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

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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. Unemployment is associated with a 27% reduction in household wage earnings. Unemployment insurance compensates for one-third of these wage losses. Households also partially compensate using a variety of income sources: capital gains, self-employment, and distributions from retirement savings accounts. More generous UI benefits crowd out household wage income and are also associated with increased distributions from retirement accounts. This combination of responses is consistent with UI benefits lengthening unemployment spells, leading to an increased reliance on retirement savings.

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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 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 after job loss (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 has also been shown to reduce job search effort. To the extent that UI provides incomplete consumption smoothing, 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.

In this paper, we use individual tax return data to provide further evidence on household experiences of the unemployed. We first provide new estimates of the wage losses associated with unemployment. We then explore the extent to which households use a variety of non-wage income sources to smooth consumption through an unemployment spell. Because of the breadth of income sources available on a tax return, we are able to consider changes to a variety of income types, including capital gains realizations, self-employment income, and distributions from retirement accounts. In a companion paper, Kawano and LaLumia (2014), we also examine spousal labor supply responses to a job loss in detail. Considering these different dimensions of compensatory behavior broadens our understanding of how families respond to the negative income shocks associated with unemployment spells.

We construct a panel of income tax returns, spanning 1999 to 2011, for households who have evidence of an unemployment spell. We rely on UI compensation being taxable income and thus reported on a tax return to identify unemployment spells. Of course, not all unemployed individuals receive UI benefits, so our results are informative about the experiences of UI recipients rather than all unemployed individuals. UI recipients, who must

have substantial labor market attachment and have suffered a job loss through no fault of their own, are a group of particular policy interest. The UI take-up rate around this period is over 75% (Ebenstein and Stange 2010), and so a significant portion of layoffs are captured by our measure of 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 27% of pre-unemployment household earnings and about 36% of pre-unemployment individual earnings. These estimates are on the high end of the range of job displacement effects estimated in survey and UI administrative data. Consistent with a large literature showing that more generous UI benefits lengthen unemployment spells, we find that more generous UI programs crowd out annual wage income. Increasing the dollar value of the state-level maximum weekly UI benefit amount by 1% is associated with about a 0.1% reduction in annual household-level wage income.

Our estimates of non-wage income components provide new evidence that households turn to other sources of funds in response to unemployment. We find that UI benefits, on average, compensate for roughly 32% of the lost household-level wages associated with unemployment. Other non-wage income sources together compensate for an additional 9% of lost wage income. Decomposing this aggregate effect reveals interesting patterns in the types of income that households rely on during unemployment. There is a small short-run increase in realized capital gains, concentrated among older households. Income from self-employment also increases in the short run, but with sustained 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. We observe that the largest short-run response to an unemployment spell is an increase in distributions from retirement accounts, suggesting that traditional savings appear to be insufficient for consumption smoothing. This response,

present in the sample as a whole, is particularly large for those who are at least 40 years old. Of our non-wage income measures, distributions from retirement accounts is the only one that is influenced by the generosity of the UI system. In fact, we find that more generous UI leads to *larger* retirement distributions. This pattern, coupled with our findings on the crowd-out of wage income, is consistent with UI benefits increasing unemployment spell lengths, and leading to a heavier reliance on retirement savings accounts.

To understand how our results are affected by using a sample of UI recipients, we use data from the Survey of Income and Program Participation (SIPP) to compare UI recipients and unemployed non-recipients. UI recipients tend to have longer unemployment spells, which is consistent with our estimated wage losses being on the high side of estimates in the existing literature. We also find that UI recipients have higher pre-unemployment earnings. This provides some suggestive evidence that UI recipients may be more likely than the typical unemployed individual to have built up stocks of wealth that can be drawn down during an unemployment spell. Longer spells may be more likely to involve reliance on various types of non-wage income, indicating that the non-wage income responses that we estimate may be an upper bound on non-wage responses for the broader unemployed population.

Our paper contributes to a large literature that examines how job loss affects earnings, consumption, savings, and other behaviors.[1] Beginning with the seminal paper by Jacobson et al. (1993), several papers have estimated the wage losses of displaced workers. These estimates of wage losses have relied on administrative data from state unemployment 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 supplement to the Current Population Survey (e.g. Farber 1997), or on longitudinal

[1]Estimates of unemployment-related earnings losses have focused on displaced workers. 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.

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.[2]

Consumption declines during unemployment spells, but by significantly less than income (Stephens 2001, Dynarski and Gruber 1997). Several mechanisms facilitate consumption smoothing. Informal transfers from family members increase (Schoeni 2002, Bentolila and Ichino 2008) and borrowing increases for families in the middle of the wealth distribution (Sullivan 2008). Households also draw down savings, but the ability to do so will vary with financial circumstances, and Gruber (2001) documents substantial heterogeneity in the wealth held by the unemployed. Workers with low levels of liquid assets may turn to less easily accessed forms of wealth. Job loss has been shown to be associated with an increased probability of taking a penalized early withdrawal from an IRA (Amromin and Smith 2003) and an increased probability of refinancing a home (Hurst and Stafford 2004). Previous empirical evidence indicates that there are consumption-smoothing benefits of UI, but that these benefits tend to be concentrated among those with little liquid or financial wealth (Gruber 1997, Browning and Crossley 2001, Bloemen and Stancanelli 2005).

Our paper also contributes to the large literature examining the 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. There is a large empirical literature, reviewed in Atkinson (1987) and Krueger and Meyer (2002), establishing that more generous UI programs increase unemployment durations. 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). Naturally, when unemployment duration is longer the income losses associated with unemployment will be larger.[3] If forward-looking

[2]In an effort to reconcile the 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.

[3]This effect could be mitigated if longer time spent searching for a job eventually produces

individuals anticipate UI receipt during a potential future unemployment spell, they may engage in less precautionary saving under a more generous UI system. Indeed, 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).

To the best of our knowledge, tax return data have not previously been used to estimate changes in income associated with unemployment. The ability to compare changes in wage income and non-wage income is an important advantage of tax return data over other data sources. In addition, tax return data measure wage income with a degree of accuracy unparalleled in survey data. Survey respondents may provide inaccurate recollections of previous earnings, and this problem can be exacerbated when earnings are fluctuating over time due to unemployment.[4] 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). 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.[5] As with wage income, the presence and amount of unemployment compensation is measured more accurately in tax return data. We show that 95% of all UI payments are captured in tax returns and reports submitted to the IRS by state unemployment offices. 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).

a higher-quality match, but evidence suggests that the wage gains from longer search times are minimal (Addison and Blackburn 2000).

[4]Using a sample of workers laid off by a single company, Oyer (2004) finds that respondents recall a job paying about 5% more per year, on average, than it actually did.

[5]IRS compliance studies show that wage income is reported with a very high degree of accuracy. Approximately 99% of the wage income that should be reported to the IRS is in fact reported (Slemrod 2007).

1 Data

We construct a panel of tax returns spanning years 1999 to 2011. Our data come from the Continuous Work History Sample (CWHS), collected by the Statistics of Income division of the Internal Revenue Service (IRS), which contains a random sample of taxpayers based on the last four digits of their Social Security numbers. Demographic data available on a tax return include marital status and number of children living at home. We also obtain date of birth and gender of the primary and secondary filers from Social Security Administration records. We make several restrictions to the sample. We exclude filers with addresses outside of the 50 states or Washington D.C., returns filed by dependents, and returns of those whose filing status is something other than single, married filing jointly, or head of household. We also restrict the age of the primary filer to be between 25 and 60.[6]

We use the presence of UI income on a tax return to indicate that a household experiences an unemployment spell.[7] While not all unemployed individuals receive UI, many displaced workers are eligible for UI benefits. Eligibility requires previous work in covered employment, job loss due to economic reasons and not quitting or being fired, and pre-unemployment earnings above a state-specific threshold. Tax returns provide self-reported UI amounts aggregated to the household level. In addition, we utilize individual-specific UI payments that appear on 1099-G forms, information returns that are submitted by state unemployment offices to the IRS. Approximately 34% of tax filing units meeting our other sample restrictions show evidence of UI receipt at some point over the course of our panel. To observe how income changes through unemployment, we restrict our analysis to households that observe becoming unemployed. This is defined as observing a year with UI income conditional on

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

[7]UI income has been fully taxable since 1987. The one exception in the tax treatment of UI income is that the first $2400 was not taxable in 2009.

not receiving UI income in the previous year. This definition excludes households that report UI in the first year they appear in the data because we cannot determine the year in which these unemployment spells began. For over 75% of our sample, we observe a single job loss, but there are some households who experience multiple unemployment spells over the course of our panel. Roughly 20% of households experience two unemployment spells, while the greatest observed number of entries into unemployment is five.

