The Insurance Role of Household Labor Supply for Older Workers

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Abstract

In this paper, we explore and compare how older and younger couple house- holds use adjustments in the wife's labor supply to mitigate the effects of negative shocks to the husband's employment status. Using difference-in-differences match- ing methods, we document a substantial added worker effect for younger house- holds. However, the wives of older men do not increase employment in response to their husbands' negative employment shocks. Instead, in older households, fe- male unemployment increases. These results are consistent with older women being constrained by the labor market in the extent to which they can adjust their labor supply to mitigate the effects of spousal employment shocks. Our findings suggest that spousal labor supply is not an effective intra-household insurance device for older households.

Citation

1 Introduction

Previous studies have documented the patterns of employment, wages, unemployment and other labor market outcomes over the life-cycle (see, e.g., Maestas and Zissimopoulos, 2010). Older workers are generally found to have less favorable labor market outcomes than their younger counterparts. Among other age-based inequalities, the older workers are subject to greater employment risk than younger workers. In particular, while layoffs and displacements are not strongly age-related (see Farber et al., 1993), the earnings loss associated with displacement increases with age (Rodriguez and Zavodny, 2002; Farber, 2005; Couch et al., 2009). Further, older workers experience longer post-job-loss unemployment spells than their younger counterparts (Chan and Stevens, 2001). The welfare and policy implications of the relatively high level of employment risk experienced by the older population depend critically on the extent to which older households are able to use either public or intra-household insurance instruments to *ex post* insure against job loss and the associated subsequent unemployment spell.

Critically, a couple household may be able to adjust the secondary earner's labor supply to cushion the impact of the primary worker's job loss. While not focused specifically on older workers, an existing literature provides empirical evidence on the insurance function of the secondary earner's labor supply. In particular, several studies document an 'added worker effect,' whereby the labor supply of the secondary earner, typically the wife, increases when the primary earner is subject to an earnings shock or an employment shock (see, for example, Mincer, 1962, Heckman and MaCurdy, 1980, Lundberg, l985, Spletzer, 1997, Cullen and Gruber, 2000).[1] Stephens Jr. (2002) takes a longer-term perspective and shows that a husband's job displacement leads to a prolonged increase in his wife's expected earnings and likelihood of employment. More recently, Blundell et al. (2012) demonstrate a consumption-smoothing role for household labor supply.

Given the relative severity of employment risk for older workers, it is important to know if spousal labor supply provides an insurance channel for older households,

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[1]Meanwhile, Layard et al. (1980) and Maloney (1987) find no evidence of an added worker effect.

or whether instead the aggregate added worker effects reported previously pertain only to younger households. Taking this as motivation, in this paper we explore and compare how older and younger couple households use adjustments in the wife's labor supply to mitigate the effects of negative employment shocks. Beyond the disaggregation according to age, we extend existing work in two further respects. First, in addition to looking at the wife's employment response, we distinguish between unemployment and nonparticipation. By looking at how the likelihood of the wife being unemployed changes following her husband's employment shock we gain insight into the extent that wives are constrained in their responses to their husbands' employment shocks. Combining with the age-based analysis, we compare the different extents that older and younger households are constrained by the labor market in their use of the wife's labor supply to smooth the impact of the husband's employment shocks. Second, in contrast to previous work using measures of annual labor supply, we use monthly information on husbands' and wives' labor market outcomes. By doing so, we are able to examine the household labor supply response in the months immediately after the husband's negative employment shock. This analysis informs on the time required before any smoothing effect of the wife's labor supply appears, and on the time that the effect persists.

Our empirical analysis uses difference-in-differences matching methods, applied to a sample of couple households drawn from the 2003-2011 waves of the Panel Study of Income Dynamics. Focusing on negative employment shocks impacting on men, we estimate the effect of an employment shock on a man's own labor market outcomes and on his wife's labor market outcomes. We find a substantial added worker effect for younger households. However, the wives of older men do not increase employment in response to their husbands' negative employment shocks. Instead, in older households, female unemployment increases and nonparticipation decreases. The latter results are consistent with older women being constrained by the labor market in the extent to which they can adjust their labor supply to mitigate the effects of spousal employment shocks. In a further round of analysis, we investigate how wives' adjustment in employment behavior impacts on household nonwork, defined as the situation where neither spouse is in employment. For younger house-

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holds we find that less than half of the added worker effect is located in households in which the husband is not in employment, suggesting that the smoothing or insurance role of wives' labor supply is more limited than that suggested by the added worker effect in isolation. For older households, we see neither an added worker effect overall nor an added worker effect within households in which the husband is slow in returning to employment.

This paper proceeds as follows. In Section 2 we describe our sample. Section 3 provides an overview of the adopted differences-in-differences matching estimator. Section 4 contains our primary results. Section 5 concludes and discusses some possible directions for future analysis.

