For Better or For Worse: The Added Worker Effect in the 21st Century U.S.

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Abstract

The average Added Worker Effect (AWE) in the United States appears small. This paper shows that such muted estimates mask substantial heterogeneity across the life cycle and household structures. Using newly linked restricted administrative and census data from 2000–2022, I exploit mass-layoff events as exogenous shocks to identify involuntary job loss and its impact on spousal labor supply. Event study and matched difference-in-difference estimates reveal that younger spouses with children increase employment and earnings in response to displacement, consistent with a financially motivated AWE. In contrast, childless young female spouses often reduce labor supply, particularly when both partners work in the same industry, reflecting a "trailing spouse" dynamic. Among older couples, job displacement accelerates joint labor market exit, consistent with coordinated retirement. These findings highlight the role of age, parental status, and joint career dynamics in shaping household labor supply responses to job loss, and help reconcile why aggregate AWE estimates in high-income countries are small despite strong responses among population subgroups.

1 Introduction

Impact of job displacement rarely stops at the workers themselves. Behind each job loss, discussions on household-level adjustments necessarily take place. Standard models of household labor supply suggests that when one partner loses their job, the other may respond by entering the labor market or increasing work hours to help offset the income loss. This reaction - known as the added worker effect (AWE) - has been used to describe spousal labor supply adjustments in the face of household-level financial shocks. The AWE may play a critical role in household risk-sharing and consumption smoothing during the times of income volatility, especially when public insurance are not sufficient to cover the sudden and large drop of labor income (Lundberg, 1985; Cullen and Gruber, 2000). While intuitively and conceptually well-established (Woytinsky, 1940; Stephens, 2002; Blundell, 2018), earlier studies debated the empirical magnitude and heterogeneity of the AWE, partly due to limitations in data availability and identification strategies. More recent evidence suggest that the magnitude of the AWE is generally small in high-income countries (Anderson et al., 2020; Halla et al., 2020; Pruitt and Turner, 2019). This paper first provides U.S. estimates of the AWE that use mass-layoff events as plausibly exogenous shocks to identify involuntary job loss.[1][2] Then, I document and interpret heterogeneity in AWE responses across the life-cycle states. In doing so, I argue that the muted average AWE masks a composition of diverging behavioral responses across age groups as well as parental status. Household and labor market constraints create further nuanced responses within each population subgroup.

Many previous studies on the added worker effect in the U.S. rely on self-reported survey data, raising concerns over misclassified separations and limited ability to account for unobserved heterogeneity in households' labor supply responses (Maloney, 1991; Stephens, 2002; Birinci, 2021). More recent papers on the U.S. labor market have turned to administrative data and updated econometric tools to improve causal inference. For example, Pruitt and Turner (2019) use IRS tax return data and find a 1.3% increase in spousal labor force participation following a $100,000 earnings loss by husbands. It is worth noting that Pruitt and Turner (2019) focus on income shocks rather than job displacement, and the IRS data limit the authors' the ability to distinguish voluntary from involuntary separations. Kawano et al. (2025) make an improvement by combining IRS tax return data with unemployment insurance (UI) data, creating a better proxy for involuntary separation. Kawano et al. (2025) find that the relative earning status (primary vs.

[1] Disclaimer: Any views expressed are those of the authors and not those of the U.S. Census Bureau. The Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data used to produce this product. This research was performed at a Federal Statistical Research Data Center under FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

[2] This research uses data from the Census Bureau's Longitudinal Employer-Household Dynamics Program, which was partially supported by the following National Science Foundation Grants SES-9978093, SES-0339191 and ITR-0427889; National Institute on Aging Grant AG018854; and grants from the Alfred P. Sloan Foundation.

secondary) of the displaced worker plays a role in the direction of added worker response of their spouses. While secondary earner increase labor supply when primary worker experiences job loss, primary worker sees an earnings reduction when secondary earner is displaced. This study furthers understanding on the interaction between the AWE and intra-household specialization, and yet one should point out that although the majority of the UI recipients lost their jobs involuntarily, the UI recipient sample also include sizable proportion of workers who are job leavers, and those who are re-entrants (U.S. Bureau of Labor Statistics, 2022[3]). In addition, datasets used in Pruitt and Turner (2019) and Kawano et al. (2025) are both annual data and contain limited demographic or household structure information, making it difficult to analyze heterogeneity in spousal response across life stages or family types.

European studies have overcome some of these limitations by taking advantage of linked administrative datasets that track individuals across firms and households. One example being Halla et al. (2020), who use job loss from mass-layoff as well as establishment closure/shutdown, and observe a 1% increase in employment and 2% increase in earnings. They conclude that the AWE in Austria is driven by women with weak labor market attachment. Similarly, Andersen et al. (2020) examine Danish bank data and estimate a 0.5%-1.5% increase in earnings among female spouses after their partners' job displacement. Hardoy and Schøne (2014) examine Norwegian displacement events but identify no significant AWE overall, though they find some responses among previously part-time employed women. While these European studies provide more granular insights, they tend to restrict attention to female spouses and touches little on the underlying mechanisms or cross-household variation in AWE strength. As a result, we still lack a clear understanding of why some households exhibit strong added worker responses while others do not, and how these responses vary with household composition, life-cycle stages, or prevailing gender roles.

This paper addresses these gaps by using restricted U.S. administrative data on mass-layoffs as exogenous shocks to employment and earnings, thereby directly identifying the AWE from involuntary displacement events. I examine both male and female spouses, and document heterogeneity by age, as well as parental status. This paper thus provides new evidence on when and for whom the AWE arises - and when it does not. I hypothesize that, for younger households with children, tighter credit constraints and high baseline consumption needs heighten the urgency for income replacement in response to earnings shocks, leading to strong positive AWE (Blundell, et al., 2018). In contrast, for young childless couples, labor supply adjustments may reflect strategic considerations around joint career decisions and geographic mobility. In these cases, the non-displaced spouse may reduce labor supply to accommodate the displaced worker's re-employment, especially when they both work in similar industries (McKinnish, 2008). Among older couples, job displacement can trigger joint retirement or earlier labor force withdrawal. This is consistent with

[3]https://www.bls.gov/news.release/uisup.t01.htm

evidence that many couples derive utility from retiring together and value coordinated timing in labor supply decisions (Michaud et al., 2020). These competing mechanisms underscore that spousal labor supply responses are not uniform. Rather, they are likely shaped by household structure, age-related opportunity costs, caregiving responsibilities, and asymmetric gender roles in economic decision-making.

To better understand these channels and to reconcile the muted average AWE often found in developed economies, I use a combination of administrative, census and public survey data in the U.S., between 2000 and 2022. Specifically, I merge the Longitudinal Employer-Household Dynamics (LEHD) with the decennial censuses and the Integrated Longitudinal Business Database (ILBD) to construct a panel of displaced workers and their spouses, which allows cleaner identification of involuntary separations and facilitates the construction of a matched control group. Using mass-layoff events as an exogenous shock to employment and earnings, I estimate event study models and matched difference-in-difference specifications, including self-employment as a novel source of family insurance. To probe the underlying heterogeneous responses, I stratify the sample further by spousal age and presence of children at the time of the mass-layoff events, to examine differential patterns in labor market adjustment. Empirical results show that younger and older spouses respond differently to household job displacement due to life-stage-specific labor supply frictions. Younger spouses aged between 25 and 49 respond positively to displacement, on average. Among young parents, AWE decreases with the age of the youngest child and increases with the number of children, with the latter restraining responses in lower-income households due to limited financial buffer and substitution into childcare. However, childless younger spouses are typically not urged by the financial pressure to provide and are more flexible geographically, leading to little AWE among male spouses and negative labor market performance among female trailing spouses, especially when couple face correlated shock in the local labor market. Additionally, older spouses show signs of early retirement, particularly among those with lower labor market opportunities and higher household income.

This paper makes two main contributions to the body of AWE literature. The central contribution is to provide the first U.S. estimates of the AWE using restricted administrative micro-data. The employer-employee linkage of the LEHD data enables me to identify involuntary job loss via mass-layoff events, which improves upon prior U.S. studies that were unable to cleanly distinguish voluntary from involuntary separations. Second, it demonstrates that the muted average AWE conceals offsetting dynamics across households, offering a life-cycle interpretation of heterogeneity in spousal labor supply responses. The size and quality of the data allow exploration of extensive heterogeneity, so as to show that the estimated AWE fundamentally differs between younger and older families, due to labor supply frictions that are specific to each life stage. Positive adjustments among younger parents coexist with muted or negative responses among younger childless spouses and retirement-like exits among older spouses, which helps explain why aggregate

AWE estimates in high-income countries tend to be small. This study also explores underlying mechanisms behind the distinctive AWE response in each life cycle, such as childcare responsibilities, correlated shocks, trailing spouse mobility, financial cushioning and joint retirement. Although prior studies have documented heterogeneity in the AWE by sex, parental status, or household income (Stephens,2002; Halla et al., 2020), this paper is the first to systematically decompose the average AWE into competing dynamics. A further novelty is the linkage of restricted U.S. administrative data with census records, which incorporates the most comprehensive measures of spousal employment and earnings to date, including self-employment as a supplemental source of family insurance.