We collect several wage and non-wage measures from household tax returns and information returns that are filed by third-parties to the IRS. Details on our variable definitions are provided in the Data Appendix. All monetary amounts are converted to real 2011 dollars using the CPI and are winsorized at the 99% level. For wage earnings, we collect information both at the household level and at the individual level. We define the wages of the unemployed individual as the wage income attributed to the individual on the tax return for whom we match UI receipt. If both the primary and secondary filers are unemployed in the same years, we use the sum of primary and secondary wage income as wages for the unemployed individual.

We consider several measures of non-wage income.[8] We first define a composite measure of non-wage income, defined as total income other than wage income and UI benefits. We also collect several individual components of this composite non-wage income measure: net capital gains realizations, self-employment income, and gross distributions from retirement accounts. These variables allow us to examine whether households increase their reliance on particular sources of income during an unemployment spell. For households in our age range, an increased reliance on retirement savings will likely trigger a penalty. We also construct a "retirement penalty" variable to capture the increased financial costs associated with drawing

[8]There are several other income types of interest that are not reported on a tax return. We do not observe an overall measure of wealth or the annual amount of saving. In-kind or cash transfers in the form of food stamps or welfare are not taxable and do not appear on any associated information return. Informal transfers from other family members are also not measured. Only transfers above the annual exclusion amount ($13,000 as of 2010, and never less than $10,000 in our sample period) would trigger a gift tax liability, and this tax is remitted by the giver rather than the recipient.

down retirement savings during an unemployment spell.[9] The final type of income that we consider comes from another social safety net program, Social Security Disability Insurance (SSDI).

We use a filer's state of residence to match individuals with information on the benefit generosity of the UI system they face.[10] UI benefits are set 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. 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.

Table 1 reports descriptive statistics for our main sample. There are 161,473 observations, representing 16,945 unique primary filers. Approximately 43% of these returns are jointly filed by married couples, and 23% are filed by heads of household. 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 approximately $70,000. While this is above the average household income for the population as a whole, previous research has shown that receipt of UI is positively associated with education (Gould-Werth and Shaefer 2012) and with income (Government Accounting Office 2012). Almost 40% of those in our sample appear to be homeowners, as measured by paying mortgage interest or deducting property taxes.[11] Approximately 36% of returns in the sample report interest income, and 10% include realized income from capital gains. We interpret both of these variables as indicators of positive financial wealth. More than half of the observations in our sample have positive values of

[9]In addition to any tax penalty owed, distributions from retirement accounts may involve psychic costs if households do not consider money to be fungible between retirement savings and precautionary savings (Thaler 1985).

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

[11]This figure is substantially lower than the homeownership rates between 60% and 70% reported for various years over our sample period (U.S. Census Bureau 2012). A homeowner who does not itemize deductions, likely one who has paid off her mortgage and whose property tax bill is less than the standard deduction, will not be included in our count of homeowners.

our composite non-wage income variable. The mean amount of non-wage income is small, equal to $3,979, and there is substantial variation around this mean.[12]

An appealing feature of our data is that, unlike survey data, UI reported in tax returns is highly accurate. Because state unemployment offices report UI payments directly to the IRS, these income amounts are not likely manipulated. To provide a sense for the coverage of all UI income in tax return data, Figure 1 compares the annual amount of UI payments, as computed by the Department of Labor, to the annual UI income implied by tax returns. For each tax return, we take the maximum UI amount reported on either the 1040 or on the collection of 1099-G forms associated with a particular filing unit. We sum these amounts for each year, and then scale up by a factor of 2000, reflecting the fact that the CWHS is a random 1-in-2000 sample of Social Security numbers. Figure 1 depicts the remarkable quality of tax return data. Between 1999 and 2011, the weighted sum of UI income in tax returns accounts for over 96% of the total UI payments. After our sample restrictions, we capture over 64% of UI payments between 2000 and 2011.

A related concern is that UI recipients are not representative of the full population of unemployed individuals. We consider this concern in detail in section 4, but here we present evidence that broad trends in the unemployment rate are observable in tax return data as well. Figure 2 compares the annual unemployment rate, as computed by the Bureau of Labor Statistics, to the annual percentage of filing units in the CWHS sample that have UI income. The two series measure somewhat different concepts, with different numerators (the number of unemployed individuals vs. the number of filing units receiving UI income) and different denominators (the labor force vs. the number of filing units). Despite these differences, the two move together, with both increasing during recessions.[13] The correlation

[12]Note that non-wage income can be negative, which reflects the inclusion of losses from business and from sales of depreciated assets.

[13]Different reference periods can explain why the percentage of filing units receiving UI income is persistently greater than the BLS unemployment rate. Receipt of UI income at any point during the year results in a filing unit being classified as unemployed in that year. In the BLS data, an individual's unemployment status is determined by his activity in the week prior to the survey.

of these two measures is 0.847. This offers some assurance that aggregate unemployment trends are represented in tax return data.

2 Estimation Strategy

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

$$WageIncome_{it} = \beta_0 + \beta_1 FirstUnemp_{it} + \beta_2 PostUnemp_{it} + \beta_3 LaterUnemp_{it} + X_{it}\Omega + \alpha_i + \gamma_t + \varepsilon_{it}, \quad (1)$$

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. We allow for the first unemployment spell to span two calendar years.[14] The variable *PostUnemp* is a dummy variable that equals one in all years after the first unemployment spell. The $LaterUnemp_{it}$ 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 represent 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. Specifically,

[14]When the maximum duration of UI benefit receipt is 26 weeks, as it is over most of our sample period, no continuous spell of UI receipt can include more than two consecutive calendar years. When the maximum benefit duration exceeds 53 weeks, as it did in some states beginning in November 2008, it is possible that a single continuous spell results in UI income receipt in three consecutive years (Rothstein 2011). Of course, it is possible that UI receipt in a single year could represent multiple short unemployment spells. Our analysis of SIPP data indicates 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. That is, these households report months with no UI income receipt preceded by and followed by months with UI income receipt.

equation 1 compares years in which a filing unit receives UI income to all years prior to the first identified entry into unemployment. The coefficient on *FirstUnemp* represents the change in income in the first unemployment spell relative to a filing unit's average income in all years before entering unemployment. We expect that $\beta_1 < 0$. If household wages do not recover within the time that we consider, 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 $LaterUnemp_{it}$ 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.

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 two new variables. *MaxWBA* measures the statutory maximum weekly 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.[15] 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 term *FirstUnemp*·*MaxWBA* allows us to estimate the extent to which more generous UI benefits affect the level of wage income reported during a first spell of unemployment. A negative coefficient on the interaction indicates crowd-out: When UI benefits are more generous, wage income falls more during an unemployment spell than when UI benefits are less generous. The term *LaterUnemp*·*MaxWBA* has a similar interpretation.

Additionally, we estimate a more flexible specification that accounts for the possibility that wage income may start to decline prior to the start of an unemployment spell and

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

may recover only slowly after an unemployment spell. Earlier studies show mixed evidence of pre-displacement declines in earnings, while consistently showing that wage recovery is slow.[16] To allow for potential long-run adjustments in wage income, we estimate an equation that includes dummies for the number of years elapsed since an unemployment spell:

$$WageIncome_{ist} = \sum_{k=-1}^{7} (\delta_k \cdot D_{kist}) + X_{ist}\Omega + \alpha_i + \gamma_t + \lambda_s + \varepsilon_{ist}. \quad (2)$$

In this equation the dummy variables $D_k, k = -1, ..., 7$, indicate that an observation occurs k years after a household's first observed layoff. Negative values indicate years prior to first UI receipt. The D_0 dummy is exactly equivalent to the *FirstUnemp* dummy included in Equation 1. This equation closely matches a specification adopted by Jacobson et al. (1993) and widely used in the subsequent literature on wage losses during unemployment. We estimate Equation 2 for a smaller sample. We focus on observations that occur at most six years prior to the unemployment spell up through seven years after the spell. With the smallest value of k equal to -1, 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 two to four years prior to the first layoff. Because households can experience multiple layoffs, positive values may include years with UI receipt. We also estimate a version of Equation 2 that includes *MaxWBA* and *Unemp·MaxWBA* to account for potential crowd out of wage income. In the current version of the paper we estimate Equation 2 only for the subsample of filing units experiencing a single spell of UI receipt over the course of the panel. In future versions, we will expand this analysis to include households with multiple spells of UI receipt.