2 Data & Sample

Our analysis uses a sample of married and cohabiting households drawn from the 2003, 2005, 2007, 2009, and 2011 waves of the Panel Study of Income Dynamics (PSID). In contrast to existing work on the added worker effect, we use monthly information about each spouse's labor market status.[2] In more detail, in each of these five waves of the PSID households, we asked them to report each spouse's labor-market status in each month of the previous calendar year. Based on this information, we distinguish three labor-market states: employment, unemployment, and nonparticipation. We organize the data such that, in each month, an individual is allocated to one and only one of these three states. In particular, an individual who reports any form of employment during the month is allocated to employment, irrespective of reporting both reported unemployment and reported nonparticipation at the same time. An individual reporting unemployment at any point during the month is allocated to unemployment provided that no employment was reported during the month. Nonparticipation provides the residual category. Figure 1 illustrates the labor market outcomes of our sampled married men and women over the life-cycle. In addition to information on these three labor market outcomes, the sample contains measures

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[2]Although sample contains both married and cohabiting couples, we refer to the household members as 'spouses,' and we refer to the male and female household member as 'husband' and 'wife.'

of individual demographics, namely age and years of education, and the household's current state of residence.
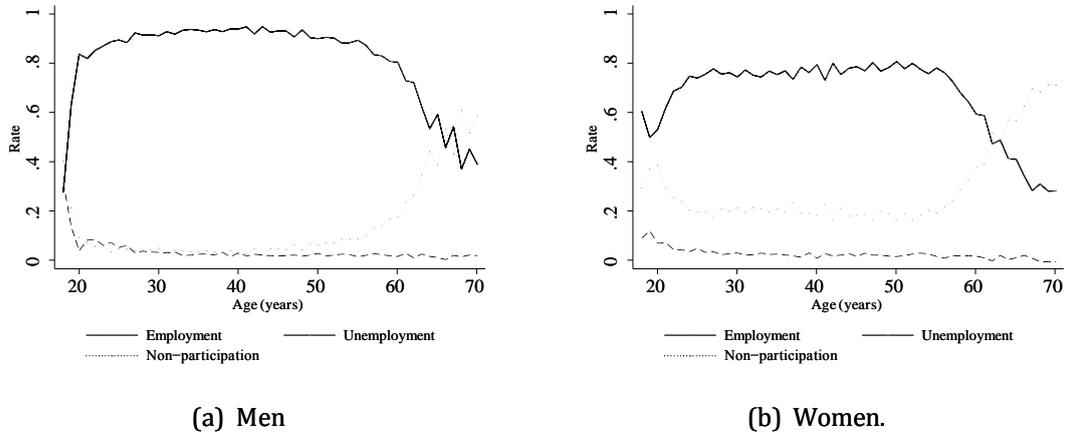

(a) Men   (b) Women.

Figure 1: Labor market outcomes over the life-cycle.

Before proceeding, we discuss three important features of our measures of labor market outcomes. First, the PSID survey instruments describe unemployment as "not working and looking for a job." Thus, the survey design helpfully draws a clear and grounded distinction between unemployment and nonparticipation. Second, while retirement is not distinguished as a separate labor market state, retired individuals appear in our analysis as nonparticipants; the increase in nonparticipation at older ages seen in Figure 1 is partly driven by retirement. Third, by defining someone as employed if they worked in any job during the month we mechanically obtain a higher rate of employment than if the employment measure was based instead on labor-market status at a particular point in time. Importantly, by organizing the data in this way we abstract from very short unemployment spells, and focus instead on responses to unemployment spells that involve at least a month without work. These prolonged spells, rather than transient spells lasting less than a month, are the forms of employment risk that are most likely to be mitigated by an adjustment in the spouse's labor supply. Figure 6 in the Appendix compares the unemployment rate in our sample with that observed in the Current Population Survey (CPS). Despite the previously noted level difference, the unemployment rate in our sample closely tracts that seen in the CPS sample.

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3 Methodology

We use matching methods to estimate the effect of a husband being subject to a negative employment shock on his subsequent labor-market outcomes and on his wife's contemporaneous and subsequent labor-market outcomes. In particular, we apply the Difference-in-Differences (DID) matching estimator of Heckman et al. (1997) and Heckman et al. (1998). In our context, the DID matching estimator entails a comparison of the change in labor market outcomes of wives around the time that their husbands were subject to a negative employment shock with the change-in-labor market outcomes over the same time period of wives whose husbands remained in employment. This comparison of differences is conditioned on individual and household characterizes, X.

