show that broad trends in the unemployment rate are replicated in tax data. Figure 2 compares the annual unemployment rate, as computed by the Bureau of Labor Statistics, to the annual percentage of primary and secondary filers in the CWHS sample reporting any UI income. The two series move together, with both increasing during recessions. Their correlation is 0.939. This offers some assurance that aggregate unemployment trends are represented in tax return data.[11]

We analyze wage income and various types of non-wage income. Complete variable definitions are in the Data Appendix, but we provide some description of our income variables here. Wage income is reported at the household level on a tax return. We construct the wages of the unemployed individual as the wage income of the person within a household for whom a 1099-G has been filed.[12] We define a composite measure of non-wage income as total taxable income net of wages and UI benefits. Components of this measure that we also analyze separately are net capital gains realizations, self-employment income from Schedule C, and gross distributions from retirement accounts.[13] Social Security Disability Insurance (SSDI) income is not taxable, but is observable from information returns.[14]

[11]The ratio of the number of unemployed individuals to the civilian population follows a similar pattern over time.

[12]If both the primary and secondary filers receive UI benefits in the same year, we define the wages of the unemployed individual as the sum of primary and secondary wage income. This occurs in only 1.6% of household-years with UI receipt.

[13]Individuals in our sample (no older than 60) will in many cases trigger a penalty when taking distributions from a retirement account. We have examined this penalty amount as an additional dependent variable, finding that it closely tracks retirement distributions.

[14]Other potentially interesting outcomes not reported on a tax return are net wealth, savings account balances, in-kind or cash transfers in the form of food stamps or welfare, or

Table 1 describes our sample of 16,946 households. Panel A reports demographic characteristics, measured in the first year of UI receipt. Approximately 43% of returns are jointly filed by married couples, and 23% are filed by heads of household. Almost 40% appear to be homeowners, as measured by paying mortgage interest or deducting property taxes.[15] Panel B reports income amounts measured in the year prior to first UI receipt. The typical filing unit in our sample has household-level wage income of over $55,000 in the year prior to an unemployment spell, and has AGI of nearly $70,000. While this is above the average household income for the population as a whole, previous research has shown that UI receipt is positively associated with education (Gould-Werth and Shaefer 2012) and income (Government Accounting Office 2012). Panel C reports the share of the sample with various types of income, both in the year prior to first UI receipt and across the course of the panel. More than half of households in our sample have non-zero values of composite non-wage income in the year before their first layoff, and nearly all report non-wage income at some point over the panel. The mean amount of non-wage income is small, $3,979 in the year prior to first layoff, and there is substantial variation around this mean.[16]

We use state of residence to match individuals with information on the generosity of the UI system they face.[17] Each state administers its own UI program, within federal guidelines. States have discretion in setting eligibility rules and in calculating benefit amounts. All states set benefits equal to some fraction, typically one half, of an individual's pre-unemployment earnings, up to a cap. This cap, the maximum weekly benefit amount, varies widely across states and over time. Florida does not change its maximum weekly benefit amount between

informal transfers from family members.

[15]We identify homeowners among those who itemize deductions, which likely excludes those who have paid off their mortgage and whose property tax bill is less than the standard deduction. Homeownership rates over our sample period are between 60% and 70% (U.S. Census Bureau 2012), and Poterba and Sinai (2011) find that 63% of homeowners itemize.

[16]Non-wage income can be negative, as it includes losses from business or from sales of depreciated assets.

[17]This introduces some measurement error. For an individual who lives and works in different states, the relevant UI program corresponds to his state of employment.

1999 and 2011, but all other states make a change at some point. Most states change the maximum benefit amount several times. The mean number of changes is seven, and 19 states provide a different maximum benefit amount in every year of our analysis. As is standard in the UI literature, we use the maximum weekly benefit amount at the time of an individual's entry into unemployment as a summary measure of the benefit generosity he faces.

Because behavior may differ in short and long spells, it would be useful to know unemployment spell length. However, we observe only annual UI income. We impute the number of weeks of UI receipt by dividing annual UI income by a predicted weekly benefit amount. We have coded the state- and year-specific benefit calculation formulas, as described in the Department of Labor's annual *Comparison of State Unemployment Insurance Laws*. Each state's benefit calculation is an increasing function of earnings in a pre-unemployment base period. We use wage income from the year before UI receipt as our measure of pre-unemployment earnings and assume that this wage income was spread evenly throughout the year.[18] This procedure, though imperfect, captures business-cycle variation in the average length of unemployment spells. The average imputed spell length is substantially higher in 2009 through 2011 and is elevated during the recession of the early 2000s.

2 Estimation Strategy

We first consider how wage and salary income changes through unemployment. We estimate a fixed effects regression model of the following form:

$$\begin{aligned} WageInc_{it} = \beta_0 + \beta_1 FirstUnemp_{it} + \beta_2 PostUnemp_{it} + \beta_3 LaterUnemp_{it} \\ + X_{it}\Omega + \alpha_i + \gamma_t + \varepsilon_{it}, \end{aligned} \tag{1}$$

[18]Many state formulas use the highest quarterly earnings in calculating benefits. If wage income is unevenly spread across the year, we will understate highest quarterly earnings, downward-biasing predicted weekly benefits and upward-biasing imputed weeks of UI receipt. Consistent with this possibility, 9% of primary filers' UI spells and 16% of secondary filers' UI spells are imputed to involve more than 52 weeks within a calendar year.

where i indicates filing unit and t indicates tax year. In some specifications wage and salary income is measured at the household level, and in other cases it refers to the wage income of the individual who receives UI. The variable *FirstUnemp* is an indicator equal to one during the first unemployment spell and zero otherwise. The variable *PostUnemp* is a dummy variable that equals one in all years after the first unemployment spell that the household does not receive UI. The *LaterUnemp* term equals one in years with UI receipt after the first spell of unemployment and zero otherwise. The vector X includes the age and age squared of the primary filer. The terms α_i and γ_t are filing unit and year fixed effects. Standard errors are clustered at the tax filing unit level.

Our estimation strategy makes use of variation over time within a filing unit. The coefficient on *FirstUnemp* represents the change in income in the first unemployment spell relative to a filing unit's average income in pre-unemployment years. We expect that $\beta_1 < 0$. If wage income does not recover within our time frame, then β_2 would also be negative to reflect a longer-run reduction in household wage income. Households may experience multiple layoffs over the course of the panel. The coefficient on *LaterUnemp* represents the change in wage income experienced in second and all subsequent unemployment spells relative to the wage income reported prior to the first observed entry into unemployment. We expect that $\beta_3 < 0$.

Previous research has shown that the generosity of UI benefits may crowd out job search efforts of the unemployed, thereby prolonging unemployment spells. Although we do not observe unemployment duration or search effort in tax return data, we can still estimate the extent to which more generous benefits alter behavior. Longer unemployment spells will produce lower values of annual wage income. To measure potential crowd-out, we augment Equation 1 with three new variables as follows:

$$\begin{aligned} WageInc_{it} = \beta_0 &+ \beta_1 FirstUnemp_{it} + \beta_2 PostUnemp_{it} + \beta_3 LaterUnemp_{it} + \beta_4 MaxWBA \\ &+ \beta_5 MaxWBA \cdot FirstUnemp_{it} + \beta_6 MaxWBA \cdot LaterUnemp_{it} \\ &+ X_{it}\Omega + \alpha_i + \gamma_t + \varepsilon_{it}, \end{aligned} \tag{2}$$

where *MaxWBA* measures the statutory maximum weekly UI benefit amount an individual could receive. This term varies with state of residence and year of entry into unemployment, but not with an individual's own past wage history.[19] Thus, while actual UI benefits depend on an individual's pre-unemployment wages, our generosity measure relies only on variation in benefit generosity that is exogenous to individual characteristics. The interaction terms of $MaxWBA$ and unemployment spell indicators allow us to estimate the extent to which more generous UI benefits affect the level of wage income reported during a spell of unemployment. Negative estimates of β_5 and β_6 indicate crowd-out; when UI benefits are more generous, wage income falls more during an unemployment spell than when UI benefits are less generous.

Additionally, we estimate a more flexible specification that accounts for the possibility that wage income may start to decline prior to the start of unemployment and may recover only slowly afterwards. Closely following a specification adopted by Jacobson et al. (1993) and widely used in the subsequent literature, we include a series of dummies measuring the number of years elapsed since an unemployment spell:

$$WageIncome_{it} = \sum_{k=-2}^{9} (\delta_k \cdot D_{kit}) + X_{it}\Omega + \alpha_i + \gamma_t + \varepsilon_{it}. \tag{3}$$

In this equation the dummy variables $D_k, k = -2, ..., 9$, indicate that an observation occurs k years after a household's first observed layoff.[20] Negative values indicate years prior to first UI receipt. The D_0 dummy is equivalent to the *FirstUnemp* dummy included in Equation 1. Because households can experience multiple layoffs, positive values, denoting years after the *first* spell of UI receipt, may include years with UI receipt. With the smallest value of k equal to -2, the estimates of δ_k can be interpreted as the change in wages k years after entering unemployment, relative to wage income averaged over the observations more than

[19]Benefit generosity is determined at the start of a spell, and remains constant over that spell.

[20]In Jacobson et al. (1993), each time period is a quarter rather than a year. Because we have annual data, our estimates of wage dynamics around the time of layoff are not directly comparable to theirs.

two years prior to the first layoff.

To investigate whether and to what extent households turn to non-wage income during an unemployment spell, we use both Equations 1 and 3, changing the dependent variable to the measures of non-wage income described in Section 1. Although we have estimated both equations for each type of non-wage income, we present a subset of results. Equation 1 is appropriate for types of income that can be adjusted very quickly, contemporaneous with layoff. Equation 3 is most suited to income types that can only be adjusted more slowly.

A state's UI generosity may influence the utilization of non-wage income sources. To explore these potential effects, we estimate Equation 2 for non-wage income measures. The predicted impact of UI generosity on non-wage income is ambiguous. UI benefits may substitute for other non-wage income sources as a means of smoothing consumption over an unemployment spell. The larger the share of wage losses that are covered through the UI system, the less likely a household may be to rely on other income sources. In this case, more generous UI would crowd out the utilization of non-wage income. Alternatively, if more generous UI benefits reduce job search effort and lengthen unemployment, households may be *more* reliant on non-wage income after job loss. In other words, the crowding out of an individual's search effort and wage income by more generous UI benefits could be associated with the "crowding in" of non-wage income during unemployment spells.

We examine several potential sources of heterogeneity. We split the sample by pre-unemployment AGI, by household demographic characteristics (age of the primary filer, marital status, gender, and the presence of children in the household), by imputed spell length, and by economic conditions that a household faced when it first entered unemployment. For pre-unemployment AGI and age, we split the sample into those with above-median and below-median values in the year prior to the first unemployment spell. For spell length, we split the sample into those with above-median and below-median spell lengths during their first unemployment spell. Previous research documents that displacements involve much larger wage losses during a recession than in an expansion (Davis and von Wachter 2011).

Therefore we also split the sample into those facing above-median and below-median state unemployment rates, and we consider whether responses to unemployment were different before and after the Great Recession began.