Next, we turn to our second objective: understanding whether and to what degree households turn to various types of non-wage income during an unemployment spell. We estimate

[16] Jacobson et al. (1993) find that wage income starts to decline as early as three years before a job displacement associated with mass layoffs. The pre-displacement earnings decline is very small for those who lose jobs outside of mass layoffs, and subsequent estimates including Schoeni and Dardia (1996) and Couch and Placzek (2010) find no pre-displacement dip in earnings.

Equation 1 now replacing wage and salary income with the measures of non-wage income described in Section 1. If households increase their reliance on these non-wage income sources during an unemployment spell, we expect that $\beta_1 > 0$ and $\beta_3 > 0$. If these increases persist over the medium- to longer-term, then $\beta_2 > 0$.

There are some additional factors to consider in evaluating particular types of non-wage income. First, our aggregate non-wage and non-UI income measure provides some indication as to whether households turn to other sources of income during unemployment to compensate for the wage income reductions that they face. In addition to the specific non-wage income sources that we estimate, this measure might increase due to increases in alimony payments, income from partnerships or S corporations, or farm income. Given that these sources of income are relatively rare for our sample, changes to non-wage income will primarily be driven by the individual income components that we consider. Second, net capital gains can be either positive or negative. If households are more likely to sell assets at a loss during unemployment, we may observe $\beta_1 < 0$ in capital gains regressions.[17] Third, our self-employment income variable likely measures only a portion of the actual involvement in self-employment because some forms of temporary work may result in under-the-table payments that are not reported to the IRS. An extensive literature documents higher levels of tax evasion and avoidance 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. The relationship between unemployment and self-employment decisions is uncertain, *a priori*. On one hand, job loss could encourage new participation in self-employment. On the other hand, periods of high unemployment are also periods of low aggregate demand, when the

[17]Note also that 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.

probability of small business failure may be particularly high. 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).

Lastly, unlike other potential responses to unemployment, an individual has limited discretion in choosing whether and when to receive SSDI income. Even if the initial decision to apply for benefits is responsive to unemployment, SSDI applications are reviewed by medical examiners who determine whether the disability prevents an individual from performing his job. 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). Another way in which SSDI income differs from other sources of non-wage income we consider is that it cannot be adjusted very quickly. The law mandates that an individual be medically unable to work for five months before applying for SSDI. The average processing time for initial applications is over three months (Social Security Administration 2014). Previous research finds that adverse labor demand shocks are associated with increased applications for Social Security Disability Insurance (SSDI) benefits (Autor and Duggan 2003). Given the nature of our empirical design and the SSDA application rules, we would not expect to find an immediate relationship between job loss and SSDI payments, but that such responses will appear in the longer run.

A state's UI generosity may influence the utilization of non-wage income sources during unemployment. To explore these potential effects, we also estimate non-wage income equations including *MaxWBA* and *Unemp*·*MaxWBA*. The predicted impact of UI generosity on non-wage income is ambiguous. On the one hand, it is quite natural to think that 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,

we would expect that more generous UI crowds out the utilization of non-wage income. A negative coefficient on the *Unemp·MaxWBA* term would provide evidence of such crowd-out. Alternatively, if more generous UI benefits reduce job search effort and lengthen unemployment spells, households may be *more* reliant on non-wage income to smooth consumption during unemployment.[18] 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.

3 Results

3.1 Graphical analysis

Before turning to our regression results, we present graphical evidence on the time path of income in years before and after unemployment. 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.[19] Households may experience multiple unemployment spells over the course of the panel, so years included in $t > 0$ may also be associated with UI receipt.

The left panel of Figure 3 plots average annual household-level wage and salary income from six years before first UI receipt to six years after first UI receipt. There are significant wage declines in the year that a household member becomes unemployed. On average, wage

[18]Higher unemployment benefits may also lead some individuals to build up a smaller stock of precautionary savings to insure against a job loss. To the extent that unemployment benefits are insufficient to accommodate a desired level of consumption given the stock of precautionary savings, we could also see this lead to a higher reliance on non-wage income during an unemployment spell.

[19]These amounts are computed by taking the estimated residuals from a regression of an income type on year fixed effects and adding back the sample average of that income type.

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. The right panel of Figure 3 plots average total income. When a household enters unemployment, total income falls sharply, with an average decline of over $6000. 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. As with wage income, there is a slight decline in total income in the year prior to an unemployment spell.

Figure 4 plots annual average income from various non-wage sources, again with year fixed effects removed.[20] 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 observations categorized as $t = 0$ 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 gains realizations display no striking change at the time of unemployment. Distributions from retirement accounts increase sharply in the year of unemployment and then quickly return to average pre-unemployment levels. In contrast, income from self-employment and disability insurance show long-run increases. For self-employment income, there is an immediate but small increase followed by continued growth, while the increase in disability insurance income occurs with a lag after entry into unemployment. These figures do not control for any individual-specific characteristics. In order to do so, we turn next to regression results.

[20]Some of these income sources are utilized by a small proportion of households, so the average income amounts depicted in Figure 4 include many zeros. To understand how the extensive margin of income utilization changes through an unemployment spell, 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 the previous year.

3.2 Regression Results: Wage Income

Table 2 presents results from fixed-effects regressions describing how wage income changes during unemployment. The first two columns show the results of estimating 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 $12,000 in annual wage income, relative to wages in pre-unemployment years. These losses are quite large; relative to the average wage income amounts in the year prior to an unemployment spell, these changes represent a 21% percent decline in household wage income and a 29% decline in wage income for the individual who becomes unemployed. Wage income remains significantly depressed in subsequent years, as shown by the negative coefficient on *PostUnemp*. Later spells of unemployment are associated with wage losses of over $9000 at the household level and about $8000 at the individual level.

Columns 3 and 4 add measures of state UI generosity to investigate the extent to which UI benefits crowd out wage income. Again, a comparison across columns shows that 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 $6,800. Each additional hundred dollars of maximum weekly benefit amount is associated with about $1300 less in annual wage income during a first unemployment spell. To put this in context, we compute an elasticity showing the percentage change in annual wage income associated with a 1% change in the

[21] We also estimate these equations using log wages as our dependent variable. In these specifications, the coefficient on $FirstUnemp$ is -0.35 (N = 133,501) when the log of household-level wage income is the dependent variable. This coefficient is statistically significant at the 1% level. 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.

maximum weekly UI benefit. In our sample, the average pre-unemployment wage income of unemployed individuals is $39,737 and the average maximum weekly benefit amount is $372. The corresponding elasticity of individual wage income with respect to weekly benefit generosity is $\frac{-1311/39{,}737}{100/372} = -0.123$. In other words, a 10% increase in benefit generosity is associated with about a 1.2% reduction in annual wage income. When looking at household-level wage income instead of individual-level wage income, the corresponding elasticity is -0.089.

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 reasonably close to our estimate that a 10% increase in the maximum weekly benefit amount reduces annual individual-level wage income by about 1.2%.

Table 3 presents the results of estimating the more flexible specification described in Equation 2, in which a large set of dummy variables measures the number of years before or after an unemployment spell. The coefficients on the D_{-1} through D_7 dummies can be interpreted as the change in annual wage income relative to wages averaged over observations two or more years prior to entering unemployment. This specification allows us to test whether wage income begins to decline in the year before UI receipt, and to allow for potentially nonlinear recovery in post-unemployment wages. Columns 1 and 2 closely match the analysis of Jacobson et al. (1993) while columns 3 and 4 add UI generosity controls.

Across all columns, the large negative coefficients on the D_0 dummy corroborate results from the simpler specification showing significant declines in wage income in years of UI receipt. The average value of wage losses in those years is close to $11,000 across specifications (evaluated at the average level of UI benefits, $372, for columns 3 and 4). The positive coefficient on the D_{-1} dummy is inconsistent with the pre-unemployment decline in earnings found by Jacobson et al. (1993), who focused on workers leaving distressed firms carrying out mass layoffs. It seems plausible that pre-unemployment declines in wage income are less prevalent for workers laid off from firms in better financial condition. Wage income remains significantly below its pre-unemployment average for several years after UI receipt. It takes approximately four years after an unemployment spell for household-level wage income to recover to its pre-unemployment level, and an additional year for individual-level wage income to fully recover. These estimates corroborate previous work that the negative effects of an unemployment spell can persist over a long period.