The remaining content of the paper is organized as follows: Section 2 describes the data and defines samples. Section 3 introduces the empirical methods. Section 4.1 and 4.2 present findings on the overall impact of displacement on the displaced workers and their spouses. Section 4.3 focuses on heterogenous effect by spousal age and parental status. Section 5 discusses policy implications and conclude.

2 Data and Sample Construction

2.1 Data Sources

This study uses a combination of U.S. administrative databases and censuses that are only accessible at the Federal Statistical Research Data Centers (FSRDC). The core dataset is the Longitudinal Employer-Household Dynamics (LEHD) program, which is a linked employer-employee database that covers over 95% of employees in the U.S. since the 1990s (Census Bureau, 2022). The LEHD data provide quarterly employment and nominal earnings records from federal tax filings and construct employee demographics based on social security administrative data. This study draw on LEHD data from 16 states, spanning all 4 census regions and 9 divisions to ensure geographic diversity and regional representativeness.[4] I am able to distinguish whether a worker has any earnings record in non-participating states. To supplement self-employment income, I incorporate the Integrated Longitudinal Business Database (ILBD), which includes Schedule C tax filings for sole proprietors and independent contractors that constitute the majority of self-employed workers in the U.S. (Census Bureau, 2024; U.S. Bureau of Labor Statistics, 2015).[5] To construct family structure, I link LEHD individuals to the 2000 and 2010 Decennial Censuses, identifying spousal and parental relationships. Individuals are matched across datasets using the Census Bureau's Protected Identification Key (PIK). In addition, I merge in several public-use datasets to control for labor market conditions and household costs, including state-level unemployment rates (BLS), childcare expenses (National Database of Childcare Prices),

[4] I have data access to the following 16 states: AL, AZ, CO, CT, IA, IN, KS, ME, NJ, OK, OR, PA, TN, VA, WA, WI.
[5] Examples include freelancers and gig workers.

Table 1: Data Sources and Contributions to the AWE Study

Data Source	Coverage / Structure	Contribution to Study
LEHD (Longitudinal Employer–Household Dynamics)	Quarterly worker–employer matched data; universe of UI-covered jobs; 2000–present	Identifies mass-layoff events; constructs worker and spousal work history panels for analysis of employment and earnings responses.
Decennial Censuses (2000, 2010)	Full population counts; household rosters	Used to construct family structure: identify spouses and find children born between 2000–2010, linking displacement events to household composition.
ILBD (Integrated Longitudinal Business Database)	Establishment-level longitudinal data	Provides a novel measure of recovery pathways by linking displaced workers to self-employment experiences.
NDCP (National Database of Childcare Prices)	Infant center-based childcare costs, 2008–present	Introduces variation in childcare costs to control for constraints on spousal labor supply adjustments.
BLS (Bureau of Labor Statistics)	State-level unemployment rates over time	Provides unemployment rates for measuring labor market conditions surrounding displacement.
DOL (U.S. Department of Labor)	State-level unemployment Insurance	Supplies measures of UI generosity, controlling for social safety net strength.

and unemployment insurance generosity (U.S. Department of Labor). The combination of these restricted administrative and census records offers a rich longitudinal panel on labor market outcomes and household structure, allowing for detailed analyses of spousal labor supply adjustments in response to job displacement. Table 1 summarizes all the data sources used, providing information on data coverage and how each dataset contributes to the analyses.

2.2 Define Mass-Layoffs and Displaced Workers

I define involuntary job loss using mass-layoff events at the state-firm level, which serves as the source of exogenous variation for identification.[6] Following Jacobson et al. (1993) and Lachowska et al. (2020), a mass-layoff occurs when a firm in a particular state experiences a 30% or greater reduction in employment over a four-quarter period. These quarters are labeled as "tm3" through "tm0," with the quarter immediately preceding this period marked as "tm4," during which a firm must have 50 or more employees to qualify as a mass-layoff firm. The restriction to the state-firm level ensures that large, multi-state employers are correctly captured by state-specific shocks rather than firm-wide reductions. Requiring a 50-worker employment level at the baseline naturally excludes smaller establishments, but it reduces noise from idiosyncratic exits and

[6]Many European studies, such as Illing et al. (2024) and Halla et al. (2020), use establishment-level mass-layoff events. This study uses state-firm level layoffs because establishment is imputed for workers in the LEHD data.

direct attention to systemic layoffs. A firm can undergo multiple mass-layoff events, but I focus on those that occurred between the first quarter of 2007 and the last quarter of 2017. This time frame ensures a consistent ten-year observation window around displacement for both affected workers and their spouses.[7]

I define displaced workers similarly to a firm, in a sense that a worker may experience multiple mass-layoffs over the course of their careers, though not necessarily within the same firm. At the time of separation, a worker needs to be between 25 and 55 years old, and with at least 12 quarters of tenure at the mass-layoff firm. This three-year tenure requirement follows Davis and von Wachter (2011), allowing me to include a broader set of workers, while capturing mid-career workers with reasonable attachment to the labor force.[8] I further categorize workers into eight super-sectors based on their pre-layoff firm.[9] I consider a worker separates from their current job when their current firm number differs from the firm number in the subsequent quarter, and a worker is considered mass laid-off if this separation occurs during the "tm3" through "tm0" period. I exclude seasonal workers, who are rehired into the same firm within four quarters after a mass-layoff, from the displaced worker sample.[10] If a worker experiences multiple mass-layoffs, I select the first event during the study period as the focus of the analysis, since subsequent layoffs may be correlated with the first one (Halla et al., 2020). I also exclude a subset of the workers who move to non-participating states after displacement and are subsequently re-employed in those states, as I cannot measure post-period earnings accurately for these workers. The remaining estimation sample only includes displaced workers and controls with complete post-event histories.[11]

2.3 Construct Outcome Variables

For each individual in the sample, I track quarterly earnings and employment status from 20 quarters before to 20 quarters after the displacement event. The primary outcome variables are employment status and real quarterly earnings, adjusted to 2010 dollars. Employment status is defined as having a firm number with positive employee earnings or self-employment income, with self-employment data supplemented from the ILBD. The real earnings measure in this study incorporates LEHD real quarterly earnings and quarterly self-employment income. LEHD earnings include both in-state and out-of-state earnings[12]: in-state earnings represent total earnings (across all jobs) at the time of the mass-layoff event, while out-of-state earnings

[7] I have access to LEHD data between 2002Q1 and 2022Q1

[8] Another tenure requirement common in the displacement literature is six years (Jacobson et al., 1993; Lachowska et al., 2020).

[9] These eight super-sectors are: Agriculture, Mining/Utilities/Construction, Manufacturing, Trade/Transportation, Information/Finance/Professional/Management, Education/Healthcare, Entertainment/Accommodation, other services.

[10] Households with seasonal workers expect the recurring employment-unemployment cycle. This study focuses on unforeseen income shocks due to involuntary job loss.

[11] Workers who move to non-participating states but are not re-employed in those states remain in the sample, with zero LEHD earnings imputed for those quarters.

[12] Due to data limitations, many prior U.S. studies only observe workers' within-state earnings (Jacobson et al., 1993; Lachowska et al., 2020; Moore and Scott-Clayton, 2024).

capture income from other states where data access is available. As mentioned previously, I exclude workers who are known to be employed in another state but lacking corresponding quarterly earnings records, as their post-layoff outcomes cannot be measured consistently. Self-employment income is reported annually and evenly distributed across four quarters.[13] The combined measure of LEHD and ILBD earnings reflects the product of work hours and hourly wages. In addition to real earnings, I use two log earnings measures as main outcomes to provide more intuitive presentations of post-displacement spousal labor supply adjustments. The first is the natural log of real quarterly earnings, with zero earnings replaced by value one before taking log ("Log Earnings" in results tables). The second imputes zero earnings using mean quarterly earnings multiplied by 0.01 (following Modalsli et al., working paper), thereby retaining all quarters in the analysis ("Log Earnings (imputed)" in results tables). This broader definition of employment and earnings provides more comprehensive measures of household income and avoids mis-measurement of spousal adjustments.