3 Results

3.1 Wage Income

Before turning to our regression results, Figure 3 presents graphical evidence on the time path of wage income in years before and after unemployment. The left panel plots average annual household-level wage and salary income from eight years before the first UI receipt to eight years after the first UI receipt. The right panel plots average total income. In these figures, zero indicates the first year(s) in which a household receives UI income. For spells that occur over two years, both of these years are included in $t = 0$. Because households can enter unemployment spells in different calendar years, characterized by different aggregate economic conditions, we plot average income net of year fixed effects. Households may experience multiple unemployment spells, so years included in $t > 0$ may also be associated with UI receipt. There are significant wage declines in the year that a household member becomes unemployed. On average, wage income falls by about $13,000 in that year. Declines in wage income appear to begin in the year prior to the first receipt of UI. This pattern could reflect a delay between becoming unemployed and applying for UI, or it could reflect a wage decline in advance of a future job loss. When a household enters unemployment, total income falls sharply, with an average decline of over $6,000. The decline in total income is smaller than the decline in wage income both because UI payments partially compensate for lost wages, and because non-wage income increases.

Table 2 presents results from fixed-effects regressions describing how wage income changes during unemployment. The first two columns correspond to Equation 1, with the dependent variable of annual wage and salary income measured at the household level in column 1

and for the unemployed individual in column 2.[21] Both columns show a similar pattern. A first unemployment spell is associated with declines of about $9,300 in annual wage income, relative to wages in pre-unemployment years. These losses are large; relative to the average wage income amounts in the year prior to an unemployment spell, these changes represent a 17% percent decline in annual household wage income and a 23% decline in annual wage income for the individual who becomes unemployed. Wage income remains significantly depressed in later years, as shown by the negative coefficient on *PostUnemp*. On average, years following an initial unemployment spell are characterized by wage income at least $8,000 lower than pre-unemployment average annual earnings. Relative to the year prior to the first unemployment spell, later spells of unemployment are associated with annual wage losses of over $10,000 at the household level and about $8,700 at the individual level.[22]

Figure 4 presents the results of estimating Equation 3. The first panel considers annual household-level wage income, and the second considers annual wages of the unemployed individual. The coefficients on the D_{-2} through D_9 dummies show the change in annual wage income relative to wages averaged over observations three or more years prior to entering unemployment. These results show evidence of substantial declines in wage income in years of first UI receipt, followed by very slow recovery. It takes six years for household-level wage income to recover to its pre-unemployment level. Individual-level wage income does not recover until nine years after unemployment entry. In interpreting these results, it is important to note that only the first unemployment spell is counted as $t = 0$. A major reason that average wage income is low in subsequent years is that some individuals experience additional unemployment spells.[23] The long-run negative wage impacts we document here,

[21]We also estimate these equations using log annual wages as our dependent variable. For log of household-level wage income, the coefficient on $FirstUnemp$ is -0.35, statistically significant at the 1% level (N = 133,501). We present level specifications of our non-wage regressions because many households do not have certain types of income. Thus we focus on the level specification when considering wage income to facilitate comparison of estimated coefficients across specifications.

[22]Results are robust to including state fixed effects, as are results in all subsequent tables.

[23]In a previous version of this paper, we analyzed only filing units experiencing a single

while substantial, are not as severe as earlier estimates. Jacobson et al. (1993) estimate that six years after job displacement, earnings losses are 25% of pre-displacement earnings. Couch and Placzek (2010) estimate earnings losses of 12% to 15% measured six years after mass layoff. We find that individual-level earnings six years after a first layoff are $2,830 lower than average pre-unemployment earnings, representing a loss of 7%. It must be noted that results are not perfectly comparable across studies, as we observe wage income at annual frequency and previous authors observed quarterly earnings.

Columns 3 and 4 of Table 2 add measures of state UI generosity to investigate the extent to which UI benefits crowd out wage income. Again, results are similar when wage income is measured at the household level and at the individual level. Wage income declines substantially during a first unemployment spell, and it declines by more in cases where UI benefits are more generous. If UI benefits were zero, a first unemployment spell would be associated with average wage losses of about $6,600. Each additional hundred dollars of maximum weekly benefit amount is associated with about $725 less in individual-level annual wage income during a first unemployment spell ($758 less at the household level). To put this in context, we compute an elasticity showing the percentage change in annual wage income associated with a 1% change in the maximum weekly UI benefit. In our sample, the average wage income of unemployed individuals in the year before a first layoff is $39,735 and the average maximum weekly benefit amount during a first spell is $368. The corresponding elasticity of individual wage income with respect to weekly benefit generosity is $\frac{-725/39{,}735}{100/368} = -0.067$. In other words, a 10% increase in benefit generosity is associated with a 0.67% reduction in annual wage income.

The crowd-out associated with subsequent UI receipt is substantially larger. In these spells, an additional $100 of maximum weekly UI benefit reduces annual individual-level wage income by $1,831. Given the average WBA of $381 for later spells, the implied elasticity indicates that a 10% increase in benefit generosity during a second or later spell reduces

spell of UI receipt over the sample period. For that group, wage income had recovered to pre-unemployment levels by four to five years after layoff.

annual wage income by 1.6%. The greater degree of crowd-out for later spells could be a result of differences in a behavioral parameter, the elasticity of unemployment duration with respect to benefit generosity, across those who experience just one unemployment spell and those with multiple spells. It could also reflect the fact that, by definition, later spells tend to occur towards the end of the panel. About 55% of second and subsequent unemployment spells occur during the last four years of our sample. These Great Recession years are characterized by both high levels of UI benefit generosity and particularly long average unemployment duration, and Card, Johnston, Leung, Mas and Pei (2015) find a high elasticity of unemployment duration with respect to benefit generosity during the Great Recession.

There are numerous estimates in the literature of the extent to which greater generosity of UI benefits increases the duration of unemployment spells. Making some assumptions, these estimates can be converted to an implied effect on annual wage income, useful for checking whether our results are of plausible magnitude. Meyer (1990) estimates that a 10% increase in UI benefit generosity is associated with an 8% increase in unemployment duration. Individuals in his sample receive UI benefits for an average of 13 weeks, so an 8% increase in duration corresponds to roughly one additional week of unemployment. This is 1/52, or 1.9%, of the available time in a year. Assuming that wage income is spread evenly over the year, and that weekly wages are similar pre- and post-unemployment, this suggests that a 10% increase in UI benefit generosity would be associated with a 1.9% reduction in annual wage income. This is substantially larger than our imputed elasticity for first unemployment spells, but very close to our elasticity estimate for subsequent spells.

Figure 5 presents evidence on how the size of the wage loss associated with a layoff varies when wage equations, corresponding to Equation 1, are estimated separately for different subsamples. The horizontal axis represents the dollar value of wage loss, with more negative values to the left. Point estimates of the coefficient on *FirstUnemp* are plotted as circles, and 95% confidence intervals are plotted as horizontal lines. Not surprisingly, the dollar value of unemployment-related wage losses is larger for high-AGI filers. Shorter spells are

associated with smaller wage losses. The difference between short and long spells persists when we consider the log of wage income instead of wage levels. Unmarried filers experience larger wage losses than married filers, both in levels and in logs. Other differences apparent in Figure 5, particularly the larger wage losses for men than for women and the larger wage losses for those with some previous receipt of non-wage income, are much less pronounced when wages are measured in logs. All log income results are available upon request.

3.2 Non-Wage Income

Our results confirm that wage losses associated with unemployment are substantial. The financial assistance provided by the UI system compensates for only a portion of household wage losses experienced during unemployment. Average annual UI income is $4,470 during first unemployment spells and $5,137 during subsequent spells. These values correspond to 48% of household-level wage losses in first spells and 51% of losses in subsequent spells. Thus, even with the UI safety net in place, there remain substantial income losses with which households must cope, either by reducing consumption or by finding income elsewhere.

To begin our analysis of non-wage income changes through unemployment, Figure 6 plots annual average income from various non-wage sources, again with year fixed effects removed.[24] The scale of the vertical axis differs across panels. Panel (a) shows that the sum of non-wage income and UI payments spikes in years of unemployment. By definition, all $t = 0$ observations contain positive UI amounts. Panel (b) shows that non-wage, non-UI income increases in years of unemployment and then remains at a higher level for several years. The temporal patterns in particular components of non-wage income vary substantially. Capital

[24]Some of these income sources are utilized by a small proportion of households, so the average income amounts depicted in Figure 6 include many zeros. To understand how the extensive margin of income utilization changes, we also look at the proportion of households reporting non-zero amounts of each income type through an unemployment spell. For most income sources, movements in the proportion of households with that income source correspond with movements in reported amounts. The exception is capital gains realizations, which are more likely in the year of an unemployment spell than in the previous year.

gains realizations display no striking change at the time of unemployment. Distributions from retirement accounts increase sharply during unemployment and then quickly fall to slightly above average pre-unemployment levels. In contrast, self-employment income and disability insurance income show long-run increases. For self-employment income, there is an immediate but small increase followed by continued growth, while the increase in SSDI income occurs with a lag after entry into unemployment.

Results showing how several types of non-wage income are adjusted during a spell of unemployment are shown in Table 3.[25] Each column corresponds to a different dependent variable, using the specification described by Equation 1. The first column considers total non-wage, non-UI income. This includes specific components considered below (capital gains, self-employment income, and retirement income) as well as less-frequently observed types of income such as alimony payments, income from partnerships or S corporations, and farm income. This composite measure of non-wage income increases by $1,024 in a first spell of unemployment. Comparing this to the household-level wage loss of $9,331, from column 1 of Table 2, we see that increased non-wage, non-UI income compensates for about 11% of the wage loss associated with a layoff. Non-wage income remains elevated in the following years, but does not increase any further during subsequent spells of UI receipt. This characterizes the average non-wage response, and responses may differ for households entering unemployment spells expected to be temporary and for households entering what they expect to be very long spells. We expect that households for whom UI receipt triggers a permanent decline in income are less likely to smooth consumption by selling assets or borrowing from retirement accounts, but we are unable to test this hypothesis empirically.

Next, we consider specific components of non-wage income to disentangle which drive the overall response. Column 2 shows no evidence that capital gains realizations increase

[25] As we explain later, SSDI income cannot be adjusted as quickly as other types of income. Estimates of Equation 1 using SSDI as a dependent variable confirm this short-run non-responsiveness. Thus, we focus on the dynamic estimation model for SSDI.

during or after unemployment.[26] One reason that the average response is small is that capital gains realizations are zero for most of the sample. Only 28% of filing units in our sample ever report non-zero capital gains. In a regression predicting whether a return includes any capital gains, we find that receiving UI is associated with a 0.5% increase in the probability of capital gains realization and this increase is statistically significant at the 5% level. A second potential reason for the small average effect is that capital gains can be negative when households sell assets at a loss. If households are simultaneously selling assets that have appreciated and depreciated, net capital gains realizations will not adequately measure the resources transferred out of equity portfolios during unemployment. To investigate this possibility we also estimate regressions in which the dependent variable is net proceeds from equity sales. We find that net proceeds from equity sales increase during first and subsequent unemployment spells, but by small amounts not significantly different from zero.

In results not presented, we additionally examine two other sources of investment income: interest income and dividend income. Interest income is related to the stock of wealth accumulated in traditional savings accounts, and in principle might proxy for savings account balances. If individuals respond to a layoff by withdrawing funds from savings accounts, we would expect to see lower levels of interest income during and after an unemployment spell. We find virtually no change in interest income during and after unemployment. The non-responsiveness of interest income likely reflects that interest is an imperfect proxy for wealth. We also find no evidence that dividend income changes significantly during or after unemployment. This is likely explained by the limited control an individual has over the timing of dividend distributions.