As in the baseline specification, Table 3 indicates that the generosity of the UI system crowds out wage income. That is, the decline in wage income is larger when UI benefits are more generous. The immediate wage loss is estimated to be about $7000 with zero UI benefits, and each additional dollar of maximum weekly UI benefit is associated with a decline of $10.35 (individual-level) to $10.89 (household-level) in annual wage income. The corresponding elasticity of annual wage income with respect to maximum weekly benefit is -0.094 for individual-level wages and -0.072 for household-level wages.

3.3 Regression Results: Non-Wage Income

The results described above confirm that wage losses associated with unemployment are substantial. Evaluated at the mean level of UI generosity, wage income falls by more than $10,000 in years of unemployment. In results not shown (available upon request), we estimate Equation 1 with UI income as the dependent variable to gauge the degree to which the UI system replaces lost wages. We find that the financial assistance provided by the UI system

compensates for less than half of household wage losses. Annual UI income, averaged over non-zero observations, is $4844, roughly 32% of the average household wage losses suffered during these years. 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.

Results showing how non-wage income is adjusted during a spell of unemployment are shown in Table 4.[22] Each column corresponds to a different dependent variable, using the specification described by Equation 1.[23] Overall, Table 4 documents an increased reliance on non-wage and non-UI income sources when a household first enters unemployment, given by the positive coefficients on the *FirstUnemp* term. The first column shows that households increase total non-wage, non-UI income by about $876 in a first spell of unemployment. This increase in non-wage income compensates for approximately 7% of the $11,794 wage income losses suffered by households. Thus, private non-wage income provides less of a financial cushion during unemployment than the UI system.

Next, we consider specific components of the non-wage and non-UI income measure to disentangle which drive the overall response. Column 2 shows that capital gains do not increase in a first unemployment spell, and increase by a small amount, $38, in later spells. One reason that the average response is small is that capital gains realizations are zero for a large majority of the sample. Only 10% of returns in our sample 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 0.7% 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,

[22]Because it is unique in many ways, we turn to our analysis of DI income separately.

[23]Among the various wage equations we have estimated, the one that is most comparable is shown in column 1 of Table 2. This regression indicates that household-level wage income falls by an average of $15,290 in years with UI receipt.

net capital gains realizations will not adequately measure the resources transferred out of equity portfolios during unemployment.

In results not presented, we have additionally examined two other sources of investment income measured in tax return data, income from interest and dividends. Interest income is related to the stock of wealth accumulated in traditional savings accounts, and in theory it might be used as a proxy for savings account balances. We find virtually no change in interest or dividend income during and after an unemployment spell. The non-responsiveness of interest income probably reflects that interest is a very imperfect proxy for wealth, while the non-responsiveness of dividend income could be due to the very limited control an individual has over the timing of dividend distributions. Capital gains, in contrast, can be finely timed by individuals.

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 $2,562 higher during a first unemployment spell than in years before. This constitutes an 93% increase from the average retirement distribution amount in the year prior to unemployment and accounts for nearly 22% of household wage losses suffered during unemployment. In post-unemployment years, retirement distributions continue to be elevated above pre-unemployment levels, by about $380. In subsequent unemployment spells, retirement distributions are on average $1140 higher than in pre-unemployment years. Column 5 shows that penalties on early withdrawals from restricted retirement accounts follow a pattern similar to retirement distributions.

We have also estimated versions of Equation 2 with various non-wage income amounts as the dependent variable.[24] The resulting patterns are very different for different types of non-wage income. The responsiveness of retirement account distributions is concentrated in the year of unemployment and in the following year. In subsequent years, distributions are

[24]Full results are available upon request. At present, we have estimated these equations for the subset of households experiencing only one unemployment spell over the course of the panel.

generally not statistically different from their pre-unemployment levels. In contrast, self-employment income continues to be above its pre-unemployment average level for several years after UI receipt. Figure 5 documents this pattern, plotting the coefficients on the set of dummy variables measuring years elapsed since unemployment entry.

Given the long lags between application for and initial receipt of DI, we restrict our analysis of changes in DI income around an unemployment spell to our dynamic specification (Equation 2). Figure 6 plots the coefficients on the set of year dummies from this estimation. DI income is unresponsive to unemployment in the short-run. DI income begins to increase two years after UI receipt, and elevated levels of DI income persist over the next several years. The average dollar changes shown in Figure 6 can be explained by changes along the extensive margin of DI receipt. Prior to unemployment, only 1% of households in our sample have any DI income. Roughly 2.5% of households are reporting DI income two years after unemployment, and this increases to 4% by the seventh year, corresponding to the last estimate in Figure 6. This timing of income receipt is consistent with households switching to DI after they have exhausted their UI benefits.

Table 5 adds controls for UI benefit levels to investigate whether a more generous UI system crowds out reliance on non-wage income during an unemployment spell. Crowd-out would be indicated by negative coefficients on the interaction terms, $FirstUnemp \cdot MaxWBA$ and $LaterUnemp \cdot MaxWBA$. We find no evidence that more generous UI benefits crowd out composite non-wage income or any of its components. The only significant coefficient on the interaction term occurs when retirement distributions are the dependent variable, and in this case the coefficient on the first spell interaction term is positive. This indicates that households facing more generous UI benefits take *greater* distributions from their retirement accounts during an unemployment spell. This perhaps surprising result might be explained by changes in job search behavior. As previously discussed, 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.

Lastly, we investigate one potential source of heterogeneity in reliance on non-wage income during unemployment. We consider whether older and younger workers respond differently. A typical life-cycle model of savings behavior predicts low or even negative net wealth early in life, when individuals are most likely to be making costly investments in schooling and may be on particularly steep portions of the age-earnings profile. Older individuals, on average, will have built up larger stocks of wealth. Thus, the option to draw down assets during an unemployment spell may be more available to older individuals than to younger individuals. In addition, the size of the wage loss associated with a spell of unemployment might be systematically different for young workers with few years of experience and for older workers with substantial work history.

We divide our sample of households experiencing just one spell of unemployment into older and younger cohorts, splitting the sample by the median age of the primary filer at the time of entry into unemployment. The results are shown in Table 6. Panel A shows that, as expected, older households both have larger wage losses and rely more heavily on non-wage income during unemployment. Among filing units headed by individuals 40 or younger, unemployment is associated with a short-run decrease in wage earnings of $14,458 and an increase in composite non-wage income of approximately $900. The wage losses are 20% larger for older households ($17,404), and the non-wage response for older households is about 80% larger, with an average increase of $1618 in non-wage income in the year of unemployment. Both age groups show persistently higher levels of composite non-wage income after unemployment than in years before unemployment.

For the younger group, distributions from retirement accounts more than fully explain the increase in composite non-wage income during unemployment. There is suggestive evidence that, after having drawn down retirement account balances during unemployment, younger workers try to undo this effect in subsequent years. Average retirement distributions and penalties on early distributions are significantly lower in the years after an unemployment

spell than before. Younger taxpayers do not have increased income from capital gains or from self-employment during an unemployment spell, but they do have higher self-employment income in the years after unemployment. For the older group, years of unemployment are associated with significantly higher realizations of capital gains, self-employment income, and retirement distributions. Self-employment income and distributions from retirement accounts remain elevated in post-unemployment years. Panel B of Table 6 presents evidence on UI crowd-out of non-wage income separately for the younger and older groups. As with the full sample, there is no evidence that more generous UI benefits crowd out non-wage income for either age group. As before, results indicate that larger UI payments *increase* retirement distributions during unemployment. This effect is much stronger for the older group.