2.4 Matching Control Group

The control group consists of workers who never experience a mass-layoff during the study period.[14] I exclude non-displaced co-workers of the laid-off workers to prevent contamination by same-firm shock and to improve external validity. For each worker, I identify all quarters in which they meet the same age and tenure criteria as displaced workers in their quarter of separation. From these qualifying quarters, I randomly assign one quarter to as the control worker's artificial "separation" quarter. This ensures that treatment and control groups are comparable in observed characteristics before displacement, and that each control worker may not be paired with more than one treated worker in the two-stage matching process. To further improve comparability, I construct the control group using the two-stage matching process proposed in Schmieder et al. (2023), selecting control workers and spouses closest to those in the treatment group. In the first stage, I group the displaced and control group workers by sex, calendar quarter of the mass-layoff event, and Core-Based Statistical Areas (CBSA). In the second stage, I implement 1:1 nearest-neighbor matching without replacement within these subgroups, using propensity scores estimated based on pre-layoff earnings and NAICS one-digit super-sectors of the displaced workers, as well as pre-layoff employment and earnings of their spouses. This approach produces a matched control group that shares the same observable characteristics and local labor market environment as displaced workers, while ensuring that control workers

[13] This approach may attenuate short-term earnings changes around the layoff period, but it is necessary due to data limitations.

[14] This definition of the control group workers differ from that in Jacobson et al. (1993) and Lachowska et al. (2020) in two aspects. First, in Jacobson et al. (1993), control group workers are the non-displaced coworkers of the treated individuals, while in this study, control individuals work in firms that are not undergoing mass-layoff at that time. Second, in both Jacobson et al. (1993) and Lachowska et al. (2020), control group workers remain employed in the same firm throughout the study period. In this study, however, control group workers can become unemployed after the "tm0" quarter. Allowing control group workers to become unemployed increases sample representativeness to the population, but also inevitably reduces the differences in labor market outcomes between the treatment and the control group.

themselves were not subject to a mass-layoff. Unlike displaced workers, control workers are not constrained to remain employed in the same firm after their artificial "separation" quarter. This design reflects realistic labor market dynamics and broadens representativeness, while maintaining comparability through matching.

2.5 Spousal Linkage

Since the LEHD data do not contain household information, I identify spouses of the treated and control workers by linking the LEHD data to the 2000 decennial census, using the "relationship to reference person" variable. I include both married spouses and unmarried partners who live in the same address as their partners. Spouses are restricted to those aged between 25 and 55 at the time of their partner's displacement. The lower age limit ensures labor market participation, while the upper age limit reduces the risk of identity theft. Unlike Halla et al. (2020), which restricts wives' upper age limit to 50, this study includes both male and female spouses, acknowledging that age differences in relationships are common. Merging with the 2000 decennial census data helps me retrieve spousal individual identifier in the LEHD data, so that I can construct employment and earnings panel for the spouses. Using timing of mass-layoff events of the displaced and control group workers, I can observe spousal characteristics in the baseline quarter, such as age, tenure, annual earnings and industry. There is a small fraction of spouses with no LEHD earnings records. This can arise due to (1) spouses never work in the labor market, (2) spouses work as business owners or self-employed, and (3) spouses work in the federal government, whose employees are in a separate data file that I have no access to. For spouses who are in category (2), I supplement their employment and earnings record using the ILBD data; for spouses in category (1) and (3), I set up unique individual identifiers and construct blank panels. Naturally, I underestimate the employment and earnings for spouses work for the federal government, but the impact on empirical analyses should be minimal as federal employees take up less than 2% of the total employed population.

2.6 Descriptive Statistics

The resulting sample of displaced workers, the matched control workers, as well as their respective spouses consists of around 436,000 individuals and 17,876,000 individual-quarter records. Table 2 presents demographic and labor market characteristics of displaced workers and matched controls, as well as their spouses. These summary statistics are measured four quarters before the displacement events. Since the sample is restricted to heterosexual couples, Column (1) and (2) report characteristics of male workers and their wives, whereas Column (3) and (4) pertain to female workers and their husbands. On average, the sample of workers and spouses are in their early to mid-40s, with control group members slightly older than

their displaced counterparts. Displaced workers tend to be one to two years younger, have approximately

Table 2: Individual Characteristics (4 Quarters before Displacement)

	Male		Female	
	Treatment	Control	Treatment	Control
	(1)	(2)	(3)	(4)
Displaced Workers				
Age (years)	44.31	46.20	43.11	44.85
	(6.36)	(6.32)	(6.41)	(6.42)
Tenure (years)	5.85	6.82	5.61	6.34
	(3.26)	(3.57)	(3.19)	(3.51)
Real annual earnings ($2010)	71,240	72,750	45,140	45,480
	(50,240)	(47,770)	(34,220)	(34,220)
Production & resource sector	0.419	0.443	0.158	0.151
	(0.493)	(0.497)	(0.365)	(0.358)
Commerce & Infrastructure sector	0.460	0.402	0.470	0.430
	(0.498)	(0.490)	(0.499)	(0.495)
Professional & Human Capital sector	0.086	0.103	0.333	0.369
	(0.280)	(0.304)	(0.471)	(0.483)
Public administration sector	0.036	0.051	0.039	0.050
	(0.186)	(0.221)	(0.194)	(0.218)
N	61,500	61,500	47,500	47,500
	Female		Male	
	Treatment	Control	Treatment	Control
Spouses				
Age (years)	42.70	44.32	44.60	45.95
	(6.53)	(6.41)	(6.29)	(6.12)
Employed (%)	0.691	0.697	0.745	0.753
	(0.462)	(0.460)	(0.436)	(0.431)
Tenure | Employed	3.55	3.63	3.85	3.84
	(3.45)	(3.51)	(3.75)	(3.76)
Real annual earnings | Employed ($2010)	38,630	38,510	59,410	59,180
	(31,990)	(32,520)	(44,370)	(44,590)
N	61,500	61,500	47,500	47,500

Notes: This table summarizes the individual characteristics of the displaced/control workers and their spouses, separated by gender. Column (1) are male treated workers and their wives; Column (2) are matched male control workers and their wives. Column (3) are female treated workers and their husbands; Column (4) are matched female control workers and their husbands. Production and resources sector includes NAICS sectors 11 to 33 (Agriculture, Forestry, Fishing and Hunting; Mining, Quarrying, and Oil and Gas Extraction; Utilities; Construction; Manufacturing); commerce and infrastructure sector includes NAICS sectors 42 to 56 (Wholesale Trade; Retail Trade; Transportation and Warehousing; Information; Finance and Insurance; Real Estate and Rental and Leasing; Professional, Scientific, and Technical Services; Management of Companies and Enterprises; Administrative and Support and Waste Management and Remediation Services); professional and human capital sector includes NAICS sectors 61 to 72 (Educational Services; Health Care and Social Assistance; Arts, Entertainment, and Recreation; Accommodation and Food Services); public administration sector includes NAICS sectors 81 and 92 (Other Services; Public Administration). Standard deviations in brackets. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

Table 3: Household Characteristics (4 Quarters before Displacement)

	Treatment (1)	Control (2)
Remained together (2000-2010)	0.96	0.96
	(0.20)	(0.19)
Number of children	1.92	1.93
	(1.25)	(1.22)
Share with children	0.54	0.49
	(0.50)	(0.50)
Region Northeast	0.32	0.32
	(0.47)	(0.47)
Region Midwest	0.21	0.21
	(0.41)	(0.41)
Region South	0.25	0.25
	(0.43)	(0.43)
Region West	0.22	0.22
	(0.42)	(0.42)
Real family earnings ($2010)	96,000	97,000
	(62,000)	(60,500)
Number of households	109,000	109,000

Notes: This table summarizes the characteristics of the treated and control households. Column (1) are summary statistics for displaced workers and their spouses; Column (2) are matched control couples. Real family earnings are the sum of displaced/control workers' earnings plus their spouses'. Standard deviations in brackets. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

one year shorter job tenure, and earn modestly less than their matched controls. Male workers earn nearly $30,000 more than female workers on average and are more concentrated in the production and resources sector (42%-44%), whereas this sector accounts for only 15% of female displaced workers. In contrast, female workers are over twice as likely as males to work in the professional and human capital sector (33%-36% vs. 8%-10%). These patterns may indirectly shape spousal labor responses, particularly through income volatility or sector-specific re-employment prospects. Turning to spouses themselves, wives of male displaced workers exhibit about 5 percentage point lower employment rate than husbands of female displaced workers (69% vs. 74%). Among those employed, wives have slightly shorter tenure and earns approximately $20,000 less than their male counterparts. These differences suggest that female spouses may have more scope for labor supply adjustments following their partner's job loss. Overall, the characteristics of treated spouses are similar to those of their matched controls, suggesting a well-balanced comparison group.