Column 3 of Table 3 considers self-employment income, which can encompass a wide range

[26]The timing of capital gains realizations has been shown to be quite sensitive to tax treatment (Burman and Randolph 1994). Given that the maximum statutory rate on long-term capital gains fell from 20% to 15% in May 2003, we might expect to see a discrete change in capital gains realizations partway through the panel. The inclusion of year fixed effects in our regression will account for any effect of this statutory rate change that was constant across states.

of activities, including starting up a formal business or taking on temporary assignments as a consultant. The relationship between unemployment and self-employment income is uncertain, *a priori*. On one hand, job loss could encourage new participation in the self-employment sector. On the other hand, periods of high unemployment are also periods of low aggregate demand, when the probability of small business failure may be particularly high.[27] We find a small negative response in reported self-employment income during years of unemployment, with a larger positive response in years following a first layoff. Our self-employment income variable likely measures only a portion of the actual involvement in self-employment because of under-the-table payments that are not reported to the IRS. An extensive literature documents higher levels of tax evasion among self-employed individuals than among those working for employers (Slemrod 2007). Thus, the response we estimate along the self-employment margin may be thought of as a lower bound on the true self-employment response.

As foreshadowed by our graphical evidence, by far the largest short-run source of non-wage income during unemployment is retirement distributions, shown in column 4. On average, retirement distributions are $4,119 higher during a first unemployment spell than in years before. In post-unemployment years, retirement distributions continue to be elevated above pre-unemployment levels, by about $550. There is a $1,902 average increase in retirement distributions during subsequent unemployment spells. We do not observe retirement account balances in our data, but data from the Survey of Consumer Finances provide a relevant point of comparison. About half of households had retirement accounts in 2010. Conditional on having a retirement account, the median 2010 balance (expressed in 2011 dollars, for comparability with our estimates) was $45,575 (Federal Reserve Bulletin 2014). Thus, the average distribution taken during unemployment is not trivial relative to typi-

[27]Fairlie (2013) analyzes a time period overlapping with our analysis, 1996 to 2009, and finds a positive relationship between local unemployment rates and entry into entrepreneurship, but evidence from earlier time periods and using different data and empirical specifications presents a mixed picture (Evans and Leighton 1989, Parker 2004).

cal account balances. Households taking early distributions face an immediate cost in the form of a penalty owed to the IRS. In our sample, the average penalty paid by a household taking a retirement distribution in a year with UI income is $545. Households also face a longer-term cost in the form of lower accumulated savings at the time of retirement. Our data are not particularly well suited to estimating this longer-term cost. A study of a much broader range of factors contributing to retirement account "leakage," of which penalized early withdrawals are one type, finds that aggregate 401(k) and IRA wealth is about 20% lower than it would be in the absence of any leakage at all (Munnell and Webb 2015).

Figure 7 documents substantial heterogeneity in the reliance on retirement income distributions. The horizontal axis measures retirement distributions realized during a first unemployment spell as a share of a household's AGI in the year prior to unemployment. We scale by AGI so that analysis of heterogenous responses is not dominated by the pattern of higher-income households having larger retirement account balances from which to draw.[28] As Figure 7 shows, households that previously reported any non-wage income show a greater reliance on retirement funds than households with no previous non-wage income. Workers with below-median imputed spell lengths take smaller distributions from retirement accounts, as a share of their AGI, than workers with longer imputed spell lengths. Those with short imputed spell lengths also take distributions that are smaller in dollar value, but larger as a fraction of the wage losses associated with unemployment. We do not know if the unemployment spells that are actually short (long) were expected to be temporary (permanent) at their start. If expectations of spell length are accurate, we would expect there to be more consumption smoothing over short spells.

Evidence on heterogeneity in realizations of capital gains and reported self-employment income is shown in the appendix, Figures A2 and A3. For nearly every subgroup considered,

[28]We have carried out similar analysis measuring retirement distribution amounts in dollars, rather than scaling by AGI. The corresponding figure is shown in Figure A1. Measured in dollar terms, retirement distributions are larger for older households than for younger households; larger for those with previously-reported nonwage income; and larger for those experiencing long spells.

capital gains realizations are not statistically different from zero. Comparing those with short imputed spell length to those with long imputed spell length, there is no significant difference in realizations of capital gains. Considering self-employment income, the most noteworthy difference across groups appears when we split the sample on the presence of any non-wage income prior to unemployment. Those with no previous non-wage income report significantly more self-employment income during a first unemployment spell. There is very little difference in the self-employment income response of those with short and long spells. This may reflect the fact that when a person enters into a spell of unemployment, she does not know if it is going to be temporary or permanent, and so it may be difficult to know whether incurring the start-up costs of entering into self-employment will be worthwhile.

Next, we turn to estimating patterns in non-wage income using the more flexible specification of Equation 3. We find very different patterns for different types of non-wage income. In results not shown, we find that the responsiveness of retirement account distributions is concentrated in the year of unemployment and in the following year. In subsequent years, retirement distributions are generally not statistically different from their pre-unemployment levels. The noisiness of capital gains, evident in earlier graphical analysis, appears in this specification as well. In no year is the average capital gains amount statistically different from its pre-unemployment level. We present results from two income sources for which we find interesting longer-run patterns in Figure 8. Panel (a) plots the results for self-employment income as the dependent variable. Self-employment income shows no immediate change in the year of layoff, but is significantly higher in all subsequent years, with a gradual increase over time.

Next we consider income from the disability insurance program. Applications for SSDI are highly cyclical (Autor and Duggan 2003, Mueller, Rothstein and von Wachter Forthcoming), although previous evidence on how an individual's receipt of UI affects SSDI application and eventual receipt is mixed.[29] Individuals have limited discretion in choosing whether and

[29]Lindner and Nichols (2012) find that policies increasing access to UI benefits reduce SSDI applications. Rutledge (2012) finds that individuals are less likely to apply for SSDI in

when to receive SSDI income. Even if the initial decision to apply for benefits is responsive to unemployment, applications go through a five-step review process that includes review by medical examiners. Only about 26% of applications are approved when first considered. Rejected applicants can appeal, and approximately 41% of applications are ultimately approved (Social Security Administration 2013). This process makes it likely that any relationship between job displacement and SSDI receipt occurs with a lag. Panel (b) of Figure 8 documents how SSDI income evolves over time in our sample. There is no change in SSDI income concurrent with the first receipt of UI income. In every subsequent year, average SSDI income is significantly above its pre-unemployment average level, and SSDI income continues to grow over time. This pattern is driven by changes in receipt of any SSDI, rather than changes in the amount of SSDI conditional on receipt. The percentage of our sample receiving any SSDI is less than 1% in years prior to unemployment, before eventually growing to approximately 4%. Our results can be reconciled with the findings of Mueller et al. (Forthcoming). Using aggregate data, they find essentially no contemporaneous relationship between rates of UI exhaustion and rates of SSDI application, nor do they find evidence of increased SSDI applications up to three months after UI exhaustion. Using administrative-level data, they find little or no effect of UI extensions on SSDI applications up to four weeks following a UI extension. Our ability to consider longer-run responses is an important advantage of using tax return data to measure SSDI receipt.

Table 4 provides estimates of Equation 2 for non-wage income, investigating how UI generosity affects reliance on non-wage income. We find no evidence that UI generosity impacts total non-wage, non-UI income or net capital gains realizations. In the case of self-employment income, raising the maximum weekly UI benefit amount by $100 is associated with a $187 smaller change in Schedule C income during a first layoff. The strongest evidence of an interaction between UI benefit generosity and non-wage income is in the case of

months when UI benefits are extended, and are more likely to apply in months when benefits are exhausted. In contrast, Mueller et al. (Forthcoming) find no evidence that UI benefit exhaustion is associated with an increased rate of SSDI application.

retirement distributions. The UI generosity interaction terms are positive, indicating that households facing more generous UI benefits take *greater* distributions from their retirement accounts during an unemployment spell. Although this is a surprising result, it might be explained by changes in job search behavior with respect to UI generosity. Previous research has shown that more generous UI benefits are associated with longer unemployment durations. Longer unemployment spells may be precisely the situations that prompt individuals to take distributions from retirement accounts. Indeed, Figure 7 shows this to be the case. Comparing the dollar amounts of additional wage loss and additional retirement distributions associated with more generous UI benefits shows similar orders of magnitude. For a first unemployment spell, an additional $100 of weekly maximum UI benefit amount is associated with a further $758 decline in household-level annual wage income (see column 3 of Table 2) and an additional $1008 of retirement distributions. These amounts are not entirely dissimilar, and could result from households using withdrawals from retirement accounts to perfectly smooth consumption during an unemployment spell. This pattern would be consistent with evidence from Browning and Crossley (2001) that households with financial assets have almost no change in consumption at the time of job loss.[30] For subsequent spells, the additional annual wage loss associated with an extra $100 of maximum weekly benefits is larger ($1831) than the associated additional retirement distribution ($707). A retirement account that has already been tapped during a first unemployment spell would plausibly provide less consumption smoothing during subsequent spells.

3.3 The Great Recession

Our panel provides an opportunity to examine whether and to what extent the Great Recession, which spanned December 2007 through June 2009, changed household experiences

[30]In additional analysis, we have investigated whether the overall positive relationship between UI benefit generosity and retirement distributions varies across age groups. We find a positive relationship for both younger and older households, with a larger magnitude for older households. The coefficients and standard errors on the $MaxWBA \cdot First\ Unemp$ term are $405 (150) for the younger group and $1498 (406) for the older group.

during unemployment. To begin, we investigate whether there are differences in the characteristics of individuals experiencing unemployment at different points in time. Table 5 shows that those receiving UI in 2008 or later are less likely to be married, more likely to be single men, have fewer children, and are slightly older.[31] Perhaps due to the increase in homeownership rates through the housing market boom, those who are unemployed in the later period are more likely to be homeowners. There are statistically significant differences in household incomes, with those unemployed in 2008 or later having lower pre-unemployment AGI, but this largely reflects differences in marital status. Controlling for marital status, the difference between earlier and later household AGI drops by 15% but remains statistically significant.

To understand how the wage losses from unemployment have varied over time, we estimate the following equation:

$$WageIncome_{it} = \alpha + \sum_{j=2000}^{2011} \beta_j Unemp_{it} \times (UnempYear = j) + X_{it}\Omega + \alpha_i + \gamma_t + \varepsilon_{it}. \quad (4)$$

In this specification, the indicator variables $(UnempYear = j)$ equal one if the household receives UI benefits in year j and zero otherwise. The coefficients, β_j, thus capture the income changes in an unemployment spell in year j relative to income in other years. These coefficients combine income changes that occur in first unemployment spells and later unemployment spells.

Figure 9 plots the wage income loss for unemployment spells in 2000 through 2011. The severity of wage loss appears to vary with the business cycle. Those experiencing unemployment during the economic boom of 2000 have particularly small wage losses associated with unemployment. Those who are unemployed between 2009 and 2011 have significantly larger wage losses than those who are unemployed in pre-Great Recession years.