More formally, those households in which the husband transitions from employment at $t = 0$ into unemployment at $t = 1$ are deemed to have suffered a negative employment shock, and form the treatment group. Those households in which the husband is employed at $t = 0$ and $t = 1$ form the control group.[3,4] Define a treatment indicator D as follows: $D = 1$ if the husband was subject to a negative employment shock at $t = 1$; and $D = 0$ otherwise. Using the Roy-Rubin potential outcomes framework (Roy, 1951; Rubin, 1974), $Y_t^s(0)$ for $s = H, W$ denotes spouse s's time-t labor-market outcomes in the absence of the husband receiving an employment shock at time $t = 1$. We are interested in the effect of a husband receiving an employment shock at $t = 1$ on his own or his wife's labor market outcomes, that is:

$$Y_t^s(1) - Y_t^s(0) \text{ for } t \geq 0. \tag{1}$$

Our analysis uses a DID matching estimator that requires the following identifying

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[3]Thus, we do not distinguish between the different underlying reasons for a transition from employment into unemployment, e.g., layoff, displacement, or voluntary quit due to a decline in wages. Instead, we treat all such events as negative employment shocks. We do, however, distinguish nonparticipation from unemployment, and therefore transitions out of the labor force are not considered negative employment shocks.

[4]This definition of the control group reasonably assumes that an individual entering unemployment would have been employed in the absence of an employment shock. Relatedly, note that households in which the husband was not in employment at $t = 0$ and those households in which the husband transitioned out of the labor force at $t = 1$ are in neither the treatment group nor the control group.

assumption:

$$E[Y_t^s(0) - Y_0^s(0)|P(X), D = 1] = E[Y_t^s(0) - Y_0^s(0)|P(X), D = 0] \text{ for } t \geq 1, \quad (2)$$

where $P(X)$ denotes the propensity score, i.e., $P(X) = Pr(D = 1|X)$. Given (2), and further assuming $0 < P(X) < 1$, the following estimator can be obtained:

$$ATT_{DID-Matched} = \frac{1}{N_T} \sum_{\substack{i=1 \\ [D_i=1]}}^{N} \left(\Delta Y_{i,t}^s(1) - \widehat{E}\Delta[Y_{i,t}^s(0)\,|P(X_i), D_i = 0] \right), \quad (3)$$

where $\Delta Q_t \equiv Q_t - Q_0$. We estimate the matched outcome using the average of the outcomes of the x "nearest neighbours." Mathematically:

$$\widehat{E}[\Delta Y_{i,t}^s(0)\,|P(X_i), D_i = 0] = \frac{1}{x} \sum_{j \in A_x} \Delta Y_{j,t}^s(0), \quad (4)$$

where A_x is the set of control observations with the lowest values of $|P(X_i) - P(X_j)|$. Our implementation uses $x = 25$.[5]

The adopted DID matching estimator delivers an estimate of the average effect of a husband receiving an employment shock at $t = 1$ on his own or his wife's labor-market outcome at time t for those households in which the husband actually experienced a negative time-1 employment shock (i.e., the Average effect of the Treatment on the Treated). Note, this identifying restriction (2) pertains to the change in a spouse's labor market status since the date of the husband's employment shock. When the outcome variable refers to the wife, i.e., $s = W$, the DID matching estimator allows unobserved time-invariant differences between the treated and control households in the level of wife's potential labor market outcomes. The DID matching estimator is therefore robust to intrahousehold dependencies between the husband's employment risk and the systematic component of his wife's labor market outcomes that may arise from, e.g., assortative mating.[6]

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[5]Any ties are broken randomly.

[6]Given the above definitions of the treatment and control groups, all husbands are initially employed, irrespective of treatment status. Therefore, when outcome variables instead pertains to the husband, i.e., $S = H$, the DID matching and matching estimators coincide.

3.1 Spell Construction and Propensity Score Estimation

For the purpose of studying the effect of a negative employment shock on household labor supply, we form an inflow sample of husbands' unemployment spells. Specifically, working one month at a time, we search through our sample of couple households and identify all households observations in which the husband transitioned from employment in the previous month into unemployment in the current moment; these observations form the inflow sample of husbands' unemployment spells, and constitute the treatment group. We attach to each spell various variables measuring household outcomes and characteristics, including the subsequent labor-market outcomes of the two spouses, wife's labor-market outcome in the previous month (this variable is required by the adopted Difference in Differences Matching estimator, see Section 3), and measures of the husband's and wife's employment behavior in the 24 months prior to the spell start date. Our inflow sample contains 692 spells. We form the control group in a similar fashion: Working one month at a time, we identify all household observations in which the husband was employed in the previous month and is also employed in the current month. We attach to each control observation the same variables measuring household outcomes and characteristics as selected for the treated observations.[7]

Using a Logit model, we estimate separate propensity score functions for men aged younger than 40 years at the time of treatment and men aged 40 years or older at the time of treatment. The variables X that appear in the propensity score comprise indicators of: the husband's age (rounded down to the nearest even year); the husband's years of education; the wife's years of education; the time of treatment (measured in months); and the household's state of residence. We also include measures of the husband's and wife's employment behavior during the 24 months prior to the spell start date. All variable measures pertain to the month before the husband's employment shock.