4 UI Recipients and Other Unemployed Individuals

Fewer than half of all unemployed individuals receive UI benefits. Among the unemployed who are eligible for UI, the estimated UI take-up rate has been estimated to fall between 65% and 80%.[25] Previous research highlights several factors associated with UI take-up. Blank and Card (1991) document the importance of unionization and region of residence, finding the highest rates of take-up in the northeast. Anderson and Meyer (1997) show that reductions in the after-tax value of benefits reduce take-up. Panel data from the NLSY indicate that UI take-up rates are higher for workers who earned more before entering unemployment, who have completed more education, who have previously received UI, or who have worked in the mining or manufacturing industries (Government Accounting Office 2006). Using data

[25]The percentage of the unemployed receiving UI fell from 40-50% in the 1960s and 1970s to about 30% in the 1980s. Blank and Card (1991) show that this decline was due entirely to reduced take-up among eligible workers, not to changes in eligibility. They estimate a take-up rate of 75% in 1977-82 and a take-up rate of 67% in 1982-87. Ebenstein and Stange (2010) extend the time series of UI receipt from 1989 to 2006 and find that over this time period, 36% of all unemployed individuals received UI. They estimate that 47% of all unemployed individuals are eligible for UI, with an implied take-up rate of 79%.

from a 1993 supplement to the CPS that asks individuals why they have not applied for UI benefits, Wandner and Stettner (2000) show that the most important reasons are believing that one is ineligible for benefits and expecting to find a new job quickly. These studies rely on data that predates the period of our analysis. Shaefer (2010) uses data from the 2001 SIPP to show that similar patterns exist in the 2000s. UI eligibility and receipt continue to be positively correlated with education and pre-unemployment wages.

For purposes of our analysis, we are particularly interested in comparing unemployed UI recipients and non-recipients in terms of pre-unemployment income, unemployment duration, and wage losses. We carry out this comparison using data from the 2001, 2004, and 2008 panels of the Survey of Income and Program Participation (SIPP). Conducted by 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. Individuals are interviewed 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 to this rule is that we keep a spell if it involved receipt of UI benefits, even if this person never reported looking for work.[26] We restrict attention to individuals between the ages of 25 and 60.

[26]There are relatively few such spells. Of the 15,215 spells involving UI receipt that we analyze in the SIPP, only 981 appear to involve no search for work.

Summary statistics for the set of unemployment spells meeting these criteria are shown in Table 7. Column 1 includes unemployment spells that involve UI receipt, column 2 includes unemployment spells without UI receipt, and column 3 focuses on the subset of spells in column 2 that appear eligible for UI benefits. Approximately 30% of spells involve receipt of UI benefits. A comparison of the first two columns shows that spells involving UI receipt are longer and are preceded by higher average monthly earnings and annual family-level earnings. Both of these patterns suggest that the unemployment spells we observe in tax return data may involve greater reliance on non-wage income sources than the spells that we cannot identify. A longer unemployment duration likely implies a greater likelihood of exhausting liquid assets and of realizing capital gains or taking distributions from a retirement account. The higher levels of pre-unemployment income make it plausible that UI recipients are more likely to own such assets in the first place.

The lower pre-unemployment income of those who do not receive UI is partially due to the earnings test used to determine UI eligibility. It may be more informative to compare UI recipients to non-recipients who meet the UI eligibility criteria and thus have substantial labor market attachment. Column 3 of Table 7 focuses on the group of UI-eligible non-recipients.[27] The implied take-up rate of UI is approximately 76%, indicating that a high proportion of job losses are accounted for with our measure of UI receipt. The eligible non-recipients are more similar to UI recipients but even this more selective group has lower pre-unemployment earnings and shorter unemployment spells than the UI recipients.[28]

[27]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.

[28]We have estimated probit regressions predicting UI takeup, using the sample of UI recipients from column 1 and eligible non-recipients from column 3. Spell length, age, homeowner status, pre-unemployment earnings, and pre-unemployment full-time work are all positively associated with UI receipt.

The amount of wage income lost during an unemployment spell is likely an important determinant of reliance on non-wage income. Panel (a) of Figure 7 plots average monthly earned income around the time of entry into unemployment. 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 one more indication that the unemployment spells we can identify in tax return data are likely associated with greater reliance on non-wage income than the unemployment spells we fail to detect. Panel (b) of Figure 7 plots monthly values of earned income plus UI benefit amounts. Even when UI benefits are accounted for, UI recipients have income well below their pre-unemployment levels throughout the year following job loss.

This analysis is useful for putting our baseline 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 over three quarters 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 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 2010, this paper first estimates the wage losses associated with unemployment. Our estimates are consistent with prior results from survey and administrative data, showing that unemployment is associated with annual wage income declines

of about 21% when measured at the household level and about 29% when measured at the individual level. While wages remain depressed for some time, we find that they return to their pre-unemployment levels within 3-4 years of the end of an unemployment spell.

We provide new evidence on the utilization of non-wage income sources by households through unemployment. The UI system, on average, buffers households from roughly one-third of the wage income losses associated with a job loss. Other non-wage, non-UI income sources compensate for an additional 9% of the wage losses experienced. There are several private insurance mechanisms that we detect are modestly used, namely a drawn down of equity holdings and an increased reliance on self-employment income. We find that households, particularly those headed by older individuals, are tapping into their retirement savings to smooth consumption through unemployment spells. This finding bears on the importance of the optimal treatment of retirement savings vehicles. The penalty on early distributions from these accounts is meant to discourage the use of such funds prior to retirement, but such penalties may be quite costly for those with a temporary decline in wage earnings.

Examining the ways that households cope with spells of unemployment is important for evaluation of the UI program. One concern about the UI program is that more generous benefits reduce job search effort of the unemployed. 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 earnings. Across several specifications, we find that raising the maximum weekly UI benefit amount by $100 crowds out about $1300 of annual wage income. 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 Unemployment Compensation from Payments and Tax Returns