[31] We exclude 2007 from this comparison because it contains months before and after the start of the Great Recession. The summary statistics are very similar when we include 2007 as a Recession year.

We next examine whether the utilization of non-wage income sources changed through the Great Recession, estimating versions of Equation 4 with non-wage income amounts as dependent variables. Although one might expect that unemployment spells involving the largest wage losses would involve the greatest reliance on non-wage income, we find a somewhat different pattern. Most income sources display no economically or statistically different response before and after the Great Recession. In Figure 10, we plot two non-wage income measures of particular interest given the average responses documented above. The first panel plots the increase in all non-wage, non-UI income associated with unemployment spells that occur in each year. There is not a particularly strong reliance on non-wage income in Great Recession years. Most estimates are not significantly different from zero, which is not surprising because these estimates pool together first and later spells, and Table 3 showed little change in aggregate non-wage income during later spells.[32] The second panel of Figure 10 shows that, regardless of when an unemployment spell occurs, the reliance on retirement distributions is substantial. This behavior looks quite similar during Great Recession years and in earlier years.

The combination of larger wage losses with no discernable increase in the realization of non-wage income during the Great Recession may be reconciled by an increased reliance on the social safety net. Bitler and Hoynes (2013) document that major safety net programs did not provide more protection to the most disadvantaged during the Great Recession, but those elements of the safety net of greatest importance to higher-income individuals, like the tax filers in our sample, did provide more protection. The maximum duration of UI benefit receipt rose to 99 weeks (Rothstein 2011), and recent evidence suggests that the length of unemployment spells became more sensitive to UI benefit generosity during the Great Recession (Card et al. 2015). In our data set, we find that annual UI income is almost exactly 50% of annual wage losses associated with unemployment, both before and

[32]If we restrict attention to first unemployment spells only, again we find that unemployment spells occurring in the Great Recession years do not involve particularly large reliance on non-wage income.

during the Great Recession. In addition, the number of people receiving SNAP benefits rose from 9% of the population on the eve of the Great Recession to 15% in July 2011, and most of this increase can be explained by changes in local unemployment rates (Ganong and Liebman 2013). Either the increase in safety net programs such as UI and SNAP mitigated the need for individuals to turn to private options, individuals simply did not have the capacity to increase reliance on assets such as retirement accounts, or consumption fell by more during unemployment in this more recent period.

4 Selection Into UI Receipt

Our analysis examines households that receive UI benefits, a subset of all unemployed individuals. Some unemployed individuals are ineligible for UI, either because pre-unemployment earnings or hours of work fall below eligibility thresholds or because they voluntarily quit or were fired. Among those who are eligible for UI, not all choose to take up benefits.[33] Ebenstein and Stange (2010) calculate UI receipt rates for 1989 to 2006, and find that 47% of all unemployed individuals are eligible for UI and that 36% receive UI, implying a take-up rate of 79%. Particularly relevant for our analysis is evidence that the decision to take up UI benefits is positively correlated with education and with pre-unemployment earnings (Government Accounting Office 2006, Shaefer 2010). If UI-recipient households have higher permanent income than unemployed households not receiving UI, then the potential to turn to non-wage income sources will be higher within our sample than for the population. Similarly, if UI recipients have longer unemployment spells involving greater-than-average wage losses, then we would expect our estimated reliance on non-wage income to be an upper bound on estimates for a broader sample of unemployed individuals.

We compare unemployed UI recipients and non-recipients using data from the 2001, 2004, and 2008 panels of the Survey of Income and Program Participation (SIPP). Conducted by

[33]Important work explaining the factors associated with UI take-up includes Blank and Card (1991) and Anderson and Meyer (1997).

the U.S. Census Bureau, the SIPP is a longitudinal survey gathering detailed information on various sources of earned and transfer income. Each SIPP panel follows individuals for up to three or four years, with interviews every four months. Information on weekly employment status is collected, allowing very precise measurement of transitions into and out of unemployment. Individuals also report income received from UI benefits. We identify all spells of unemployment experienced by SIPP respondents, and compare spells with and without receipt of UI income.

We define the start of an unemployment spell as a transition from an employment status of either working for pay or being temporarily absent from a job without pay, to an employment status of being on temporary layoff, having no job and looking for work, or having no job and not looking for work. We define the end of an unemployment spell as four consecutive weeks of work. We drop spells in which a person's employment status was always without a job and not looking for work, as this behavior is considered being out of the labor force rather than being unemployed. The exception is that we keep a spell if it involved receipt of UI benefits, even if this person never reported looking for work.[34] We restrict attention to individuals between the ages of 25 and 60.

Summary statistics for the set of unemployment spells meeting these criteria are shown in columns 1 through 3 of Table 6. Column 1 includes unemployment spells that do not involve UI receipt. Column 2 focuses on the subset of spells in column 1 that appear eligible for UI benefits despite not involving benefit receipt.[35] Column 3 includes spells in which UI income is received. Comparing the number of observations in columns 1 and 3, approximately 30% of spells involve receipt of UI benefits. Spells involving UI receipt are longer, with a mean length

[34]There are relatively few such spells, 6.4% of all spells involving UI receipt.

[35]Eligibility depends on pre-unemployment earnings and the reason for job separation. Information on the reason for job separation is unavailable for many unemployment spells in the SIPP. It is not collected when the reporting of a job separation occurs at the very beginning of a new reference period (that is, "on the seam" between SIPP interviews). In the SIPP, changes in employment status are heavily concentrated on the seam. If there is no information available on the reason for job separation, we do not classify an unemployment spell as UI-eligible.

of almost 30 weeks, relative to a mean length of 19.6 weeks for spells without UI receipt. The mean imputed unemployment spell length in our tax sample, reported in column 4, shows that the spells identified in tax data are similar in length to spells reported by UI recipients in the SIPP. We hypothesize that longer spells are more likely to exhaust liquid assets and to necessitate turning towards assets such as retirement accounts. Compared to non-recipients, UI recipients are older, more likely to be married, and more likely to be homeowners.

Panel B compares annual income amounts from the SIPP and from tax return data (shown in column 4 of Table 6, repeated from Table 1). It offers some reassurance about the reliability of our main estimates, while highlighting the importance of using multiple data sources to understand responses to unemployment. In tax return data, these amounts are measured in the calendar year before the year in which UI income is first received. In the SIPP, annual amounts were computed by aggregating over the 12 months prior to unemployment entry.[36] UI recipients in the SIPP have higher levels of earnings than non-recipients of UI. Pre-unemployment wage and salary amounts, measured either for the unemployed individual or for the family including that individual, are similar for UI recipients in the SIPP and for UI recipients in tax data. The average amount of family-level business income is higher in the SIPP than in tax return data, and the annual amount of distributed income from retirement accounts is substantially higher in tax return data. Both patterns are plausible based on what is known about the under-reporting of self-employment income to tax authorities and the potential to forget infrequently realized income when responding to a survey. Panel C shows the share of families reporting any income of a particular type, again measured in the 12 months (SIPP) or calendar year (tax data) prior to unemployment entry. Values for wage and business income are fairly similar for UI recipients in tax return data and UI recipients in the SIPP, and are also similar for UI recipients and non-recipients in the SIPP. There is a difference in the reported receipt of retirement distributions, with 13% of observations in the tax data including retirement distribution income and only 4%

[36]With fewer than 12 months of earnings data, we scaled up to annual amounts.

of SIPP observations reporting retirement distribution income.

The amount of wage income lost during an unemployment spell is likely an important determinant of reliance on non-wage income. Figure 11 plots average monthly earned income around the time of entry into unemployment, with panel A showing individual-level earnings and panel B showing earnings at the household level. The scale on the vertical axis differs across panels. The drop in monthly earnings is greater for UI recipients than for non-recipients. The recovery over the following months is slightly greater in absolute terms for UI recipients, but eleven months after entering unemployment the UI recipients are earning a lower fraction of their pre-unemployment monthly earnings than the non-recipients are. We interpret this pattern as additional evidence that the unemployment spells we identify in tax return data are likely associated with greater reliance on non-wage income than the unemployment spells we fail to detect.

This analysis is useful for putting our tax-based estimates into context with respect to the experiences of all households that suffer a job loss. If we are concerned about job losers with significant labor market attachment, then it appears we are able to identify a large and representative sample of such spells in tax return data. The observable differences between UI recipients and those who do not take up UI generally suggest that our estimates represent an upper bound on the extent to which the full population of unemployed households rely on non-wage income during unemployment.

5 Conclusions

Unemployment imposes large financial costs on households. By providing comprehensive measures of income from wages and from non-wage sources, tax return data can offer new insights into how households cope with the strain of unemployment. Using a panel of tax return data spanning 1999 to 2011, this paper first estimates the wage losses associated with unemployment. We find that unemployment is associated with annual wage income declines

of about 17% when measured at the household level and about 23% when measured at the individual level. Wages remain depressed for some time, returning to pre-unemployment levels only after several years. The wage losses associated with a first unemployment spell were particularly large in 2009-2011, reflecting continued weakness in the labor market following the Great Recession.

We provide new evidence on the utilization of non-wage income sources by households through unemployment. The UI system, on average, buffers recipient households from roughly half of the wage income losses associated with a job loss. Other non-wage, non-UI income sources compensate for an additional 11% of the wage losses experienced in a first unemployment spell, but provide much less of a buffer in later unemployment spells. Tapping into retirement savings is by far the most prevalent short-run response to unemployment, despite the penalties incurred by taking early distributions from retirement accounts. This finding suggests that traditional savings balances are insufficient for coping with the negative income shocks associated with layoffs. We also find evidence of longer-run increases in income from self-employment and from SSDI after unemployment.

One concern about the UI program is that more generous benefits reduce job search effort. Consistent with the large literature showing that more generous UI benefits are associated with longer unemployment spells, we find that more generous benefits are associated with lower annual wage income. We find smaller crowd-out of wage income in first observed unemployment spells than in later spells. Overall, we find little evidence that the generosity of the UI system influences the extent to which households utilize other income sources. The exception is that more generous UI is associated with an increased reliance on retirement savings. Coupled with the crowd out of job search effort, this result indicates that a more generous UI system may lead households to rely even more heavily on savings that have been set aside for retirement. This interaction should be of concern for policy-makers evaluating the recent increases in UI generosity, if such expansions of the UI system result in recipients finding themselves less financially prepared for retirement in the future.