Figure 2 shows the histograms of the log odd ratio of the estimated propen-

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[7]There are many more control observations than treated observations. To maintain manageability, we select a random 5% of control observations for use in the matching analysis. We use probability weights when estimating the propensity score to adjust for this under-sampling of the control group.

sity score, split by treatment status and age at the time of treatment. For both age groups, the support of the distribution of the estimated propensity score for the control observations overlaps the support of corresponding distribution for the treated observations.[8] There are substantial and significant difference between the treatment and control groups in terms of observed characteristics such as age, education, and employment history. However, by conditioning on the estimated propensity score, we are successful in balancing observed characteristics: Based on a Likelihood Ratio test, we do not reject the joint hypothesis of the equality between the treatment sample and the sample of matched controls in the means of 13 characteristics.

(a) Treated aged<40 years.

(b) Controls aged<40 years.

(c) Treated aged≥40 years.
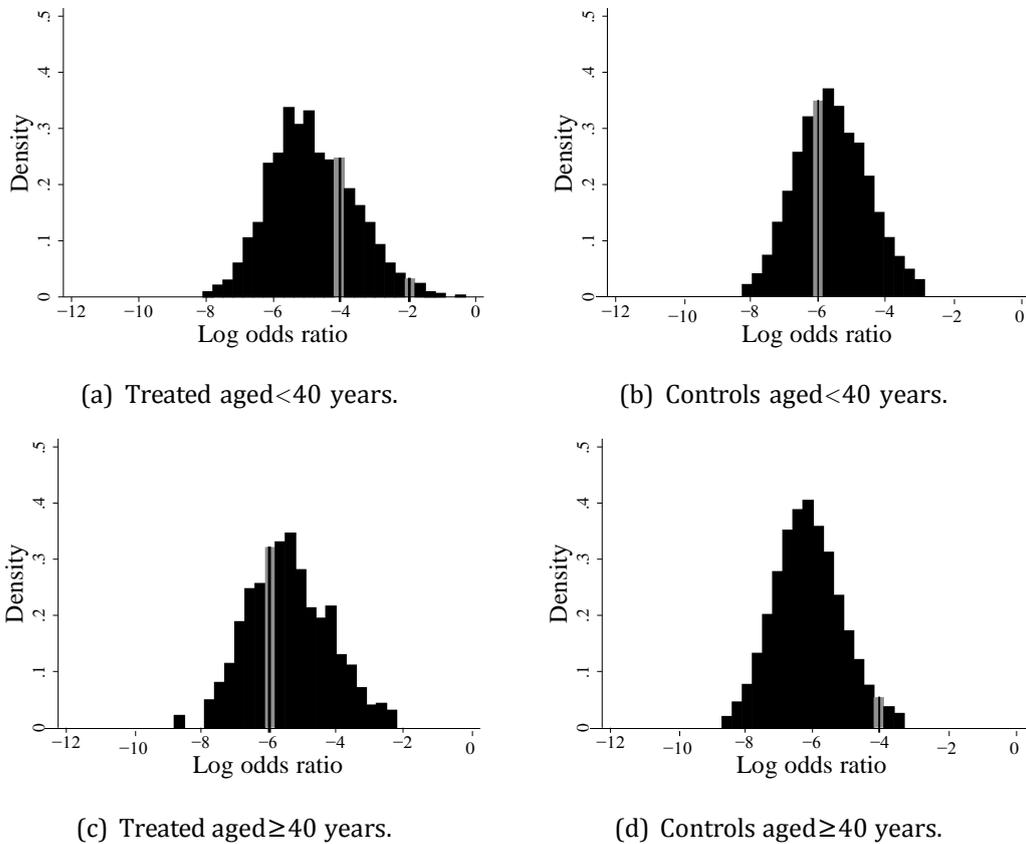
(d) Controls aged≥40 years.

Figure 2: Log odds ratio of the estimated propensity score.

Due to the biennial nature of the PSID during the period of our study, we have very few observations at 9-17 months after an employment shock. Given this, we group our observations according to the elapsed duration since the husband's

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[8]The results reported in the main text were obtained without restricting matches by setting a caliper value. In the Appendix we show that our results are robust to imposing a caliper value of 0.005 and restricting to the range of common support.

employment shock, and study outcomes at the following time points, i.e. in the month of the husband's employment shock, at 1-2 months after, 3-5 months after, 6-8 months after, 18-23 months after, and 24-29 months after.

4 Results

We first study how the labor market outcomes of cohabiting men are impacted by a negative employment shock that shifts the man from employment into unemployment. Next, we examine how the same shock impacts on wives' labor market outcomes. Throughout our analysis, we distinguish between younger households, defined as those households in which the man is younger than 40 years old when he be- comes unemployed, and older households, in which the man is aged 40 years or older at the start of his unemployment spell. In doing so, we uncover an interesting life-cycle dimension of the nature of the household response to employment shocks.
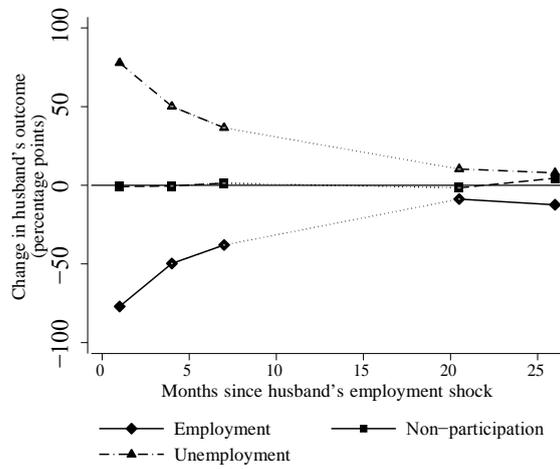
4.1 Husbands' Labor Market Outcomes