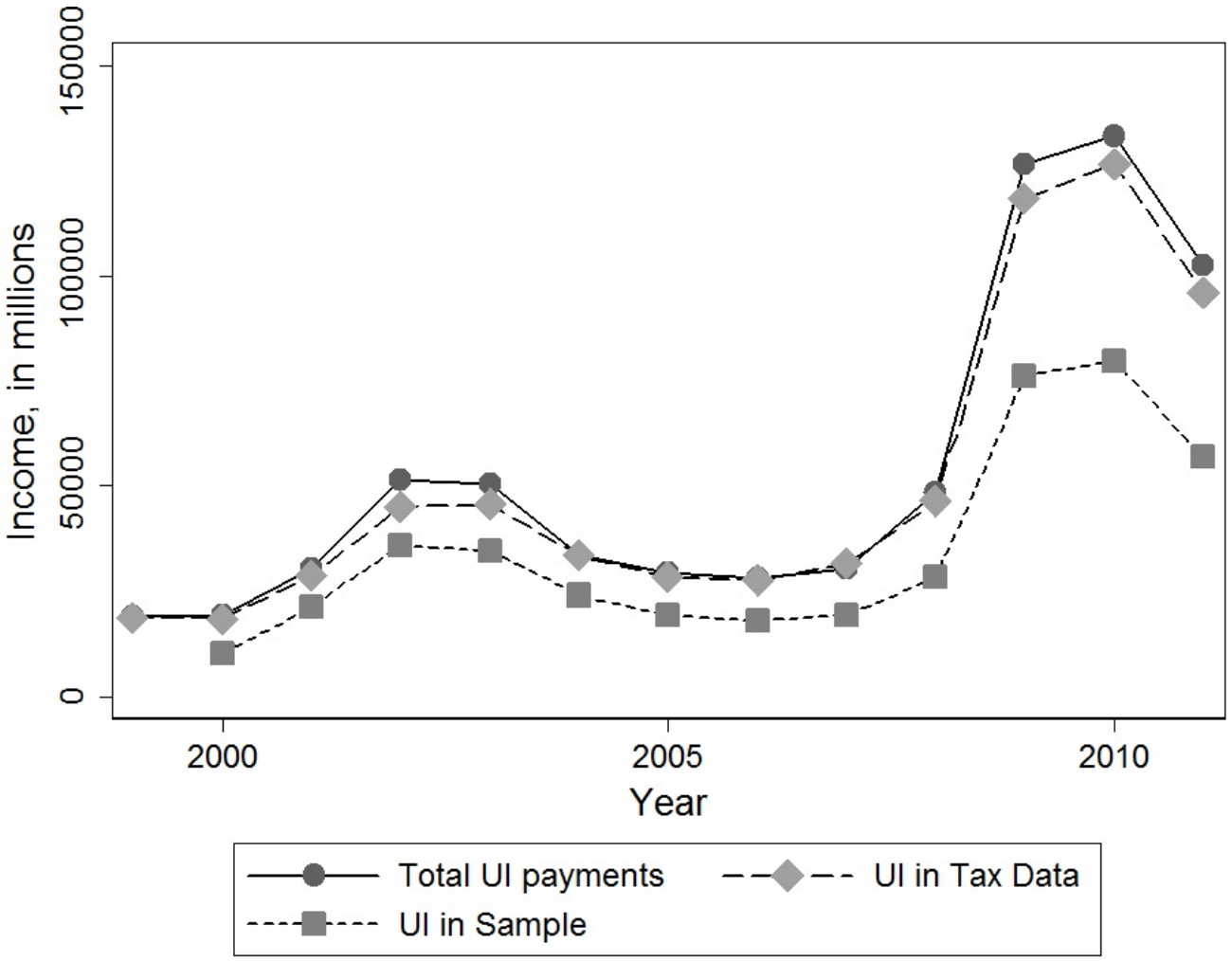
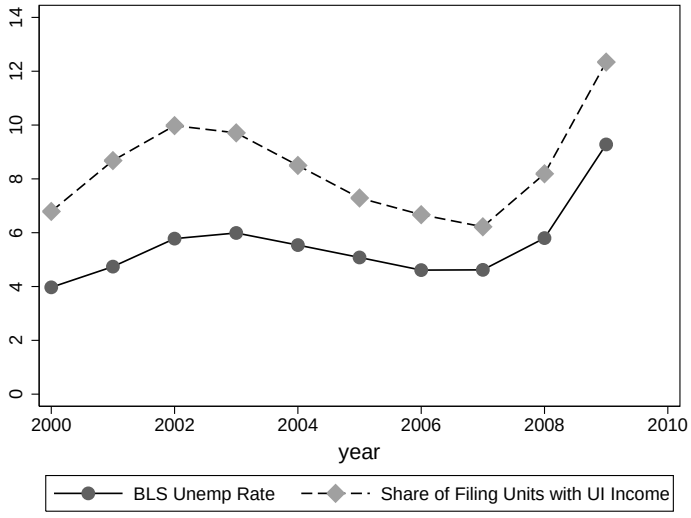
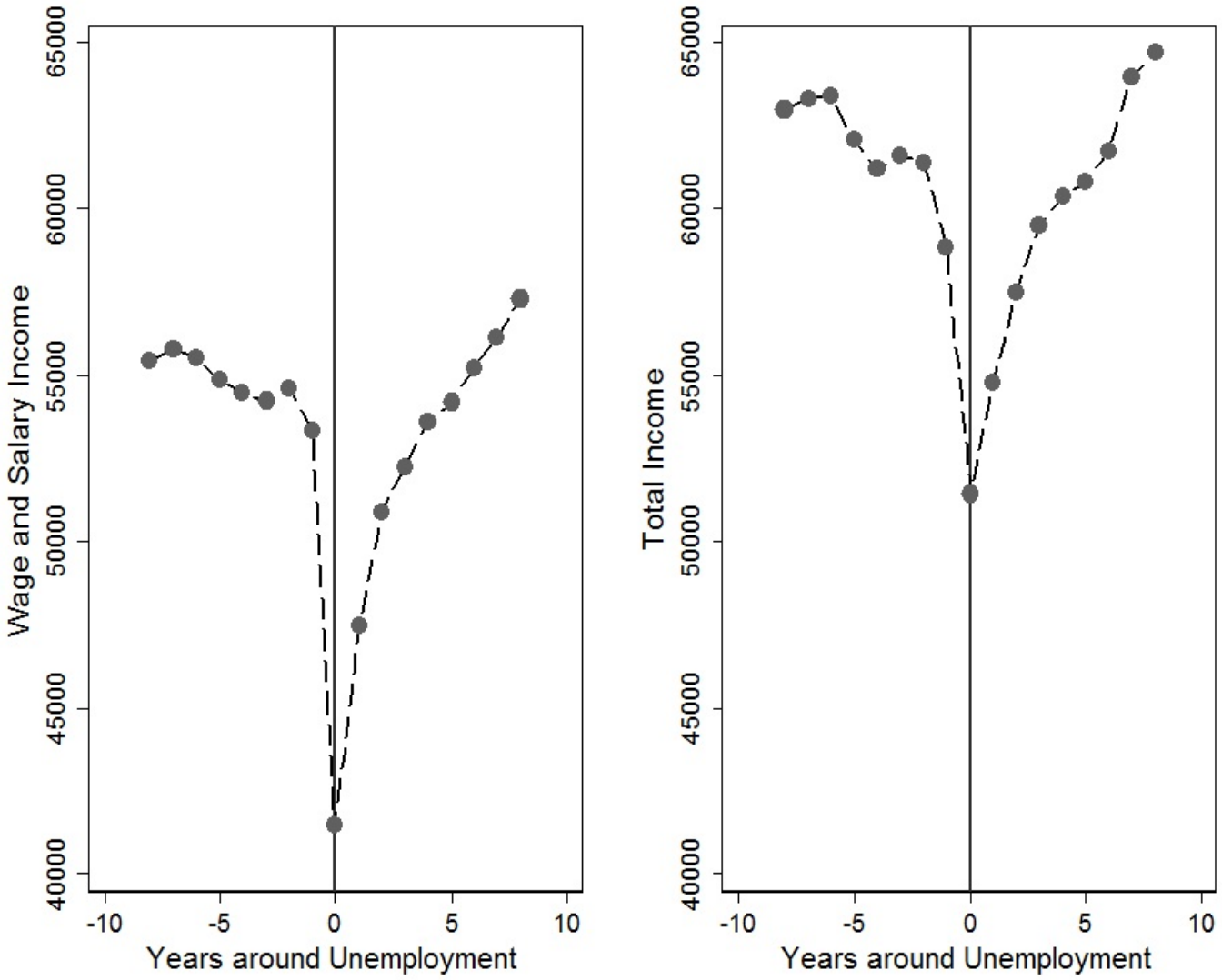


Figure 2: Comparison of Unemployment Rate and UI Recipiency Rate



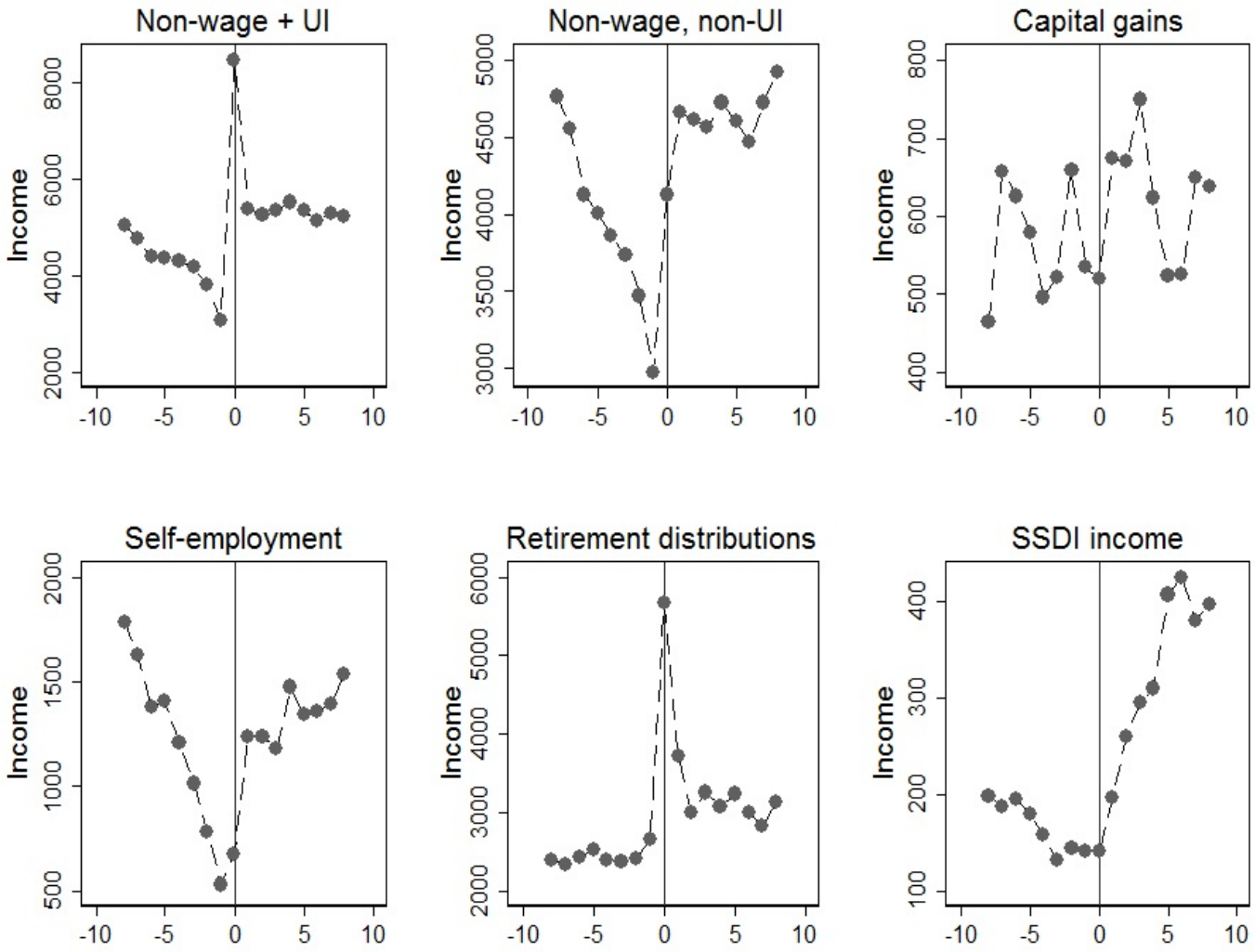
The solid line indicates the national unemployment rate, as reported by the Bureau of Labor Statistics. The dotted line indicates the percentage of tax returns in the sample that report any income from unemployment insurance benefits.