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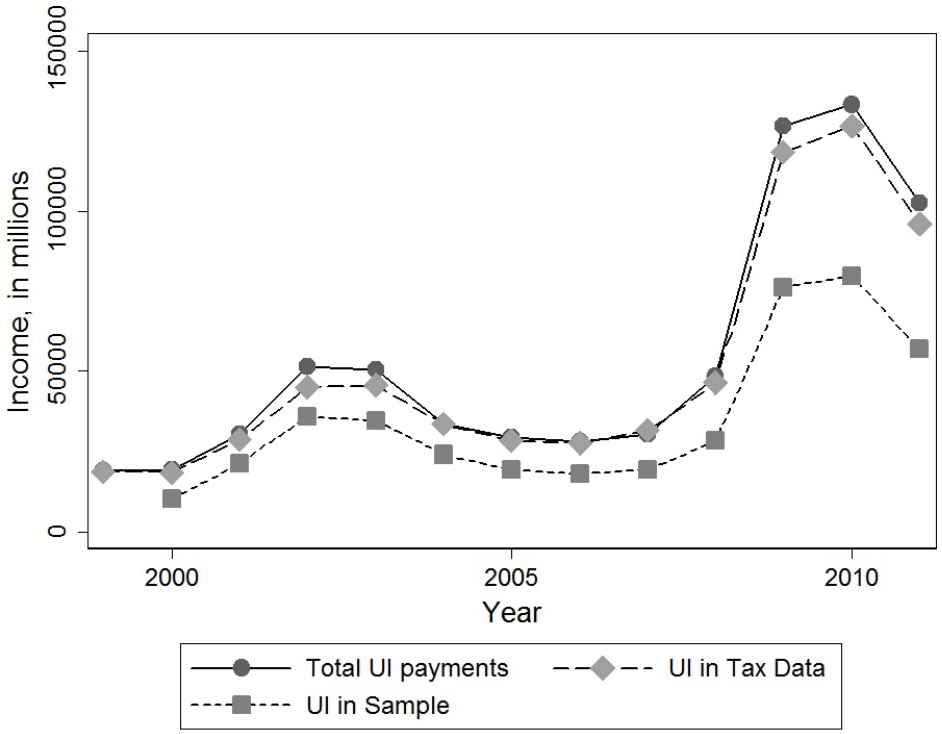
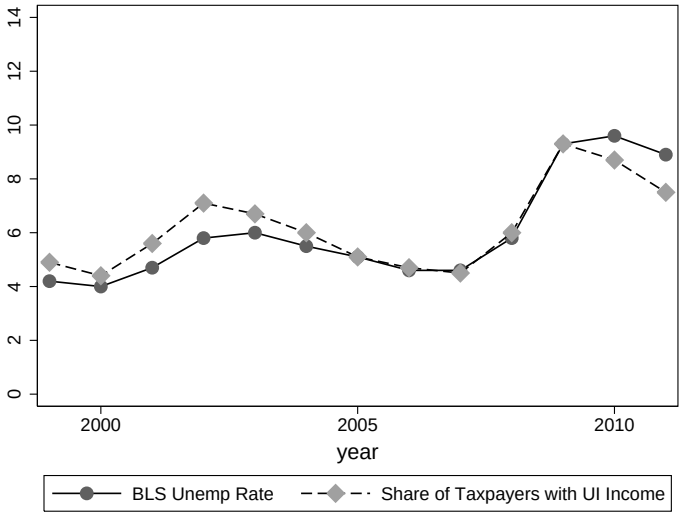
Figure 1: Comparison of Aggregate Unemployment Compensation and UI Income Observed on Tax Returns



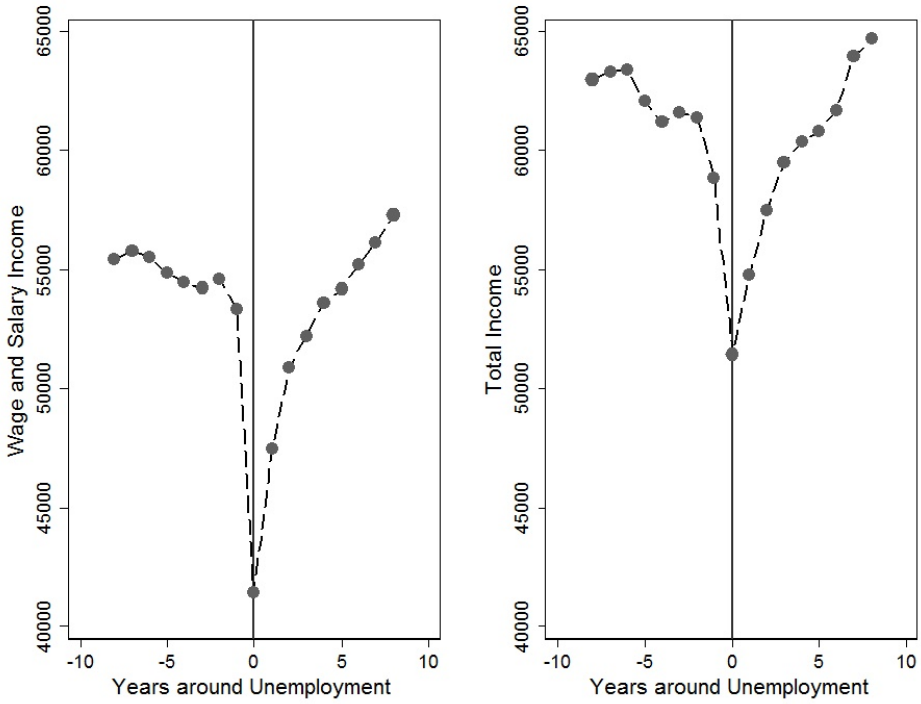
The solid line indicates the annual amount of all UI payments made, as reported by the Department of Labor. The dotted line with diamond markers indicates the annual amount of all UI income reported in tax returns, imputed from the CWHS. The dotted line with square markers indicates the amount of UI income captured in our estimation sample. The restrictions that lead to differences between the dotted lines are: (1) the tax return must be for non-dependent filers; (2) households must file from the 50 states or Washington D.C.; (3) filing status must be single, married filing jointly, or head of household; (4) primary filers must be between 25 and 60 years of age; and (5) entry into UI receipt must be observed.

Figure 2: Comparison of Unemployment Rate and UI Recipiency Rate



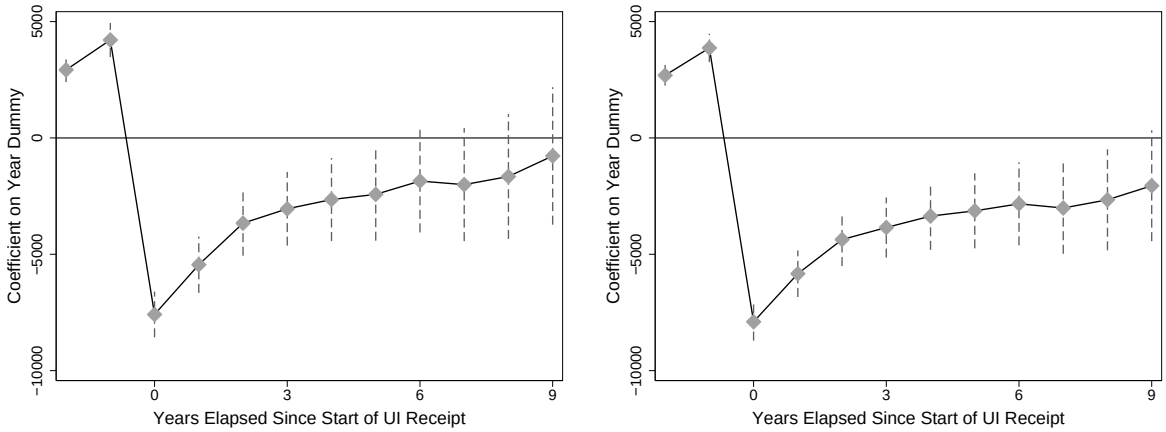
The solid line indicates the national unemployment rate, as reported by the Bureau of Labor Statistics. The dotted line indicates the percentage of all primary and secondary filers in the tax return sample reporting any income from unemployment insurance benefits.

Figure 3: Income Changes Through Unemployment



The left panel depicts average wage income and the right panel depicts average total income in years around a first unemployment spell. The first spell of UI receipt is denoted as t=0. These series control for year fixed effects by adding the residuals from a regression of income on year fixed effects to the sample average of wage income (on the left) or total income (on the right).

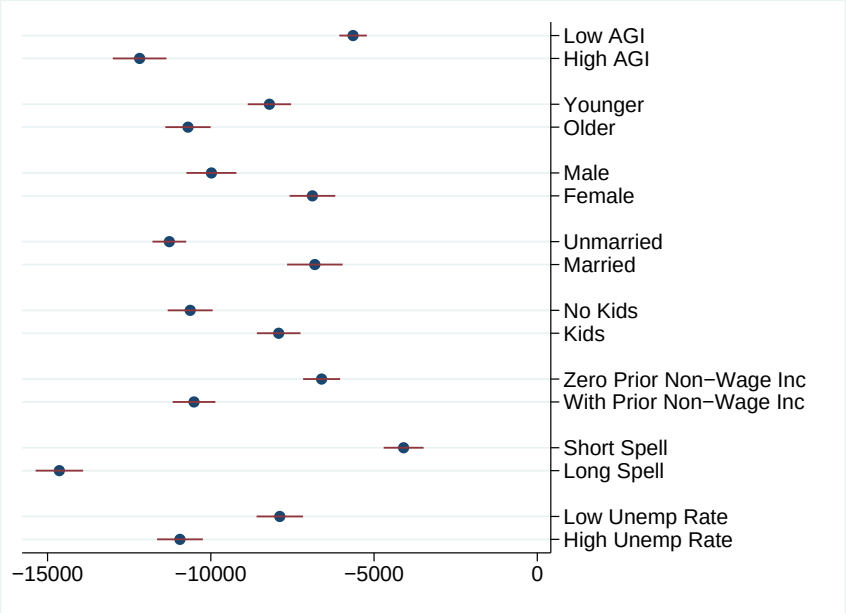
Figure 4: Coefficients from Dynamic Wage Income Regression