Figure 3 shows how husbands' labor-market outcomes adjust following a shock to their own employment that moves them from employment into unemployment. For both younger households and older households, employment shocks lead to a prolonged increase in unemployment and a persistent reduction in employment. Interestingly, we do not see an impact on the rate of nonparticipation.[9] Figure 3(c) compares the responses of older and younger men. In the spirit of the results of Chan and Stevens (2001), we find that employment shocks are more detrimental to employment outcomes of older men than for younger men. In particular, in the year following the employment shock older men are around 5-7 percentage points less likely to be in employment than their younger counterparts.
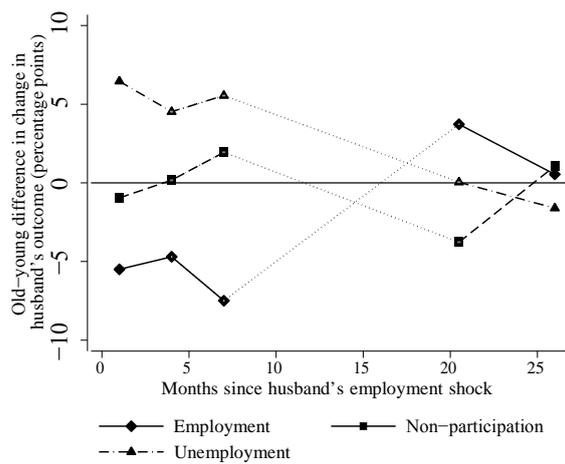
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[9]Note, this result does not exclude the possibility that retirement behavior responds to employment shocks. Specifically, we cannot rule out the possibility that employment shocks cause men to move from being a nonretired, nonparticipant to being a retired, nonparticipant.
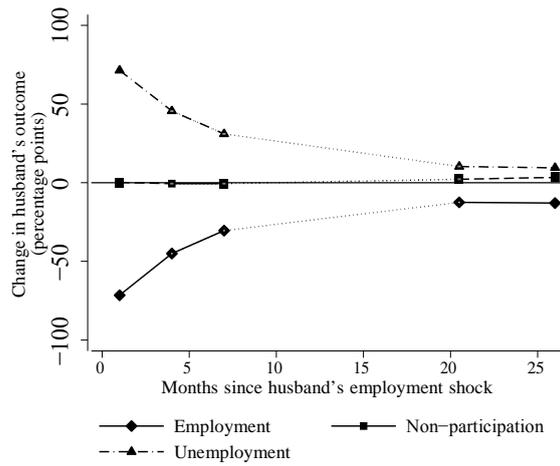
(a) Younger households.
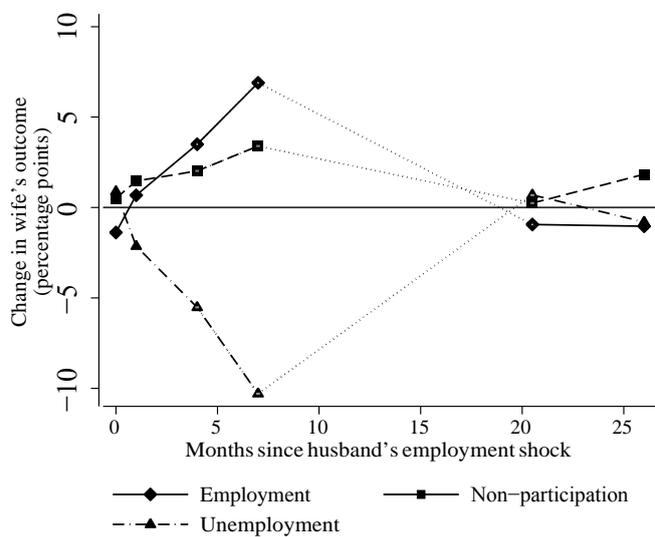

(b) Older households.

(c) Difference in responses between older and younger households.