Table 3 compares household-level characteristics between displaced and control families. The vast majority of the sample couples remain together between 2000 and 2010, likely reflecting the older average age of the sample. Both the treated and control households have, on average, close to two children, aligning with

U.S. national averages for families. Treated families are marginally more likely to have children currently living in the household, possibly because control households are older and more likely to have children who have already left home. These household characteristics suggest relative stability but also point to variations in caregiving responsibilities across life cycle stages. By construction, the sample is evenly distributed across four U.S. Census regions, which each region composed of data from four states. This balance mitigates concerns over geographic founding in the subsequent analyses. Family earnings (in 2010 dollars), calculated as the sum of the annual earnings of each worker and their spouse, are balanced across treatment status, though the large standard deviations highlight substantial within-group income variation that may influence spousal responses.

3 Empirical Methods

This study identifies the added worker effect by comparing labor market outcomes between spouses of the displaced workers and those of control group workers, before and after the mass-layoff events. I use event studies to provide a visual check of pre-trends and dynamics, and to demonstrate the impact of displacement on spousal labor supply. The matched difference-in-difference approach allows estimation of person-level AWE, facilitating analyses of heterogeneity.

3.1 Event Study

The event study approach closely follows Halla et al. (2020), as well as other previous studies on mass-layoffs. Model specifications are given as follows:

$$Y_{ik} = \sum_{\substack{l=-20 \\ l\neq -8}}^{20} \delta_l \times I\{k = l\} \times Disp_i + \sum_{l=-20}^{20} \gamma_l \times I\{k = l\} + \alpha_i + \eta_t + \epsilon_{il} \tag{1}$$

The event study model analyzes the labor force outcome Y_{ik} of individual worker or spouse i at event time k (ranging from -20 to 20), within a difference-in-differences framework. The treatment effect is captured by the first term, where $Disp_i$ indicates an individual's treatment status, $I\{k = l\}$ denotes the relative quarter, and δ_l^q measures the effect at each relative quarter k from -20 to 20, omitting quarter $k = -8$ as the baseline. The second term captures baseline trends over the same event window, reflecting general labor force participation patterns among the control group (i.e. event-time fixed effect). The model further incorporates α_i as individual fixed effects to capture unobserved, time-invariant characteristics, and η_t as calendar-time fixed effects to control for broader temporal fluctuations, where t indicates calendar quarter

ranging from 2002Q1 to 2022Q4. The term ϵ_{it} denotes the idiosyncratic error accounting for unexplained variation.

While the underlying data are measured quarterly, I aggregate the event time indicators into broader event-year bins to improve precision and ease interpretation for all of the spousal event studies in this paper. Specifically, I recode the relative event quarters (ranging from -20 to 20) into discrete event-year categories. For example, quarter -20 to -17 are grouped into event year -5, quarters -16 to -13 into event year -4, and so forth. Each resulting dummy variable represents a one-year bin around the event, with event year 0 corresponding to the quarter of spousal displacement. This binning approach reduces estimation noise from quarter-to-quarter fluctuations and accounts for the fact that spouses may not adjust immediately within a single quarter. Equation (1) above now becomes:

$$Y_{ik} = \sum_{\substack{l=-5 \\ l\neq -2}}^{5} \delta_l \times I\{k = l\} \times Disp_i + \sum_{l=-5}^{5} \gamma_l \times I\{k = l\} + \alpha_i + \eta_t + \epsilon_{il} \tag{2}$$

where the range of event years are from -5 to 5. I omit event year -2 as the reference category.

3.2 Matched Difference-in-Difference

The two-stage matching process, which constructs the one-to-one matched control group for the displaced worker sample, enables this study to perform a matched difference-in-differences analysis. This method follows the identification strategies suggested in Schmieder et al. (2023) and Illing et al. (2024), and complements the event study by estimating the added worker effect (AWE) at the individual level. This person-level AWE provides a straightforward way to examine heterogeneity in the displacement effect on spousal labor supply and to discern differential impacts across various population subgroups.

By attaching control group spouses' labor market outcomes to those of treated spouses, the individual-level estimated AWE is given by:

$$\begin{aligned}\Delta_{dd}Y_i &= \Delta Y_{ik} I\{Disp_i = 1\} - \Delta Y_{ik} I\{Disp_i = 0\} \\ &= \left(\sum_{l=0}^{20} Y_{ik} I\{Disp_i = 1\} - \sum_{l=-20}^{-1} Y_{ik} I\{Disp_i = 1\}\right) - \left(\sum_{l=0}^{20} Y_{ik} I\{Disp_i = 0\} - \sum_{l=-20}^{-1} Y_{ik} I\{Disp_i = 0\}\right)\end{aligned} \tag{3}$$

where $\Delta Y_{ik} I\{Disp_i = 1\}$ denotes the change in earnings from before to after the separation quarter for the spouse of displaced worker i, and $\Delta Y_{ik} I\{Disp_i = 0\}$ represents the corresponding change for the control group spouse. The left-hand side term, $\Delta_{dd}Y_i$, thus captures the individual-level estimate of the added

worker effect.

To explore heterogeneous AWE in population subgroups, I regress the estimated individual-level AWE on various indicator or categorical variables. For instance, gender differences in the AWE can be estimated by the following regression:

$$\Delta_{dd} Y_i = \beta_0 + \beta_1 \text{Female}_i + \beta X_i + \epsilon_i$$

where Female_i is a dummy variable indicating the spouse's gender, and X_i includes control variables such as demographic characteristics. In this case, the coefficient β_1 identifies the differential impact of displacement by spousal gender (Illing et al., 2024).

Since the focus of this paper is on life-cycle stages and spousal age is not included in the two-stage matching process, I employ inverse probability weighting based on pre-layoff spousal employment and earnings, as well as spousal age and NAICS one-digit super-sectors to address the potential imbalance between the treatment/control groups within each age category (following Halla et al., 2020). I use the inverse probability weighting in subgroup event studies and matched difference-in-difference regressions, where subgroups are defined based on spousal age and parental status. The combination of event study and matched difference-in-difference approaches allows me to both assess dynamic treatment effects and explore heterogeneity across key demographic and economic dimensions, while addressing potential concerns about identification, matching quality, and common trends.

4 Results

This section presents the empirical findings on the labor market consequences of job displacement for workers and their spouses. I begin by documenting the persistent employment and earnings losses experienced by displaced workers, consistent with prior literature. I then turn to the added worker effect (AWE) - the potential labor supply response of spouses following their partners' job loss. In the full sample, I find a muted average response, masking substantial heterogeneity in both direction and magnitude of spousal adjustments. To unpack this heterogeneity, I examine how the AWE varies systematically by age and parental status. I find that younger spouses with children are the most likely to increase labor supply, suggesting financial urgency drives the response. In contrast, younger spouses without children show limited or even negative responses, particularly among women, consistent with a trailing spouse mechanism. Among older spouses, the dominant pattern resembles a retirement response, with labor market exits more likely when the displaced worker is never re-employed, when both spouses worked in the same industry, or when household earnings

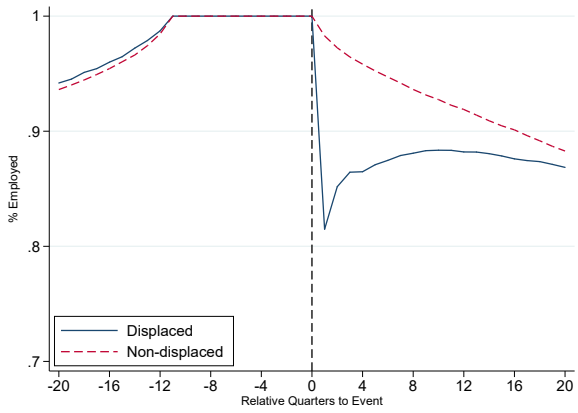
were relatively high prior to displacement. The subsections below discuss each of these findings in turn.

4.1 Persistent Economic Losses from Displacement

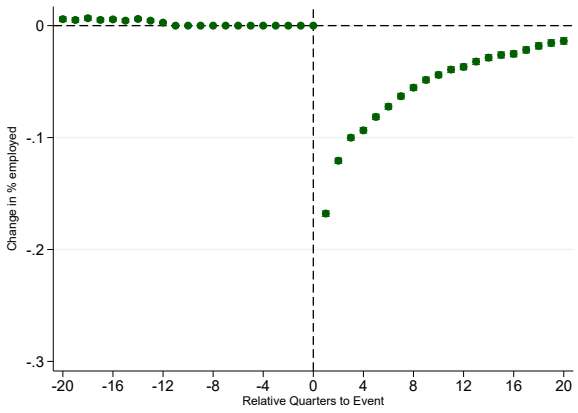
Figure 1 documents the labor market losses of job displacement by comparing displaced workers to their matched non-displaced workers over event time, where quarter 0 marks the displacement event. Panels (a) and (c) display raw means for employment and real quarterly earnings, while panels (b) and (d) present the corresponding event study estimates from regression models controlling for person, event time and calendar time fixed effects. Pre-displacement employment and earnings trends are nearly identical across the displaced and control groups, supporting the parallel trends assumption. At the time of displacement, workers displaced between 2007Q1 and 2017Q4 experience an immediate and sharp decline in both employment rates (almost 20 percentage points) and earnings (about $4000). The trajectories of control workers remain stable during the same period. In post-displacement periods, employment steadily recovers but does not return to pre-event levels even after five years, remaining a few percentage points below the control workers. Similarly, real quarterly earnings show partial recovery but remain over $1000 below the counterfactual level by the end of the fifth year. These substantial and long-lasting negative impacts from displacement reinforce the need to examine household-level responses - particularly spousal labor supply adjustments - as measures of self-insurance.