(a) Household-Level Wage Income (b) Wage Income of Unemployed Individual

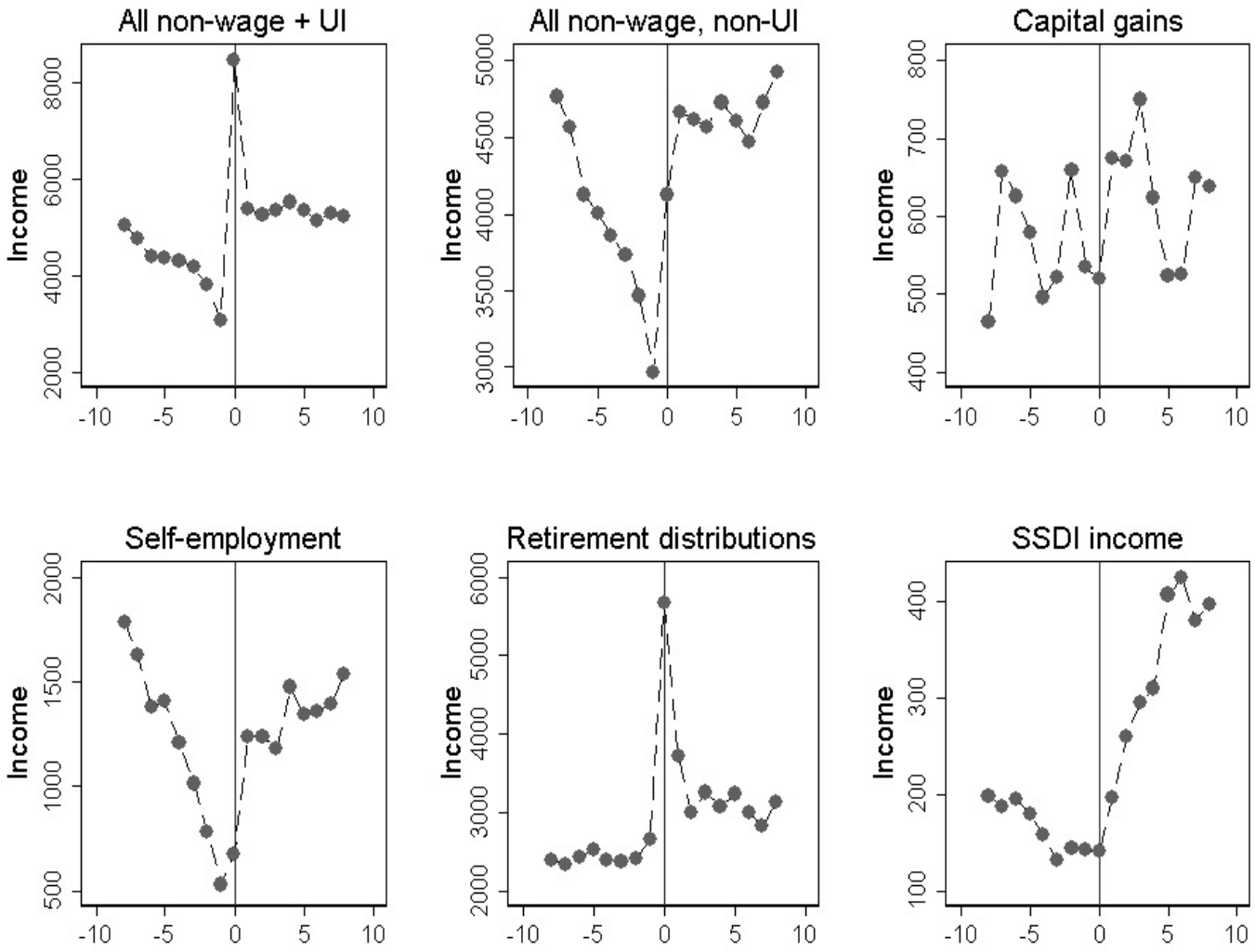
The figure plots the regression coefficients and 95% confidence intervals on a series of dummy variables, D_k, for number of years elapsed since entry into unemployment. The dependent variable is annual wage income, measured at the household level in the first panel and at the individual level in the second panel.

Figure 5: Heterogeneity in Size of Wage Loss Associated with First Unemployment Spell



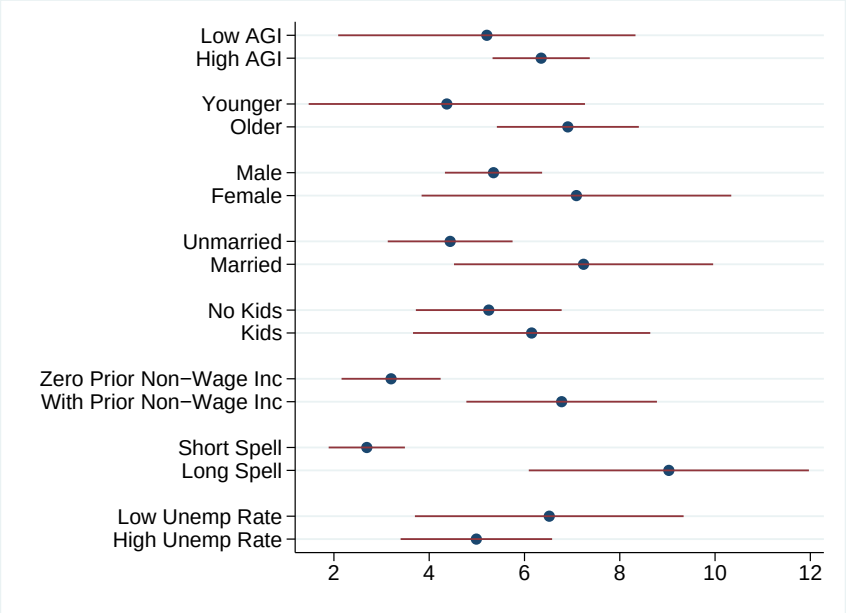
The figure plots regression coefficients and 95% confidence intervals on the *FirstSpell* indicator variable from regressions of Equation 1 on different subsamples. The splits are as follows, from the top of the figure to the bottom: (1) by whether AGI is below or above the median for the sample; (2) by whether the primary filer's age in the year of first entry into unemployment is below or above the median age; (3) by gender of the unemployed individual; (4) by marital status; (5) by presence of children on the tax return; (6) by presence of non-wage income sources prior to the first unemployment spell; (7) by whether the imputed length of the first spell is below or above that year's median imputed spell length; and (8) by whether the state unemployment rate in the year of first entry into unemployment is below or above the median.

Figure 6: Non-Wage Income Components Through Unemployment



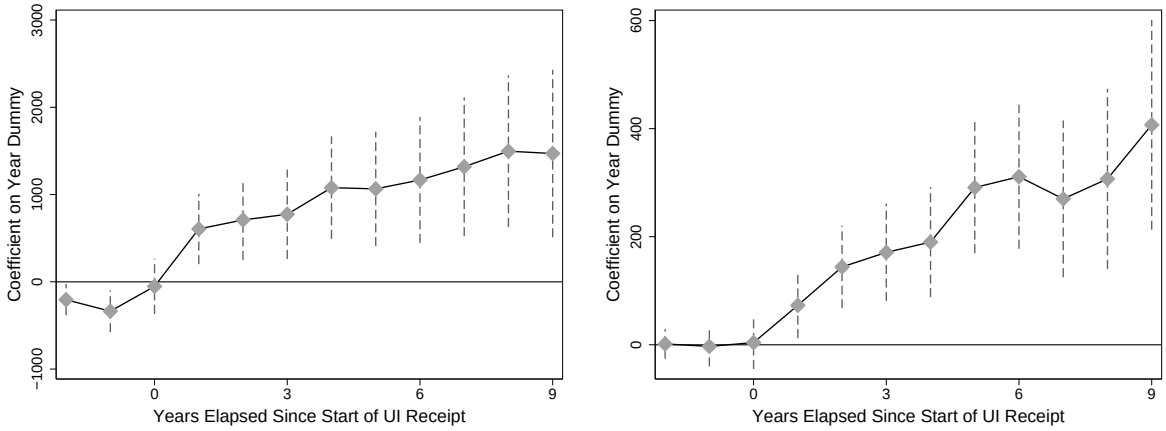
Each panel plots average annual amounts of a particular type of non-wage income. The first spell of UI receipt is denoted as t=0. These series control for year fixed effects by adding the residuals from a regression of a particular income source on year fixed effects to the sample average of that income source.

Figure 7: Heterogeneity in Size of Retirement Distribution as a Share of AGI, First Unemployment Spell



The figure plots regression coefficients and 95% confidence intervals on the *FirstSpell* indicator variable from regressions of Equation 1 on different subsamples. The dependent variable in the regressions is the amount of a filing unit's retirement distributions divided by the same household's AGI in the year prior to unemployment. The splits are as follows, from the top of the figure to the bottom: (1) by whether AGI is below or above the median for the sample; (2) by whether the primary filer's age in the year of first entry into unemployment is below or above the median age; (3) by gender of the unemployed individual; (4) by marital status; (5) by presence of children on the tax return; (6) by presence of non-wage income sources prior to the first unemployment spell; (7) by whether the imputed length of the first spell is below or above that year's median imputed spell length; and (8) by whether the state unemployment rate in the year of first entry into unemployment is below or above the median.

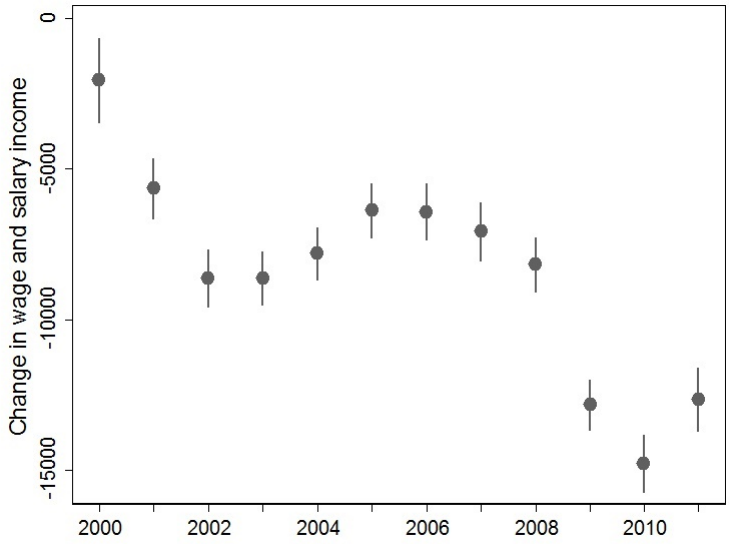
Figure 8: Coefficients from Dynamic Non-Wage Income Regressions



(a) Self-Employment Income (b) SSDI Income

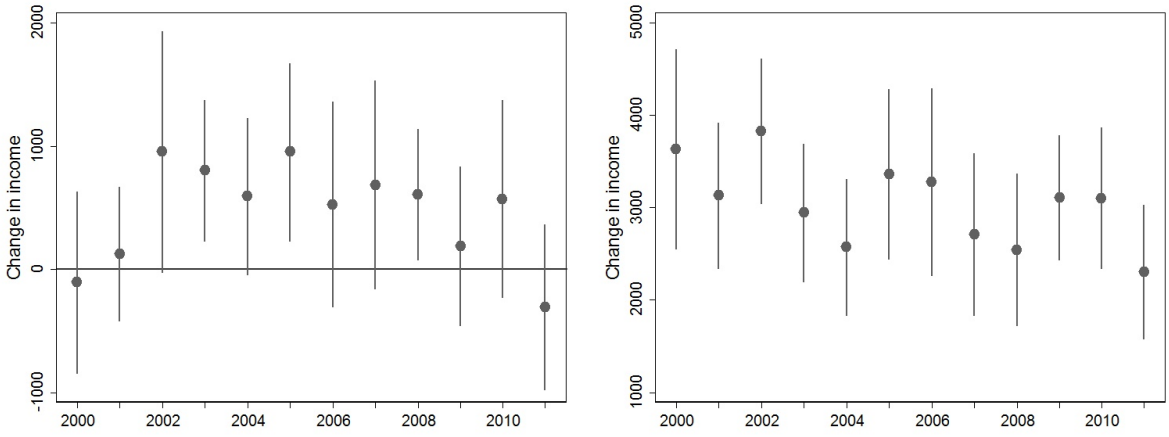
The figure plots the regression coefficients and 95% confidence intervals on a series of dummy variables, D_k, for number of years elapsed since entry into unemployment. The dependent variable in the left-hand panel is annual sole-proprietorship income from Schedule C. The dependent variable in the right-hand panel is annual income from disability insurance.

Figure 9: Business Cycle Variation in Wage Losses Associated with Unemployment



The figure plots the regression coefficients and 95% confidence intervals on a series of dummy variables, β_j, for the year in which a household receives UI. The dependent variable is wage and salary income.