Figure 3: Husbands' labor-market outcomes following own negative employment shocks.
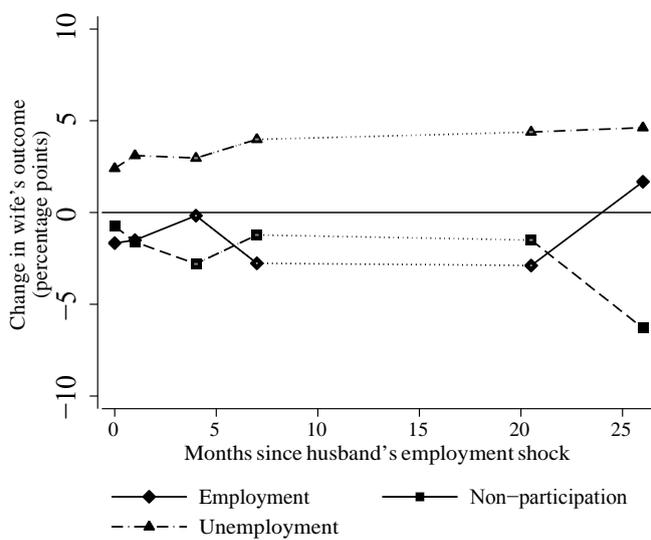
4.2 Wives' Labor Market Outcomes

Figure 4 illustrates our DID-matching estimates. Looking first at younger house-holds, defined as those households in which the man is younger than 40 years old at the time of the shock, we see that the wives' employment rate does not respond immediately when her husband experiences an employment shock. However, a positive added worker effect is observed starting at one month after the employment shock. The added worker effect increases steadily in the months following the husband's employment shock: eight months after the husband's employment shocks the wife is around eight percentage points more likely to be in employment as compared to if her husband had not experienced an employment shock. At 18 months subsequent to the husband's employment shock the added worker effect has disappeared. The positive added worker effect for younger households is balanced by a decrease in unemploy- ment, an effect that is consistent with married women dropping their reservation wages or increasing search intensity in response to their husbands being subject to an employment shock.

A contrasting pattern of response is observed for wives in older households, de- fined as those households in which the man is aged 40 years or older at the time of the negative employment shock. In particular, for older households, no added worker effect is observed. Instead, following the husband's employment shock the wives' unemployment rate increases, with a roughly offsetting effect on the rate of nonparticipation. These findings suggest that older cohabiting women would like to use their own labor supply to mitigate the effect of their husbands' entry into unemployment, but are constrained by the labor market in their ability of realizing their desired employment status.

(a) Younger households.

(b) Older households.

Figure 4: Wives' labor-market outcomes following husbands' negative employment shocks.

4.3 Further Exploring the Smoothing Role of Wives' Labor Supply

An increase in the wife's employment in response to her husband's negative employment shock is a particulary valuable intrahousehold insurance device if the adjustment occurs when the husband has not yet returned to employment; in this case the wife's adjustment moves the household from being a zero-earner household to being a one-earner household. In contrast, increases in the wife's employment that occur when the husband has returned to employment increase the household income when there is already an income stream from the husband's employment and, therefore, are less focused on mitigating the extreme consequences of a spousal employment shock. In this final section, we explore how the likelihood of household nonwork, i.e, the situation where neither spouse is employed, is impacted by the wife's adjustment in her employment status following her husband's negative employment shock.

The quantity of interest is:

$$(Y_{i,t}^H(1)Y_{i,t}^W(1) - Y_{i,t}^H(0)Y_{i,t}^W(0)) - (Y_{i,t}^H(1)Y_{i,0}^W(1) - Y_{i,t}^H(0)Y_{i,0}^W(0)), \qquad (5)$$

where Y is now an indicator of nonwork, defined to include both unemployment and nonparticipation. The first term in (5) is the effect of the husband's negative employment shock on household nonwork when the wife's labor supply is free to adjust from its preshock, i.e., $t = 0$, level. The second term in (5) is the effect of the husband's negative employment shock on household nonwork when the wife's labor supply is held at its pre-shock, i.e., $t = 0$, level. The sum difference of these two terms therefore represents the effect of the wife's employment adjustment following her husband's negative employment shock on household nonwork. Rearranging (5) gives:

$$Y_{i,t}^H(1)\Delta Y_{i,t}^W(1) - Y_{i,t}^H(0)\Delta Y_{i,t}^W(0). \qquad (6)$$

Assuming:

$$E[Y_{i,t}^H(0)\Delta Y_{i,t}^W(0)|P(X), D = 1] = E[Y_{i,t}^H(0)\Delta Y_{i,t}^W(0)|P(X), D = 0], \qquad (7)$$

the following propensity score matching estimator can be derived:

$$ATT_{Non-work} = \frac{1}{N_T} \sum_{\substack{i=1 \\ [D_i=1]}}^{N} \left(Y_{i,t}^H(1)\Delta Y_{i,t}^W(1) - \widehat{E}[Y_{i,t}^H(0)\Delta Y_{i,t}^W(0)\,|P(X_i), D_i = 0]\right),$$

(8)

where the matched outcome is estimated as described in Section 3. Note, the identifying restriction given by (7) pertains to an interaction of the spouses' outcomes and, therefore, is a restriction on the second moment of outcomes, rather than the previously utilized mean restriction. Further, note that the identifying restriction refers to the change in the wife's behavior, and hence we maintain robustness to time-invariant unobservables specific to the wife's outcomes.