The magnitude of employment and earnings loss, as well as their respective recovery paths five years after displacement, are comparable to those found in the literature. For instance, using administrative data from Pennsylvania, Jacobson et al. (1993) find that high-tenure workers displaced from distressed firms suffer immediate earnings drops of around 30-40% and long-term losses averaging 20% even six years post-displacement, with only partial recovery - patterns echoed in the persistent gaps observed here. Similarly, Lachowska et al. (2020), examining Washington state workers displaced during the Great Recession, document comparable magnitudes of long-term earnings losses similar to those in Jacobson et al. (1993), primarily stemming from initial wage drops and slow subsequent recovery, consistent with the partial rebound in quarterly earnings seen in my sample. In contrast, Couch and Placzek (2010) revisit displaced worker losses with Connecticut administrative data from the 1990s, and estimate smaller long-term earnings reductions of 10% to 13% six years after displacement. Couch and Placzek (2010) highlight potential variations due to economic conditions or regional factors compared to the more severe and persistent effects in recession-inclusive periods like in this paper. Furthermore, Davis and von Wachter (2011) emphasize that job displacements occurring during recessions, such as the Great Recession captured in the 2007-2017 data in my sample, incur substantially larger cumulative earnings losses, often nearly double those in economic

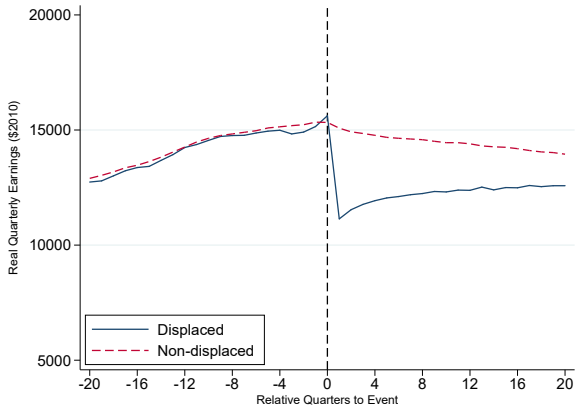
Figure 1: Employment and Earnings Losses after Job Displacement (All Displaced Workers)



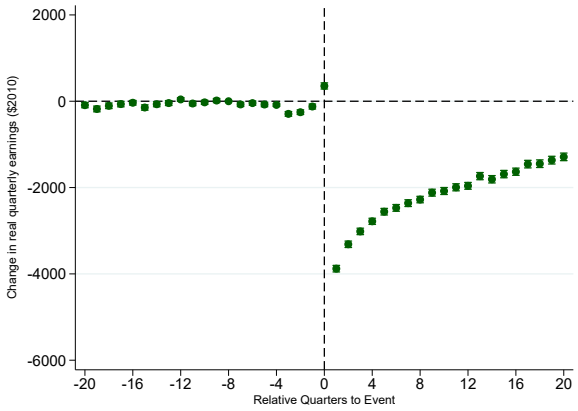
(a) Raw Means: Employment



(b) Event Studies: Employment



(c) Raw Means: Real Quarterly Earnings



(d) Event Studies: Real Quarterly Earnings

Notes: Panels on the left show raw means of treatment and control groups; panels on the right show event study graphs. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

expansions, underscoring the amplified persistence of employment and earnings gaps during downturns.

I corroborate the event study patterns by regression results in Table 4, which estimate the average displacement effect on key labor market outcomes separately by sex. Regressions in this table suppress the constant term to show category-specific effects. For both male and female displaced workers, job loss leads to statistically significant declines in employment probability, real earnings, and log earnings (exclude zero earnings). Specifically, displacement reduces the likelihood of employment by 6 percentage points for women and 5.6 percentage points for men. As for earnings, female displaced workers lose an average of $1583 in quarterly earnings, while male displaced workers face a larger average loss of $2498. When measured in log terms, the earnings penalties translate to declines of 17.8% and 19.2% for women and men, respectively. These results indicate that men experience larger absolute earnings losses post-displacement, with similar

(though slightly higher) relative losses in percentage terms - a pattern consistent with the unweighted findings in Illing et al. (2024), who use German administrative data from 2002 and 2012, and document that men's earnings losses after mass-layoffs are higher than women's in absolute terms. While the present study uses U.S. data and finds comparable relative losses, the alignment with Illing et al. (2024) underscores the role of family-specific factors, such as childcare, in determining the persistence and magnitude of losses and in motivating household-level labor market responses.

Table 4: Displacement Effect on Labor Market Outcomes by Sex
(Category Specific Effects)

	Employed	Total Earnings	Log Earnings
Female displaced workers	-0.060***	-1583***	-0.178***
	(0.0015)	(32.66)	(0.0039)
Male displaced workers	-0.056***	-2498***	-0.192***
	(0.0012)	(41.35)	(0.0031)
Number of individuals		109,000	

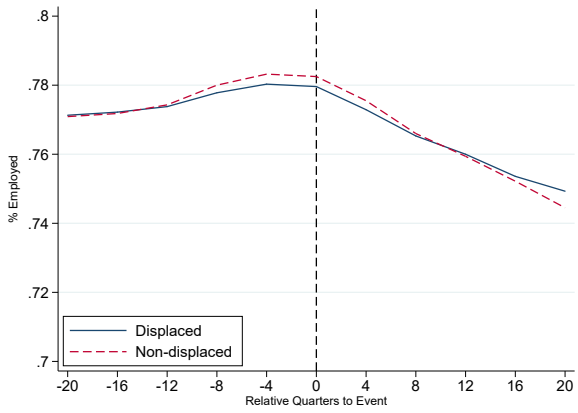
Notes: Cells report changes in employment and real quarterly earnings following displacement, by sex of the displaced worker. Estimates are based on matched difference-in-differences models with clustered standard errors at the matched pair level. Constants are forced to zero so as to show effects of displacement specific to each category. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

4.2 Muted Overall Spousal Response

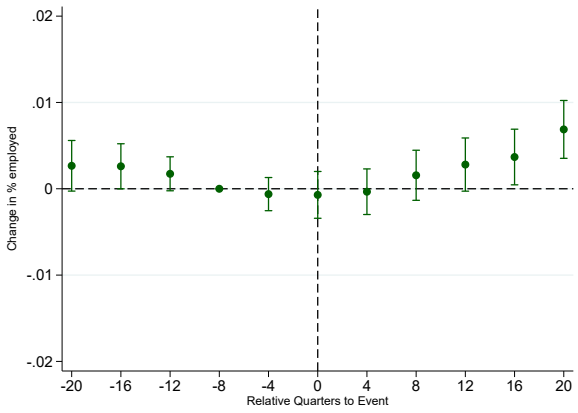
Figure 2 presents the overall added worker effect (AWE) on employment and earnings for the pooled sample of spouses. The raw means in Panels (a) and (c) show parallel trends between spouses of displaced and control workers prior to the layoff. The trajectories slightly diverge after displacement. Panel (a) shows a modest increase in employment for spouses of displaced workers relative to controls, visible three years post-displacement. Corresponding event study in Panel (b), however, show that there are barely any statistically significant difference between the two groups. Earnings patterns mirror the employment response. As shown in Panel (c), real quarterly earnings remain largely stable for spouses of control workers, while a slight dip occurs for treated spouses. Event study estimates in Panel (d) suggest a statistically significant decrease in earnings in the post-displacement period.