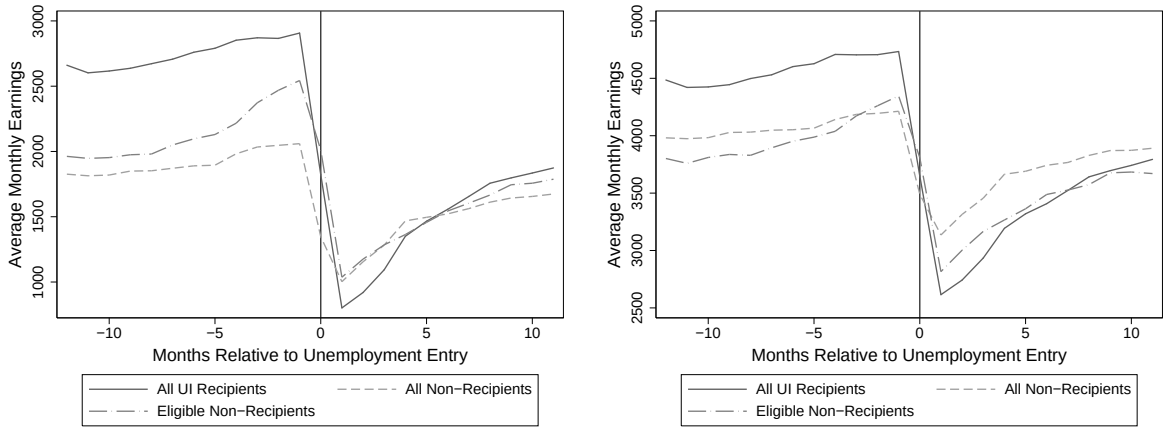
Figure 10: Business Cycle Variation in Initial Reliance on Non-Wage Income



(a) All non-wage, non-UI income (b) Retirement distributions

The figure plots the regression coefficients and 95% confidence intervals on a series of dummy variables, β_j, for the year in which the household receives UI. The dependent variables are non-wage income and distributions from retirement accounts.

Figure 11: Average Monthly Earned Income



(a) Individual-Level Earned Income (b) Household-Level Earned Income

The figure plots average real monthly income amounts. The panel on the left shows monthly individual-level earned income. The panel on the right shows monthly amounts of total family earned income. Data are drawn from the 2001, 2004, and 2008 panels of the SIPP.

Table 1: Summary Statistics

Panel A: Characteristics in first year of unemployment

	Mean	Std. Dev.
Married filing jointly	0.43	0.50
Head of household	0.23	0.42
Single male	0.20	0.40
Single female	0.16	0.36
Children at home	0.88	1.08
Age of primary filer	40.47	10.14
Homeowner	0.36	0.48

Panel B: Income in year prior to first unemployment spell

	Mean	Std. Dev.
Adjusted gross income	69,930	113,130
Household wage and salary income	55,353	54,529
Wage income of unemployed individual	39,735	40,784
All non-wage income	3,979	73,987
Capital gains	904	25,823
Self-employment (Schedule C) income	482	7,503
Retirement distributions	2,762	20,350

Panel C: Proportion with non-zero amounts

	Year prior to first spell	Ever in sample
Adjusted gross income	1.00	1.00
Household wage and salary income	0.99	1.00
Wage income of unemployed individual	0.95	1.00
All non-wage income	0.55	0.95
Capital gains	0.10	0.28
Self-employment (Schedule C) income	0.11	0.40
Retirement distributions	0.13	0.57
Mean number of years in panel	9.5	
Mean number of years with UI	2.3	
Number of households	16,946	

The table reports summary statistics for the estimation sample. Panel A provides sample means and standard deviations of household characteristics in the first year of UI receipt. Panel B provides sample means and standard deviations of income amounts in the year prior to a first unemployment spell. Panel C provides the proportion of the sample reporting non-zero amounts of different income components either in the year prior to the first UI receipt or ever over the course of the panel.

Table 2: Fixed Effects Regression Results, Wage Income

	No UI Generosity Controls		With UI Generosity Controls	
	Household Level	Unemployed Individual	Household Level	Unemployed Individual
	(1)	(2)	(3)	(4)
FirstUnemp	-9,331***	-9,249***	-6,585***	-6,621***
	(245)	(211)	(831)	(729)
PostUnemp	-8,364***	-8,767***	-8,412***	-8,836***
	(372)	(315)	(372)	(315)
LaterUnemp	-10,013***	-8,721***	-1,972*	-1,554*
	(270)	(231)	(1,038)	(893)
MaxWBA			2,951***	1,773***
			(360)	(282)
MaxWBA × FirstUnemp			-758***	-725***
			(218)	(193)
MaxWBA × LaterUnemp			-2,047***	-1,831***
			(268)	(232)
Age	7,464***	5,255***	7,164***	5,084***
	(190)	(149)	(189)	(150)
Age squared	-80***	-57***	-80***	-57***
	(2)	(2)	(2)	(2)
Constant	-107,611***	-75,688***	-105,599***	-74,789***
	(4,049)	(3,143)	(4,014)	(3,130)
Observations	161,482	156,622	161,482	156,622
Number of households	16,946	16,441	16,946	16,441

Each regression includes year and filing unit fixed effects. Maximum weekly UI benefit amount is measured in hundreds of dollars. Standard errors are clustered at the filing unit level.

Table 3: Fixed Effect Regression Results, Non-Wage Income

	All Non-Wage Income	Capital Gains	Self-Employment Income	Retirement Distributions
	(1)	(2)	(3)	(4)
FirstUnemp	1,024***	510	-107*	4,119***
	(166)	(482)	(65)	(207)
PostUnemp	1,492***	-514	966***	554***
	(443)	(637)	(104)	(177)
LaterUnemp	88	671	-648***	1,902***
	(263)	(571)	(80)	(172)
Age	-526***	1,019***	158***	-801***
	(112)	(305)	(49)	(80)
Age squared	7***	-10***	-2***	12***
	(1)	(4)	(1)	(1)
Constant	12,561***	-16,881***	-1,674	14,129***
	(2,202)	(6,350)	(1,022)	(1,612)
Observations	161,482	161,482	161,482	161,482
Number of households	16,946	16,946	16,946	16,946

Each regression includes year and filing unit fixed effects. Standard errors are clustered at the filing unit level.

Table 4: Fixed Effect Regression Results, Non-Wage Income, With UI Generosity Controls

	All Non-Wage Income	Capital Gains	Self-Employment Income	Retirement Distributions
	(1)	(2)	(3)	(4)
FirstUnemp	804	320	579**	432
	(960)	(276)	(240)	(803)
PostUnemp	1,522***	-11	970***	599***
	(430)	(102)	(104)	(178)
LaterUnemp	-731	170	-270	-852
	(918)	(282)	(299)	(680)
MaxWBA	369	-66	319***	-343**
	(260)	(114)	(102)	(133)
MaxWBA× FirstUnemp	62	-97	-187***	1,008***
	(241)	(73)	(65)	(228)
MaxWBA× LaterUnemp	213	1	-96	707***
	(281)	(70)	(76)	(183)
Age	-570***	73**	124**	-775***
	(122)	(36)	(50)	(83)
Age squared	7***	-1***	-2***	12***
	(1)	(0)	(1)	(1)
Constant	13,048***	228	-1,402	14,173***
	(2,265)	(762)	(1,024)	(1,637)
Observations	161,482	161,482	161,482	161,482
Number of households	16,946	16,946	16,946	16,946

Each regression includes year and filing unit fixed effects. Maximum weekly UI benefit amount is measured in hundreds of dollars. Standard errors are clustered at the filing unit level.

Table 5: Summary Statistics, by Period of Unemployment Entry

	Unemployment Spells, 2000–2006		Unemployment Spells, 2008–2011		
	Mean	Std. Dev.	Mean	Std. Dev.	Difference
Panel A: Characteristics in first year of unemployment					
Married filing jointly	0.46	0.50	0.44	0.50	***
Head of household	0.21	0.41	0.20	0.40	**
Single male	0.18	0.38	0.21	0.41	***
Single female	0.13	0.34	0.13	0.34	
Number of kids	0.89	1.08	0.85	1.08	***
Age	41.09	9.64	42.02	10.00	***
Homeowner status	0.33	0.47	0.43	0.49	***
Panel B: Income in year prior to first unemployment spell					
Adjusted gross income	73,604	120,007	61,299	75,584	***
Household wages	54,720	44,123	54,178	46,364	
Unemployed individual's wages	43,991	40,137	40,721	35,622	***
All non-wage income	3,841	79,442	3,642	42,060	
Capital gains realizations	930	25,751	1,284	72,238	
Self-employment income	499	7,825	380	6,047	
Retirement distributions	2,668	20,411	2,640	17,936	
Number of years in panel	10.43	3.10	10.12	3.44	***
Number of years unemployed	3.52	2.48	3.41	2.21	***
Number of observations	18,822		17,054		

The table reports summary statistics for the estimation sample, split by the year in which UI income was received. Because the Great Recession officially began in December 2007, we exclude 2007 from these calculations. Panel A provides sample means and standard deviations of household characteristics in the first year of UI receipt. Panel B provides sample means and standard deviations on income amounts in the year prior to a first unemployment spell.

Table 6: Comparing Observations of Unemployment in SIPP and Tax Return Data

	Unemp Spells in SIPP			UI Recipients in Tax Return Data
	Received UI?			
	No	No, But Eligible	Yes	
	(1)	(2)	(3)	(4)
A. Characteristics of Spells and Unemployed Individuals				
Mean Spell Length, Weeks	19.6	20.1	29.9	27.7
Average Age	39.3	38.4	41.5	40.4
Proportion Married	0.51	0.49	0.54	0.43
Mean Number of Children	0.94	0.93	0.84	0.88
Proportion Homeowner	0.55	0.51	0.62	0.36
B. Family-Level Income Before Unemployment				
Family wage and salary income	46518	47727	54007	55353
Wage/salary income of unemp individual	22880	27225	33371	39735
Family-level business income	3056	1566	1604	482
Retirement distributions	176	145	199	2762
C. Proportion with Non-Zero Income Before Unemployment (Family Level)				
Family wage and salary income	0.98	1.00	0.99	0.99
Wage/salary income of unemp individual	0.95	1.00	0.98	0.95
Family-level business income	0.12	0.08	0.08	0.11
Retirement distributions	0.04	0.03	0.04	0.13
Number of Observations	35979	4825	15215	

The table provides summary statistics for unemployed households identified in the Survey of Income and Program Participation. Columns (1)-(3) split the SIPP sample by UI eligibility and receipt status. Column (4) reproduces information on unemployment spells identified in our tax return data, reported in Table 1. In column 4, we also include the average imputed spell length for households in any year that they receive UI benefits.

A Data Appendix

Household wage and salary income: Household-level wage and salary income is reported on line 7 on IRS Form 1040.

Individual-level wage and salary income: Wage income earned at each job is reported on a W-2 form filed by the employer. We sum over all W-2s for each person in each year to compute individual-level annual wage and salary income. For approximately 92% of our sample, the difference between wages reported on the 1040 and wages derived from W-2 filings is less than or equal to $25. There are several reasons why the wage and salary amount reported on a filer's tax return can differ from W-2 wages. The tax return amount will be larger if the individual received scholarship or fellowship income, tip income, certain employer-provided adoption benefits, or excess salary deferrals. The W-2 amount will be larger if the individual is a statutory employee with business-related expenses to deduct. These individuals report W-2 amounts on Schedule C, not on the wage line of the tax return. For all tax filers not married filing jointly, we define wage income as the larger of the 1040-based amount and the sum of W-2 amounts. For tax filers who are married filing jointly, we assign individual wages according to W-2 records and split any positive difference between tax return earnings and combined W-2 earnings equally between the primary and secondary filers.