Figure 5(a) and Figure 5(c) show the effect of the husband's negative employment shock on the level of household nonwork for, respectively, older and younger households. For both age groups, a negative employment shock increases the level of nonwork at the time of the shock by around 35 percentage points. The effect of shock on nonwork falls over the following months, and at two years after the shock, the effect on household nonwork is less than 5 percentage points. Figure 5(b) shows that for younger households the wife's employment adjustment reduces household non-work by around three percentage points at eight months after than husband's negative employment shock. Recall, the added worker effect at this post-shock duration is around seven percentage points, so only around 40% of the total added worker effect is located in households in which the husband is not working. In other words, for younger households, added worker effect is not concentrated in households in which the man is slow in returning to employment. For older households, illustrated in Figure 5(d), any female employment adjustment has little impact on household nonwork. Thus, for older households we see neither an added worker effect overall or an added worker effect within households in which the husband is slow in returning to employment.[10]

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[10]Note, in principle, it is possible that changes in the employment outcomes of wives reduce household nonwork while not giving an added worker effect on average (this would happen if women with working husbands dropped out of employment and women with nonworking husbands moved into employment).
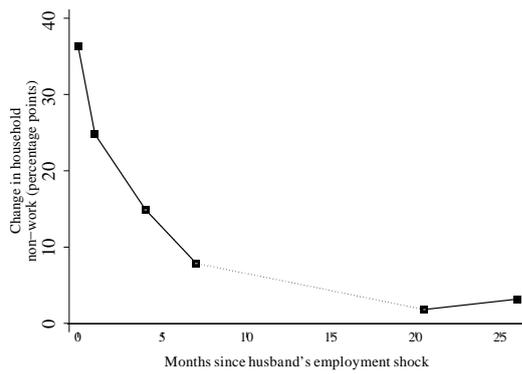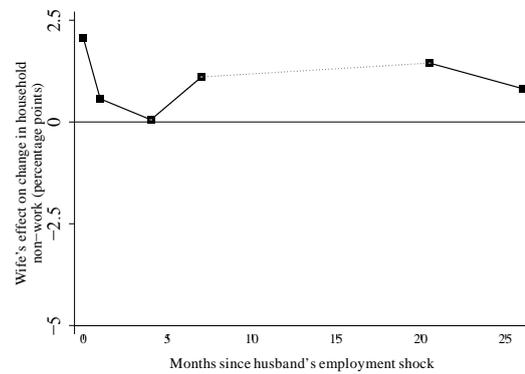
(a) Household nonwork: younger households.
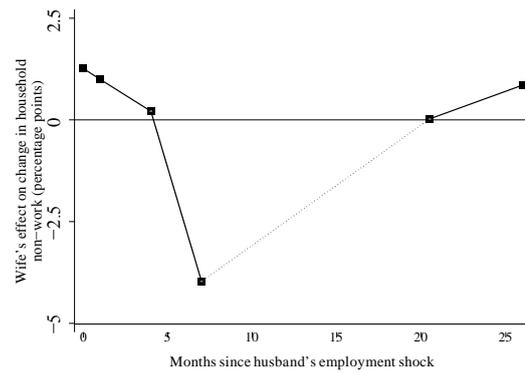
(b) Effect of wife's employment adjustment on household nonwork: younger households.
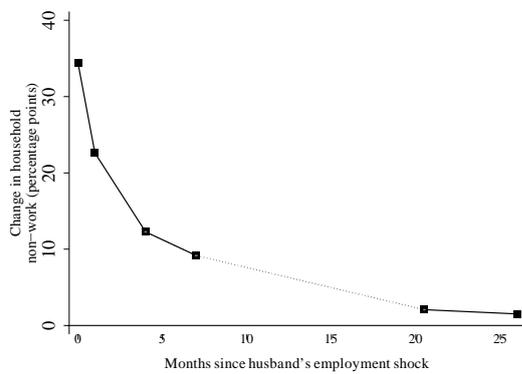
(c) Household nonwork: older households.

(d) Effect of wife's employment adjustment on household nonwork: older households.

Figure 5: Household nonwork following husbands' negative employment shocks, and effect of wives' employment adjustment on household non-work.

5   Conclusion

In this paper, we have presented some preliminary results on the effects of husbands' negative employment shocks on subsequent own and spousal employment, unemployment and nonparticipation. Our key findings are as follows: An added worker effect is observed for younger households, but not for older households; the added worker effect is absent in the month of the shock, but increases steadily during the following eight months, reaching seven percentage points; in older households the wives' unemployment rate increases following the husbands' negative employment shocks, and labor force nonparticipation decreases, suggesting substantial constraints on employment options of older women; and less than half of the added worker effect for younger households is concentrated in households in which the husband is not working.