Taken together, these patterns indicate that while spousal labor supply may adjust following job loss, the average effects are relative modest in aggregate. Importantly, these results are consistent with existing studies of the AWE (Appendix 1), which often find them to be small in magnitude and concentrated in particular subgroups. For instance, Stephens (2002) uses Panel Study of Income Dynamics data on U.S. husbands' displacements, documents a small and temporary AWE, with wives increasing labor supply by only about 3-5 percentage points in the short term, mirroring the muted and insignificant overall employment

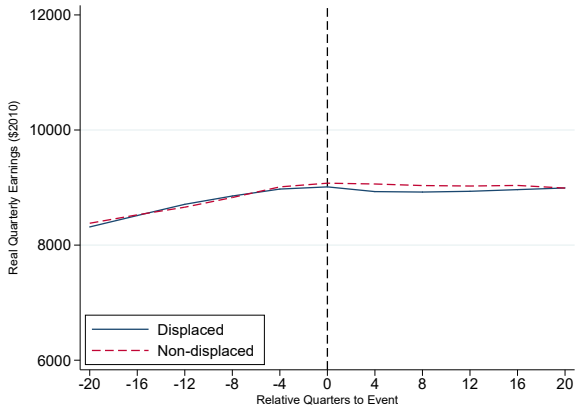
Figure 2: Overall AWE on Employment and Earnings (Pooled Spousal Sample)



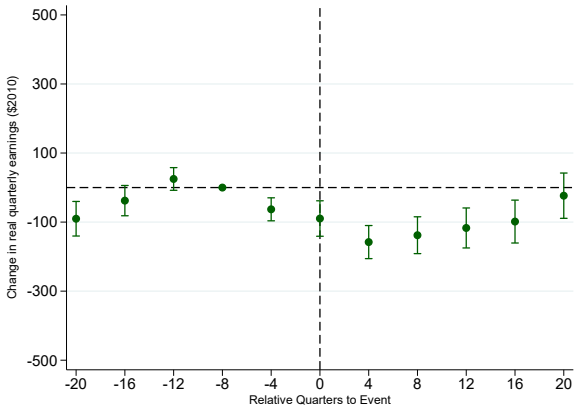
(a) Raw Means: Employment



(b) Event Studies: Employment



(c) Raw Means: Real Quarterly Earnings



(d) Event Studies: Real Quarterly Earnings

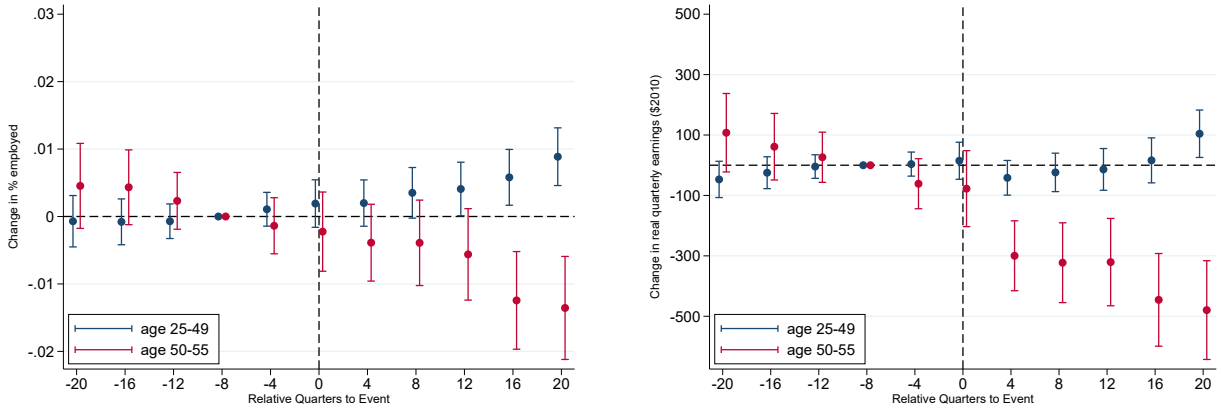
Notes: Panels on the left show raw means of treatment and control groups; panels on the right show event study graphs. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

response observed here. Similarly, Pruitt and Turner (2019), Bredtmann et al. (2018) and Hardoy and Schøne (2014) highlight that while households mitigate earnings risk through spousal labor adjustments, aggregate effects may be diluted by heterogeneity across income groups and institutional factors such as unemployment benefits. Similarly, Halla et al. (2020), Anderson et al. (2020) and Bredtmann et al. (2018) find the AWE vary substantially by gender norms and spousal labor market attachment. Thus, rather than pointing to the absence of an aggregated response, the findings in this paper (and in the literature) underscore the conditional nature of the AWE.

This study proposes that one important dimension of heterogeneity may be household life-cycle stages. Younger couples may exhibit stronger AWE due to financial urgency, greater flexibility in adjusting work hours and locations, and longer time horizon for income recovery. In contrast, older household may be

less responsive, either because one spouse is near retirement or because labor market barriers constrain adjustment. This pattern is suggested in Blundell et al. (2018), in which households with younger children tend to respond to earnings shocks more through spousal labor supply, whereas older households rely more on consumption smoothing through savings. Motivated by this framework, the next section investigates AWE responses across different points in the household life cycle.

Figure 3: AWE by Spousal Life Cycle



(a) Spouses by Age Groups: Employment

(b) Spouses by Age Groups: Earnings

Notes: FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

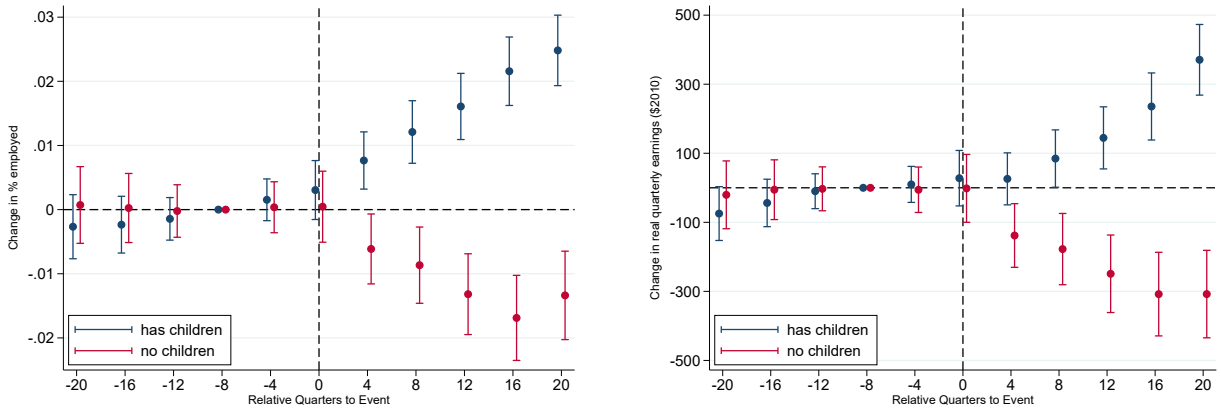
4.3 Spousal Age and Life-cycle AWE

This section argues that the overall muted AWE is a compositional outcome by spousal life-cycle stages and parental status. Figure 3 demonstrates the differential effect based on spousal age at the time of the event. The left panel includes employment event studies by age group of the spouses, and the right panel includes those for real quarterly earnings. The blue markers represent employment/earnings paths for spouses between 25 and 49 years old at the time of displacement, and the red markers are for spouses between 50 and 55 years old. Markers are slightly staggered to show overlapping pre-trend more clearly, and ticks show the 95% confidence intervals. For older spouses, the employment response is largely muted in the immediate post-displacement period and eventually turns negative. Point estimates dipping below -0.01 (about 1 percentage point) by year 5 and the 95% confidence intervals excluding zero in later years. This decline in employment is accompanied by a substantial earnings loss, with estimates showing persistent negative effects accumulating to over $400 per quarter by the end of the fifth year. In contrast, spouses aged 25-49 exhibit a positive and growing employment response. Although the effects are negligible and statistically insignificant in the first two post-displacement years (quarter 1-8), employment gradually increases from year 3 (quarter

9-12) onward, reaching a statistically significant gain of approximately 1-2 percentage points by year 5. The earnings response among young couples is less pronounced, with estimates oscillating around zero, only to become modestly positive (around $100) at the end of the study period.

The inconsistent results between employment and earnings among younger spouses prompt further sample disaggregation. Among younger couples, those with children respond to displacement differently from couples who don't (Figure 4), and such differences suppress the magnitude of average young spouses' labor supply response. Younger spouses with children, shown with blue markets, steadily increase employment response that becomes statistically significant by year 3, with point estimates rising to around 1.5-2 percentage points by year 5 and confidence intervals excluding zero. Their real quarterly earnings also rise substantially in this period, with estimates turning positive after year 2 and exceeding $350 by the end of year 5, indicating active compensation for household income loss through increased labor supply. In contrast, there is little evidence of a positive AWE for childless younger spouses. Both employment and real earnings decline starting soon after the displacement events, with employment dropping by up to -0.01 and earnings by -$200 to -$300 in later years, often significantly. The findings in Figure 4 clarify that the muted average AWE among younger households masks a strong positive labor supply response from parents, offset by declining responses from childless younger spouses. This heterogeneity highlights the importance of financial urgency and household composition in shaping spousal adjustment to job displacement. To better understand the mechanisms driving these divergent responses across the life cycle, the following subsections further disaggregate the sample of spouses into three groups: young parents, young spouses without children, and older spouses.