Figure 3: Income Changes Through Unemployment



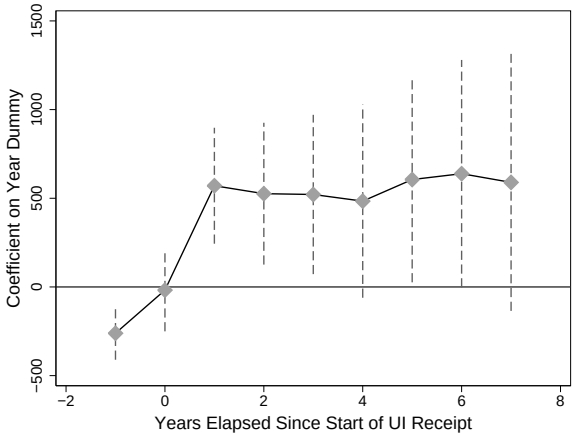
The left panel depicts average wage income and the right panel depicts average total income in years around an unemployment spell. Years with UI income are denoted as t=0. These series control for year fixed effects by adding the residuals from a regression of income on year fixed effects to the sample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

Figure 4: Non-Wage Income Components Through Unemployment



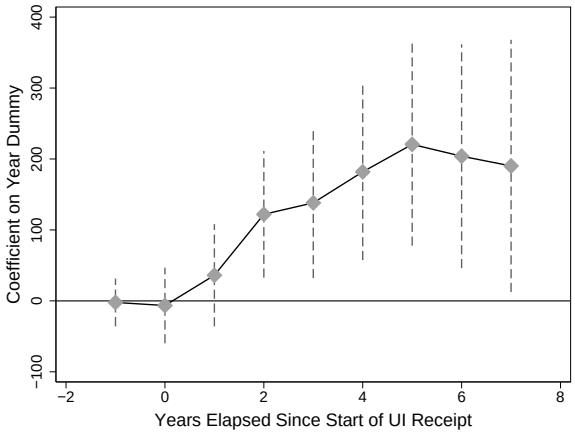
Each panel plots average annual amounts of a particular type of non-wage income. Years with unemployment income are denoted as t=0. These series control for year fixed effects by adding the residuals from a regression of a particular income source on year fixed effects to the sample average of that income source.

Figure 5: Coefficients from Self-Employment Income Regression



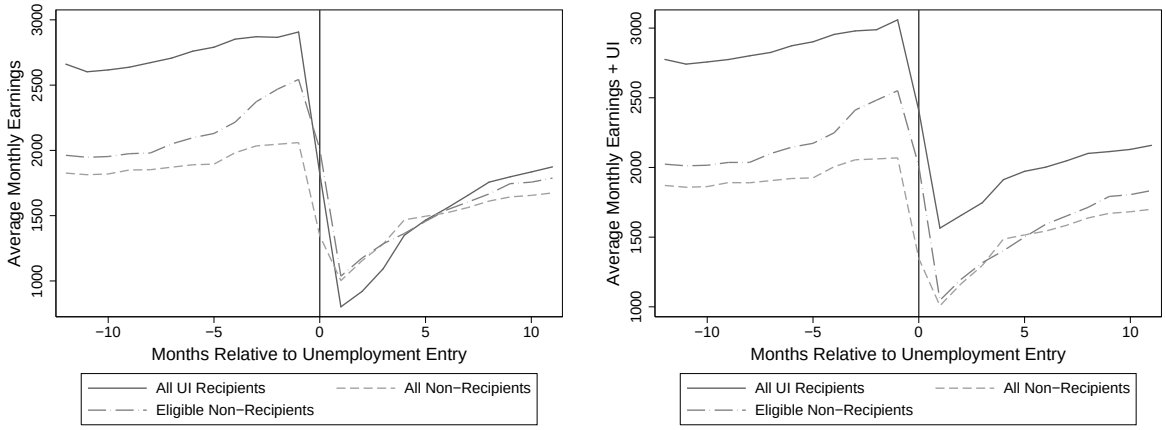
The figure plots the regression coefficients and 95% confidence intervals on a series of dummy variables, D^k, for number of years elapsed since entry into unemployment. The dependent variable is annual income from Schedule C.

Figure 6: Coefficients from Disability Insurance Income Regression



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 income from disability insurance.

Figure 7: Average Monthly Earned Income



(a) Without UI

(b) With UI Income

The figure plots average monthly income amounts. The panel on the left shows monthly individual-level earned income. The panel on the right shows the sum of monthly individual-level earned income and UI benefits.

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	0.37	0.48

Panel B: Income in year prior to first unemployment spell

	Mean	Std. Dev.	Fraction with non-zero amounts
Adjusted gross income	69934	113132	1.00
Household wage and salary income	55356	54529	0.99
Wages of unemployed individual	39737	40785	0.95
Non-wage income	3979	73989	0.55
Interest income	888	68105	0.36
Dividends	262	3526	0.15
Capital gains	904	25824	0.10
Self-employment (Schedule C) income	482	7503	0.11
Retirement distributions	2763	20351	0.13
Retirement penalty	53	410	0.06
Number of years in panel	9.53	3.65	
Number of years with UI	2.26	1.67	
Number of households	16,945		

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)
First Unemployment Spell	-11,794***	-11,593***	-6,859***	-6,726***
	(257)	(221)	(821)	(704)
Later Spells	-9,633***	-7,955***	-1,932	-1,039
	(313)	(261)	(1,279)	(1,066)
Post-First UI Spell	-7,889***	-8,161***	-7,908***	-8,188***
	(374)	(315)	(374)	(315)
Max WBA			3,219***	2,021***
			(359)	(281)
Max WBA × First Spell			-1,322***	-1,311***
			(215)	(185)
Max WBA × Later Spells			-1,940***	-1,739***
			(323)	(270)
Age	7,409***	5,181***	7,076***	4,976***
	(190)	(149)	(189)	(149)
Age (squared)	-80***	-57***	-80***	-57***
	(2)	(2)	(2)	(2)
Constant	-105,660***	-73,087***	-103,252***	-71,757***
	(4,065)	(3,147)	(4,025)	(3,129)
Observations	161,473	156,613	161,473	156,613
Number of households	16,945	16,440	16,945	16,440