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We stress the preliminarily nature of these results. Many extensions and refinements are called for. In particular, we would like to include formal tests for the differences between older and younger workers, as well as statistical significance for the remaining effects. Statistical tests that do not adjust for estimation of the propensity score or for clustering at the household level suggest that the effects stressed in the main text are significant, and in general we can detect significance of the effects with magnitude of 2-4 percentage points. Finally, in terms of the underlying economics, we are still to formalize the mechanisms behind the above-reported variation over the life-cycle in the household response to employment shocks.
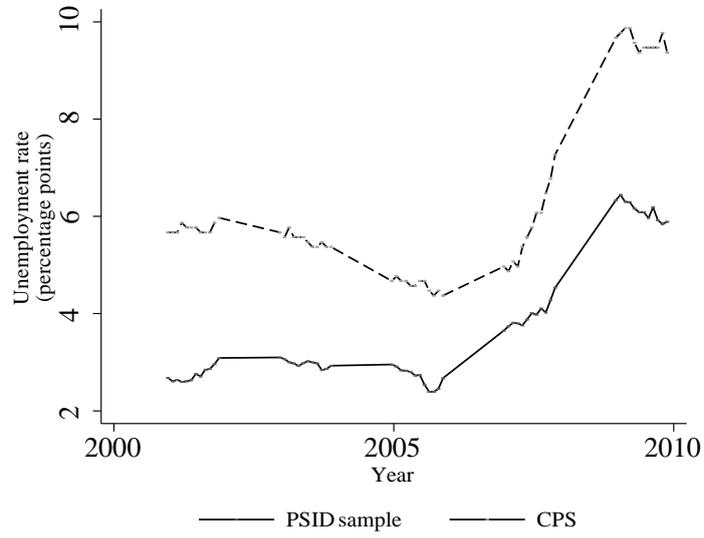
Appendix

Comparison of Unemployment Rates

Figure 6: Comparison of unemployment rates: 2002-2010.
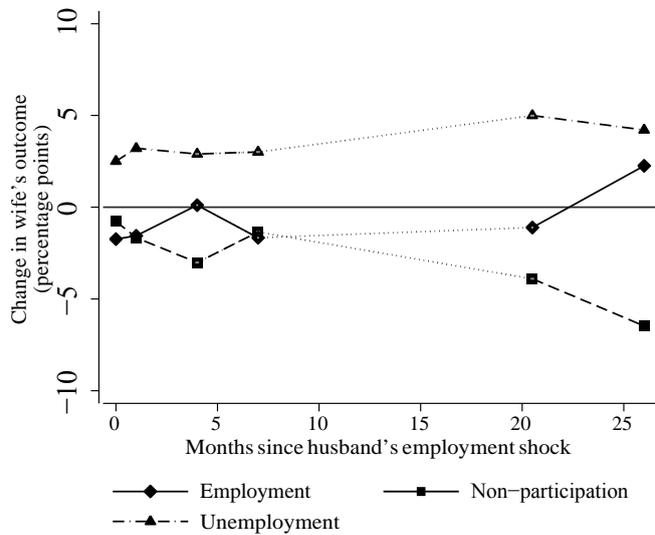
Robustness Checks

The results reported above were obtained by matching to the 25 nearest neighbors, without further regard for the distance between the treated observations and matched controls. We check the robustness of our results to the matching method by rerunning the estimations underlying the results presented in Figure 4 using caliper value of 0.005 and restricting the observations with estimated property scores in the range of common support. A comparison of Figure 4 and the estimates from this robustness check, illustrated in Figure 7, shows that our results are not sensitive to the use of the more restrictive matching method.[11]

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[11] Our ability to match successfully in part reflects that an employment shock is a low probability event, and therefore the number of control observations is many times larger than the number of treated observations.
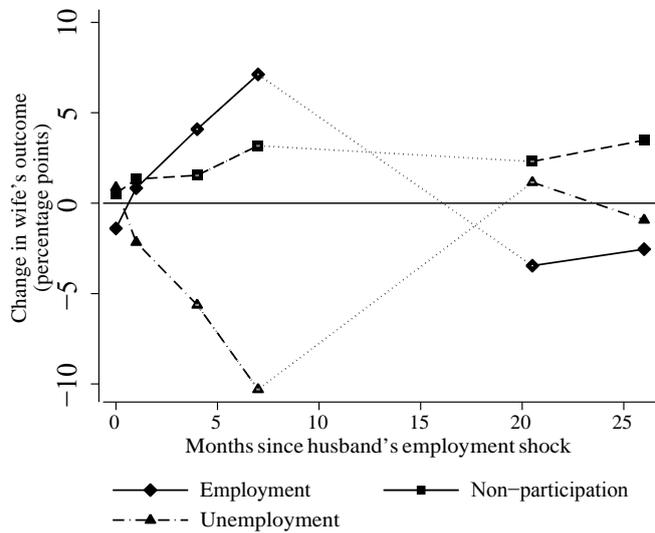
(a) Younger households.

(b) Older households.

Notes: Matching uses caliper value of 0.005 and is restricted to the range of common support.

Figure 7: Robustness check: Wives' labor market outcomes following husbands' negative employment shocks.

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