Figure 4: Impact of Having Children on the AWE (Spouses 25-49)



(a) Young Spouses by Parental Status: Employment

(b) Young Spouses by Parental Status: Earnings

Notes: FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

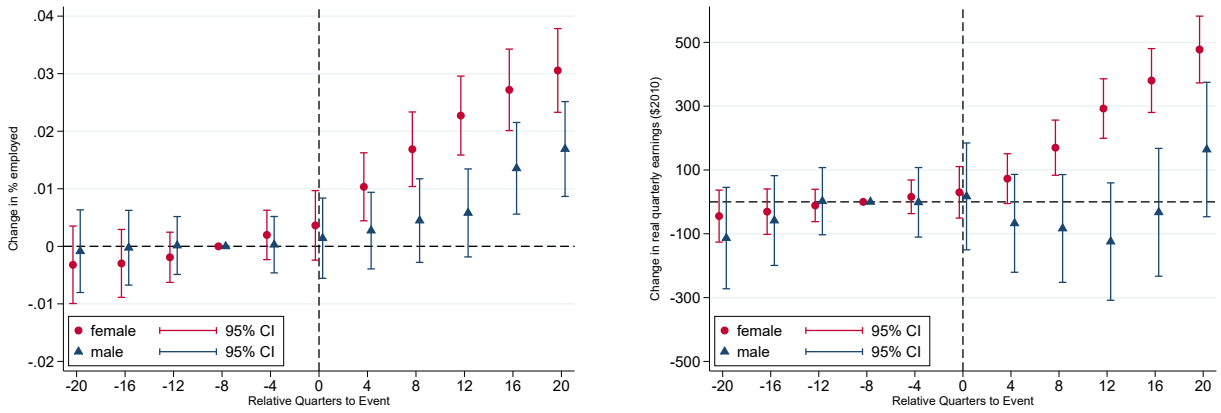
4.3.1 Impact of Having children

This subsection focuses on young spouses - between 25 and 49 years old - with children. Figure 5 presents event study estimates disaggregated by spousal sex, with the left panel showing changes in employment probability and the right panel showing changes in real quarterly earnings. Young fathers show react little to their wives' job loss. Their employment rises slightly starting the 4th year post-displacement but such increase doesn't translate into earnings, which hover near zero and show no statistically significant changes. Young mothers, however, steadily increase both employment and earnings soon after their husbands' displacement. The employment effect begins modestly in the first year but strengthens over time, reaching over 3 percentage points by year 5. Earnings follow a similar pattern, starting near zero but rising to over $400 per quarter by the end of the study period, becoming statistically significant in later years. These effects are economically meaningful, representing substantial adjustments relative to baseline levels. The stark contrast suggests that young mothers are the primary added workers in dual-parent households, consistent with traditional gender roles in household labor adjustment.

Using Australian administrative data on mass-layoffs, Halla et al. (2020) also document that wives increase employment by about 1 percentage point when husbands are displaced - a response driven by extensive margin adjustments among mothers with older children. However, the magnitudes found in this paper are larger (3+ percentage points for mothers vs. 1 percentage points in Halla et al.), potentially reflecting differences in institutional contexts, such as less generous public insurance in the U.S. crowding out less AWE than in Australia. Similarly, Bredtmann et al. (2018) find across European countries that wives' labor supply responds to husbands' unemployment, with effects ranging from 2-5 percentage points in some contexts, emphasizing persistent gender specialization in household responses to job loss.

I set up the matched difference-in-difference regressions such that the dependent variables are calculated using equation (3) detailed in Section 3. For each regression in Table 5, 6 and 7, I provide coefficients and standard errors for variables of interest, as well as mean values of the dependent variable for corresponding reference groups. All regressions control for state, year, displaced worker's industry and race fixed effects, as well as the business cycle, state-level unemployment rate, childcare cost, and unemployment insurance generosity. I demean all continuous controls so as to provide meaningful interpretations, and I cluster standard errors at the matched pair level (Abadie and Spiess, 2022). Treatment and control groups are inverse propensity score reweighted within age subgroups.

Figure 5: Differential Impact by Sex (Spouses 25-49; Have Children)



(a) Spousal Employment by Sex

(b) Spousal Earnings by Sex

Notes: The left panel show employment event studies and the right panel show earnings event studies, by sex of spouses. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

These result corroborate the gender differential found in Figure 5. Young mothers are 1.7 to 2.1 percentage points more likely to be employed. They also earn about $200 more (or 11% to 20.1% more) per quarter, on average, than young fathers in similar circumstances. Results in Table 5 further suggest that the strong AWE response among young parents can be attributed to financial urgency of having younger children, though this effort is dampened among low-income large families. In this table, the variable on the number of children is demeaned so that the reference category represents male spouses with about two children in the sample. I construct the low-income dummy to indicate families whose earnings is lower than 50th percentile of the sample. Positive coefficients on the number of children, the low income dummy, and the age of the youngest child all point to financial urgency as a driving force behind positive AWE in this demographic group. Specifically, each additional child is associated with a 1 percentage point increase in employment probability and a 5.2% to 10.5% increase in real earnings (with an absolute earnings increase of $72, though insignificant). Being in a low-income family links to a 1.3 percentage point increase in employment and a 11.7% to 19.1% increase in real earnings. However, as the family size increases, the ability to increase labor supply for spouses in low-income families shrinks, possibly due to substitution into childcare and out of labor market work. Coefficients on the interaction term between the number of children and the low-income dummy demonstrate the magnitude of this effect: among low-income families, an additional child in the family leads to a 0.7 percentage point decrease in employment and a 4.3% to 8.0% decrease in spousal earnings. The age of the youngest child in the family not only indicates financial urgency, but also childcare intensity. As the youngest child in the family ages, parents are freer to increase work in the labor market, with each additional year associated with a 0.6 percentage point rise in employment and 3.4% to 5.7% higher earnings. However,

the negative coefficients on the quadratic term indicate an inverted-U shape: labor supply responses rise with child age but taper off after a certain point, suggesting parents reenter the labor market as children become more independent.

These patterns echo heterogeneity in Halla et al. (2020), where the AWE is strongest among mothers with children aged 3-15 that are often returning from maternity leave, while responses are muted for those with very young children (0-2 years old) due to childcare constraints. In contrast, the positive effects of child age and number in this study (albeit tempered by low income), highlight how financial pressures may dominate in the U.S. context, with less emphasis on maternity breaks. Blundell et al. (2018) similarly emphasize that households with young children rely more on spousal labor supply for insurance, aligning with the financial urgency mechanism observed in this table.

Table 5: Financial Urgency and Constraint of Low Income, Spouses Aged 25–49 with Children

	Employed	Real Earnings	Log(Earn)	Log(Earn; imputed)
Number of children	0.010***	72.30	0.105***	0.052***
	(0.0029)	(63.98)	(0.0262)	(0.0138)
Low income	0.013***	77.76	0.191***	0.117***
	(0.0041)	(78.17)	(0.0383)	(0.0198)
Number of Children*Low income	-0.007*	-123.0*	-0.080**	-0.043**
	(0.0038)	(75.06)	(0.0343)	(0.0178)
Age of youngest child	0.006***	60.57**	0.057***	0.034***
	(0.0020)	(37.49)	(0.0182)	(0.0094)
Age of youngest child^2	-0.00045***	-4.91***	-0.0044***	-0.0024***
	(0.00010)	(1.86)	(0.0009)	(0.0005)
Female	0.017***	210.2***	0.201***	0.110***
	(0.0043)	(91.62)	(0.0408)	(0.0214)
Mean Dep. Var (Men)				
Number of individuals		51,500		