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

Table 3: Fixed Effects Regression Results, Wage Income with Leads and Lags

	No UI Generosity Controls		With UI Generosity Controls	
	Household Level	Unemployed Individual	Household Level	Unemployed Individual
	(1)	(2)	(3)	(4)
Years Elapsed Since Unemp Entry				
D_{-2}	3,421***	3,232***	2,934***	2,811***
	(302)	(260)	(300)	(258)
D_{-1}	5,232***	4,885***	4,417***	4,171***
	(453)	(387)	(451)	(384)
D_0	-7,590***	-8,001***	-3,765***	-3,403***
	(632)	(533)	(1,130)	(951)
D_1	-4,588***	-5,125***	-3,977***	-4,621***
	(808)	(684)	(811)	(689)
D_2	-1,982**	-2,979***	-1,728*	-2,782***
	(956)	(801)	(956)	(803)
D_3	-556	-1,932**	-299	-1,727*
	(1,098)	(927)	(1,095)	(927)
D_4	-240	-858	-169	-816
	(1,277)	(1,076)	(1,274)	(1,073)
D_5	392	-172	442	-153
	(1,452)	(1,220)	(1,442)	(1,213)
D_6	2,703	1,368	2,440	1,092
	(1,650)	(1,386)	(1,636)	(1,376)
D_7	4,017**	1,547	3,309*	897
	(1,909)	(1,596)	(1,890)	(1,578)
D_8	5,469**	2,363	4,386*	1,402
	(2,445)	(2,064)	(2,414)	(2,036)
MaxUI			3,225***	2,824***
			(530)	(425)
Unemp · MaxUI			-1,289***	-1,446***
			(253)	(212)
Unemp · Post-Unemp · MaxUI			-1,135***	-605***
			(272)	(230)
Age	6,941***	4,799***	6,824***	4,692***
	(310)	(248)	(309)	(248)
Age (squared)	-86***	-62***	-85***	-61***
	(3)	(3)	(3)	(3)
Constant	-79,060***	-51,989***	-84,733***	-56,797***
	(7,507)	(6,052)	(7,452)	(6,011)
Observations	78,425	76,993	78,425	76,993
Number of households	8,817	8,639	8,817	8,639

Each regression includes year and state dummy variables, and filing unit fixed effects. Maximum weekly UI benefits is in hundreds of dollars. Standard errors are clustered at the filing unit level.

Table 4: Fixed Effect Regression Results, Non-Wage Income

	Non-Wage Income	Capital Gains	Self-Emp. Income	Retirement Distributions	Tax on Ret. Plans
	(1)	(2)	(3)	(4)	(5)
First Unemployment Spell	876***	8	17	2,562***	51***
	(301)	(16)	(52)	(100)	(3)
Later Spells	-64	38**	-352***	1,140***	42***
	(331)	(19)	(60)	(112)	(3)
Post-First UI Spell	1,349**	3	700***	382***	-4
	(570)	(23)	(74)	(105)	(3)
Age	-491***	28***	92***	-623***	7***
	(176)	(9)	(31)	(50)	(1)
Age (squared)	8***	-1***	-1***	9***	-0***
	(2)	(0)	(0)	(1)	(0)
Constant	10,873***	276	-636	10,878***	-146***
	(3,555)	(187)	(679)	(991)	(23)
Observations	161,473	161,473	161,473	161,473	161,473
Number of households	16,945	16,945	16,945	16,945	16,945

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

Table 5: Fixed Effect Regression Results, Non-Wage Income, With UI Generosity Controls

	Non-Wage Income	Capital Gains	Self-Emp. Income	Retirement Distributions	Tax on Ret. Plans
	(1)	(2)	(3)	(4)	(5)
First Unemployment Spell	1,701	71	225	655*	41***
	(1,102)	(55)	(188)	(377)	(10)
Post-First UI Spell	1,360**	2	700***	388***	-4
	(563)	(23)	(74)	(105)	(3)
Later Spells	-559	112	-41	533	50***
	(1,354)	(71)	(238)	(453)	(14)
Max WBA	602	-15	162***	-128	-1
	(459)	(20)	(59)	(83)	(2)
Max WBA × First Spell	-218	-17	-55	518***	3
	(275)	(15)	(49)	(103)	(3)
Max WBA × Later Spells	120	-18	-78	154	-2
	(375)	(18)	(59)	(112)	(3)
Age	-556***	30***	75**	-612***	7***
	(190)	(9)	(32)	(50)	(1)
Age (squared)	8***	-1***	-1***	9***	-0***
	(2)	(0)	(0)	(1)	(0)
Constant	11,442***	255	-509	10,850***	-147***
	(3,581)	(187)	(680)	(993)	(23)
Observations	161,473	161,473	161,473	161,473	161,473
Number of ssnp	16,945	16,945	16,945	16,945	16,945

Each regression includes year and state dummy variables, and filing unit fixed effects. Maximum weekly UI benefits is in hundreds of dollars. Standard errors are clustered at the filing unit level.

Table 6: Heterogenous Non-Wage Income Responses, by Age

	Household Wages (1)	Non-Wage Income (2)	Capital Gains (3)	Self-Emp. Income (4)	Retirement Distributions (5)	Tax on Ret. Plans (6)
Panel A. No UI Generosity Controls						
Primary at most 40 years old at start of unemployment spell						
(N = 33,644 observations for 4420 households)						
Unemp	-13,656***	955***	-1	84	1,197***	46***
	(606)	(307)	(30)	(104)	(146)	(5)
Post-Unemp	-9,640***	1,353***	23	778***	-426**	-13***
	(885)	(422)	(45)	(147)	(166)	(5)
Primary over 40 years old at start of unemployment spell						
(N = 40,982 observations for 4446 households)						
Unemp	-16,894***	1,606**	86*	260**	4,345***	69***
	(658)	(676)	(48)	(106)	(253)	(6)
Post-Unemp	-14,669***	1,974*	29	1,215***	661**	10
	(956)	(1,088)	(66)	(177)	(276)	(6)
Panel B. With UI Generosity Controls						
Primary at most 40 years old at start of unemployment spell						
(N = 33,644 observations for 4420 households)						
Unemp	-8,140***	-572	-45	197	268	37**
	(1,553)	(1,022)	(81)	(378)	(556)	(18)
Post-Unemp	-9,518***	1,378***	23	780***	-413**	-13***
	(878)	(419)	(45)	(147)	(166)	(5)
MaxUI	4,063***	417	-9	83	177	3
	(806)	(384)	(40)	(124)	(126)	(4)
Unemp · MaxUI	-1,473***	419*	12	-30	254*	2
	(423)	(253)	(23)	(102)	(151)	(5)
Primary over 40 years old at start of unemployment spell						
(N = 40,982 observations for 4446 households)						
Unemp	-10,764***	3,851*	347**	526	1,474	74***
	(2,244)	(2,193)	(157)	(399)	(981)	(21)
Post-Unemp	-14,637***	1,969*	27	1,217***	670**	10
	(954)	(1,083)	(66)	(177)	(276)	(6)
MaxUI	3,309***	179	-55	138	-77	-0
	(968)	(1,238)	(56)	(132)	(203)	(5)
Unemp · MaxUI	-1,629***	-605	-71*	-71	775***	-1
	(602)	(568)	(41)	(103)	(263)	(6)

Each regression includes year and state dummy variables, demographic controls, and filing unit fixed effects. Maximum weekly UI benefits is in hundreds of dollars. Standard errors are clustered at the filing unit level.

Table 7: Comparison of SIPP Unemployment Spells With and Without UI Receipt

	Received UI?		
	Yes	No	No, Eligible
	(1)	(2)	(3)
Mean Spell Length, Weeks	29.9	19.6	20.1
Characteristics of Individuals			
Average Age	41.5	39.3	38.4
% Married	54.2	51.1	49.2
% Female	40.5	46.2	38.0
% Homeowner	62.4	54.7	51.0
% Working $\geq$ 35 Hours, Pre-Unemp	78.0	59.6	72.7
Own Monthly Earnings, Pre-Unemp	2946	2124	2630
Family Income,12 Months Pre-Unemp			
Total Family Earnings	55,612	49,574	49,294
Number of Spells	15,215	35,979	4825

This table relies on data drawn from the 2001, 2004, and 2008 panels of the Survey of Income and Program Participation. Dollar amounts are in real 2009 dollars. All means in column 2 are statistically different from corresponding means in column 1 at the 1% level, and all means in column 3 are statistically different from corresponding column 1 means at the 1% level

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 are consistent within $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 is 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.

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 7 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 pension and annuities accounts (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 not all of this income is 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 SS retirement benefits from OASI and too old to be receiving survivor benefits paid to children. This leaves DI payments and survivor benefits paid to widowed parents caring for children under age 16. Over the years that we analyze, DI 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/table`
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 (WBA): The maximum weekly benefit amount available under the UI system is a summary measure of the benefit generosity he faces. 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/unemplo
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.