All non-wage income: This composite measure is defined as total income (line 22 on Form 1040) less wage and salary income (line 7 on Form 1040) and UI benefits (line 19 on Form 1040).

Capital gains realizations: Net capital gains is reported on line 13 on Form 1040 and is defined as the amount of taxable gains reported on the 1040, which aggregates long-term and short-term gains and losses. This variable can take on either positive or negative values. Negative values occur when assets are sold at a loss. This measure includes capital gains distributions paid out to holders of mutual fund shares. The choice of when to realize capital gains distributions from mutual funds is not within the control of the taxpayer, and thus will not be a particularly easy margin along which to adjust during unemployment.

Self-employment income: Self-employment income is reported on line 12 on Form 1040 and defined as net Schedule C income. These data likely only measure a portion of the actual involvement in self-employment. Some forms of temporary work may result in under-the-table payments that are not reported to the IRS.

Gross distributions from retirement savings: Gross distributions from retirement savings sums all withdrawals from IRAs (line 15a on Form 1040) and income from pensions and annuities (line 16a on Form 1040).

Retirement penalty: The retirement penalty variable combines the 10% tax paid on any penalized early withdrawals from an IRA or employer-sponsored retirement plan (line 30 on Form 1040), as well as penalties paid on excess IRA contributions (line 59 on Form 1040). Withdrawals from traditional IRA accounts generally trigger a

10% tax on the amount distributed if the IRA holder is under age 59.5. There are a number of special cases under which an early IRA withdrawal is not subject to the 10% penalty. Withdrawals used for first-time home purchases or for qualified higher education expenses are exempt from the penalty. Most relevant for our analysis, withdrawals used to pay health insurance premiums are exempt for individuals who have lost their jobs. Individuals who have held Roth IRAs for less than five years are subject to the same rules for early withdrawals as are holders of traditional IRAs, while those who set up a Roth IRA at least five years earlier are able to take tax-free withdrawals at any time. Withdrawals from an employer-sponsored retirement plan, most often a 401(k), are typically subject to the 10% tax if the account holder is under age 55.

Social Security Disability Insurance (SSDI):

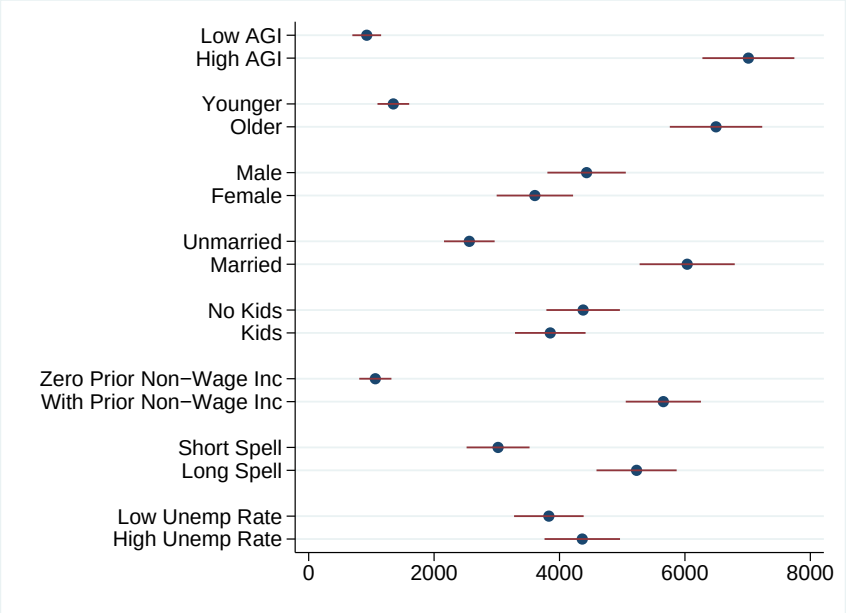
Although this income is not taxable, it is reported on the SSA-1099 information returns that the Social Security Administration provides to the IRS. This form does not distinguish between payments made from different elements of the Social Security Administration's Old Age and Survivor's Insurance (OASI) and Disability Insurance (DI) programs. However, the age restrictions that we have imposed, 25 to 60, mean that everyone in our sample is too young to be receiving Social Security retirement benefits from OASI and too old to be receiving survivor benefits paid to children. This leaves SSDI payments and survivor benefits paid to widowed parents caring for children under age 16. Over the years that we analyze, SSDI payments account for more than 97% of these two types of payments. We have calculated this percentage using Social Security Administration data from `http://www.ssa.gov/oact/STATS/table4a4.html` and `http://www.ssa.gov/oact/STATS/table4a5.html`. We sum SSA-1099 payments to primary and secondary filers to get an aggregate measure of SSDI income for the household.

Maximum Weekly Benefit Amount (MaxWBA):

The maximum weekly benefit amount available under the UI system is a summary measure of benefit generosity. Details on state programs come from the semi-annual "Significant Provisions of State Unemployment Insurance Laws" published by the Department of Labor's Employment and Training Administration. Historical reports are available at `http://www.ows.doleta.gov/unemploy/statelaws.asp`. States can change their policies mid-year, and in cases where the January and July Department of Labor reports show different maximum benefit amounts, we use the simple average of the two. A small number of states offer a larger maximum weekly benefit amount for claimants with dependents. Results presented here use the benefit amount for a filer with no dependents, but we have checked that the patterns of results are robust to using the maximum weekly benefit amount including dependent allowances.

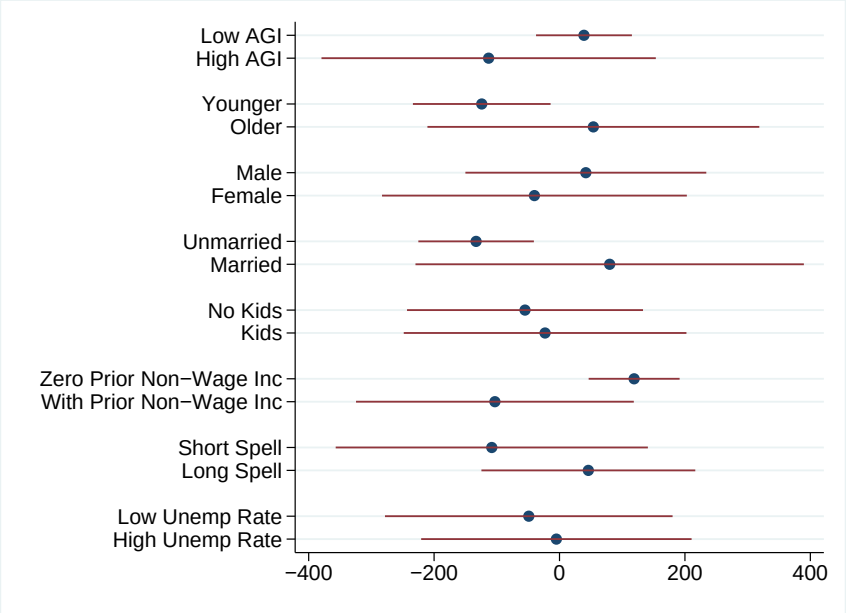
Online Appendix

Figure A1: Heterogeneity in Dollar Value of Retirement Distribution, First Unemployment Spell



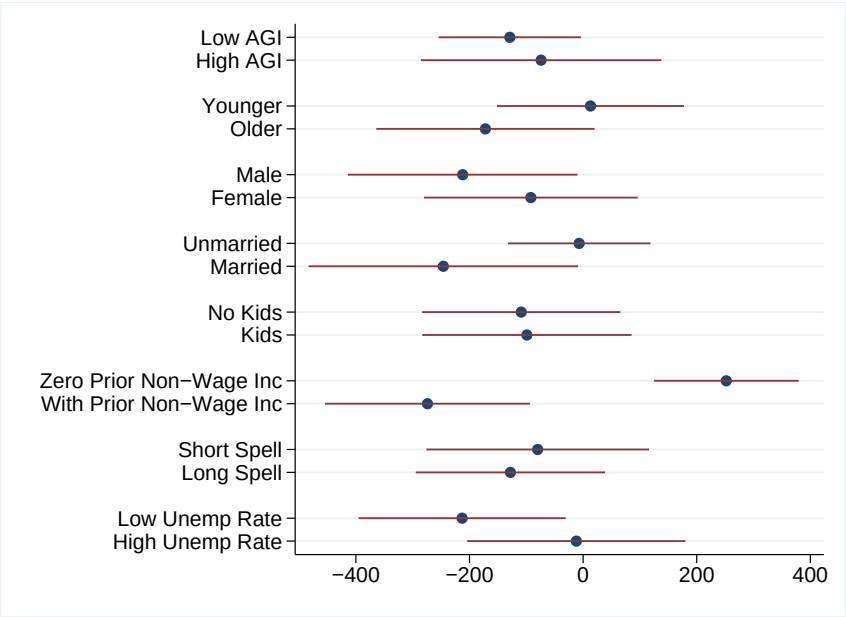
The figure plots regression coefficients and 95% confidence intervals on the *FirstSpell* indicator variable from regressions of Equation 1 on different subsamples. The dependent variable in the regressions is the dollar amount of a filing unit's retirement distributions. The splits are as follows, from the top of the figure to the bottom: (1) by whether AGI is below or above the median for the sample; (2) by whether the primary filer's age in the year of first entry into unemployment is below or above the median age; (3) by gender of the unemployed individual; (4) by marital status; (5) by presence of children on the tax return; (6) by presence of non-wage income sources prior to the first unemployment spell; (7) by whether the imputed length of the first spell is below or above that year's median imputed spell length; and (8) by whether the state unemployment rate in the year of first entry into unemployment is below or above the median.

Figure A2: Heterogeneity in Capital Gains, First Unemployment Spell



The figure plots regression coefficients and 95% confidence intervals on the *FirstSpell* indicator variable from regressions of Equation 1 on different subsamples. The dependent variable in the regressions is the amount of net capital gains realizations. The splits are as follows, from the top of the figure to the bottom: (1) by whether AGI is below or above the median for the sample; (2) by whether the primary filer's age in the year of first entry into unemployment is below or above the median age; (3) by gender of the unemployed individual; (4) by marital status; (5) by presence of children on the tax return; (6) by presence of non-wage income sources prior to the first unemployment spell; (7) by whether the imputed length of the first spell is below or above that year's median imputed spell length; and (8) by whether the state unemployment rate in the year of first entry into unemployment is below or above the median.

Figure A3: Heterogeneity in Self-Employment Income, First Unemployment Spell



The figure plots regression coefficients and 95% confidence intervals on the *FirstSpell* indicator variable from regressions of Equation (1) on different subsamples. The dependent variable in the regressions is the amount of net Schedule C income. The splits are as follows, from the top of the figure to the bottom: (1) by whether AGI is below or above the median for the sample; (2) by whether the primary filer's age in the year of first entry into unemployment is below or above the median age; (3) by gender of the unemployed individual; (4) by marital status; (5) by presence of children on the tax return; (6) by presence of non-wage income sources prior to the first unemployment spell; (7) by whether the imputed length of the first spell is below or above that year's median imputed spell length; and (8) by whether the state unemployment rate in the year of first entry into unemployment is below or above the median.