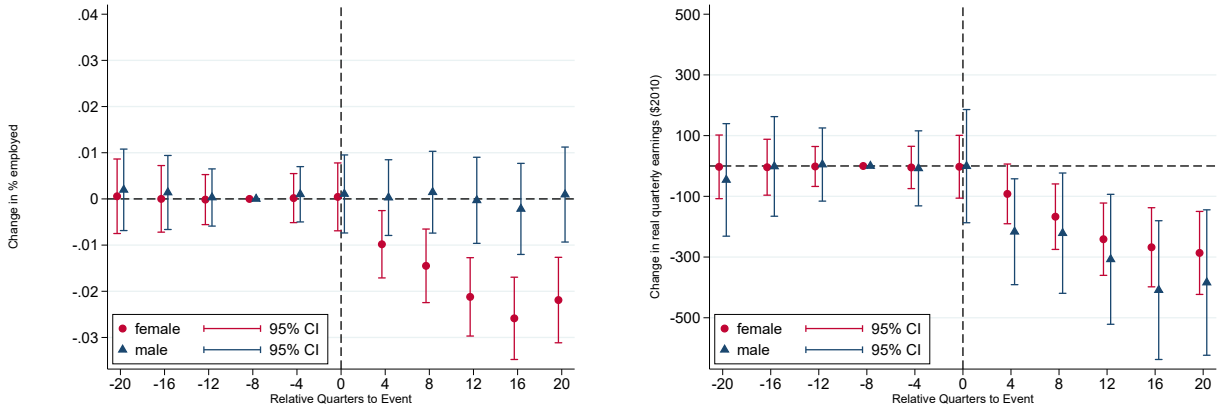
Notes: Cells report changes in spousal employment, real quarterly earnings and log earnings following displacement. Estimates are based on matched difference-in-differences models controlling for state, year, displaced worker's industry and race fixed effects, as well as the business cycle, state-level unemployment rate, childcare cost, and UI generosity. Standard errors are clustered at the matched pair level. Treatment and control groups are inverse propensity score reweighted within age subgroup. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

4.3.2 Young Spouses without Children

This subsection examines young spouses without children and their AWE response, which differs markedly from that among young parents. Event studies for childless young couples (Figure 6) reveal negative employment and earnings responses, particularly among female spouses. The employment probability of childless

male spouses remain largely unaffected by their wives' displacement, with point estimates fluctuating around zero and 95% confidence intervals including zero throughout the post-displacement period. However, they appear to suffer from a pay cut, as shown in the right panel of Figure 6, where earnings estimates trend slightly negative, dipping to around -$100 to -$300 between year 2 and year 5. Female spouses reduce both employment and earnings sharply soon after their husbands' job loss, with employment dropping immediately to about -0.01 in year 1 and continuing to decline, reaching over -2 percentage points by the end of the observation window, with confidence intervals excluding zero from year 1 onward. Earnings follow suit, falling to nearly -$400 by year 5, statistically significant during the entire post-displacement period. This negative AWE among childless couples, especially for women, may reflect leisure complementarity or correlated shocks rather than insurance motives, contrasting with the positive responses in households with children. For instance, hlGarcia-Pérez and Rendon (2020) document that while the AWE is robust overall, it is weaker in childless households, where spousal labor supply does not increase to offset job loss, potentially due to lower financial urgency. On the same note, Stephens (2002) finds small or negligible AWE effects in general, with heterogeneity suggesting muted responses in childless families.

Figure 6: AWE for Younger Spouses with No Children (Spouses 25-49; by Sex)



(a) Spousal Employment by Sex

(b) Spousal Earnings by Sex

Notes: The left panel show employment event studies and the right panel show earnings event studies, by sex of spouses. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

Table 6 confirms that being a female spouse in a childless couple is associated with significantly lower employment (-2.1 percentage points) and earnings (log effects ranging from -15.5% to -7%) following their husbands' displacement. The "Same industry" variable in this table (and in Table 7) is a dummy that equals one if the spouse works in the same 1-digit NAICS super-sector as their displaced partner. Although working in the same industry does not affect male spouses, the interaction between female and same-industry

displacement is strongly negative across all outcomes. This asymmetry suggests that the gender differences observed in Figure 6 can possibly be attributed to correlated shocks in the local labor market and losses among trailing spouses. Specifically, in the first four columns, we see that female spouses who worked in the same industries as their displaced husbands are more likely to reduce employment by 2.6 percentage points and earnings by 14% to 25%, with an absolute earnings drop of -$321. This finding indicates that somehow, correlated shocks in the local labor market disproportionately affect childless female spouses.

The fifth column captures whether the displaced worker is re-employed in a different MSA. Wives of childless male displaced workers are 1.3 percentage points more likely to relocate following displacement, with this effect rising by 3.3 percentage points when they work in the same industry as their husbands. This pattern likely reflects reactive mobility, driven by the displaced husbands' re-employment needs rather than improved job opportunities for the spouse. The finding aligns with the notion that childless couples have greater structural and financial flexibility to relocate, unhindered by childcare constraints or schooling concerns. Yet, this flexibility often translates into a career sacrifice for female spouses, who may forgo their own employment or career prospects to support their husbands' re-employment. In contrast, male spouses of displaced women appear less likely to relocate (negative but insignificant same-industry effect) and are more likely to remain in their pre-displacement jobs - even if that means accepting earnings losses - which suggest a gendered asymmetry in who becomes the trailing spouse after displacement.

Table 6: Correlated Shocks and Trailing Spouse, Spouses Aged 25–49 Without Children

	Employed	Real Earnings	Log(Earn)	Log(Earn; imputed)	Moved
Female	-0.021***	-36.55	-0.155**	-0.070**	0.013*
	(0.0058)	(116.4)	(0.0540)	(0.0283)	(0.0072)
Same industry	-0.003	74.49	-0.079	-0.031	-0.015
	(0.0090)	(221.6)	(0.0901)	(0.0487)	(0.0122)
Female × Same industry	-0.026**	-321.1**	-0.250**	-0.143***	0.033**
	(0.0125)	(264.2)	(0.121)	(0.0642)	(0.0162)
Recession	-0.021***	-184.1***	-0.174***	-0.086***	0.026***
	(0.0053)	(99.2)	(0.0489)	(0.0255)	(0.0065)
Mean Dep. Var (Men)					
Number of individuals			28,500		

Notes: Cells report changes in spousal employment, real quarterly earnings and log earnings following displacement. Estimates are based on matched difference-in-differences models controlling for state, year, displaced worker's industry and race fixed effects, as well as state-level unemployment rate, and UI generosity. Standard errors are clustered at the matched pair level. Treatment and control groups are inverse propensity score reweighted within age subgroup. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

These results resonate with literature on gender asymmetry in family migration. For example, Bielby and Bielby (1992) show that wives are less willing to relocate for their own better jobs due to family ties and gender-role beliefs, leading to them trailing their husbands more often. Sorenson and Dahl (2016) concur that couples are more likely to choose locations with higher expected wage for the husband, and that husbands are better matched to their jobs than their wives, both of which amplify women's earnings losses post-relocation.

4.3.3 AWE among Older Spouses

This section explores factors that potentially lead to early exit from the labor market among spouses between 50 and 55 years old at the time of the displacement events. As shown in Table 7, spouses whose partners are never re-employed experience substantial declines in employment probability (5.2 percentage points) and large reductions in earnings, with log earnings falling by 37.1% to 76.9% and absolute earnings by $1,166 per quarter. These magnitudes point to early retirement or permanent labor market exit among older spouses. Trailing spouse dynamics seen among childless young couples is also visible here. When the displaced worker is re-employed in a different MSA, the spouse's earnings decline significantly (-$433 per quarter, or -16.2% to -9.1% in log terms), though the employment effect is small and insignificant, suggesting relocation disrupts job continuity for older spouses who may be less willing or able to reenter new labor markets late in their careers. Spouses working in the same industry as their displaced partners show negative effects, with employment dropping by 1.3 percentage points and log earnings by 6.7% to 12.0%, possibly reflecting correlated risks of job loss or limited outside opportunities. Notably, higher household earnings are associated with reduced spousal labor supply, with each log point increase linked to a 2.1 percentage point drop in employment and 20.8% to 33.6% lower log earnings, consistent with income effects and financial cushioning: wealthier households may view the layoff as an opportunity to transition into retirement rather than seeking new work.

The negative AWE on spouses between 50-55 years old diverge from Lee (2015), who finds that wives often postpone retirement following their husbands' late-career job loss. Several key differences help contextualize the divergence. First, Lee relies on self-reported retirement, whereas this study measures observed labor supply outcomes, which may capture detailed adjustments not reflected in survey retirement status. Second, Lee's analysis relies on a smaller sample of older workers without matched controls, raising concerns about statistical power and potential selection bias. For instance, when focusing on the subsample of couples who experienced job loss during economic downturns, Lee finds that the effect is not statistically significant, suggesting either small sample issues or that correlated local market shocks may deter an added worker response. In contrast, this study leverages a larger, matched-sample design, allowing me to detect negative

spousal responses among older couples. These differences suggest that, while earlier work documents positive AWE among older wives, findings in this study reflect the predominance of joint retirement-like behavior and labor market constraints in shaping older spouses' labor supply.

Furthermore, coefficients on household earnings - a proxy for wealth - align with Michaud (2003) and heterogeneity analyses in Lee (2015). Both studies discuss the role of financial cushioning in incentivizing joint labor market exit. Michaud (2003) find that the Spouse Allowance program in the social security system provides incentive to lower participation for older couples, and heterogeneity results on family wealth in Lee (2015) suggest that lower probability in spousal retirement is driven primarily by wives in the bottom 25th percentile of wealth. In the context of this study, higher household resources or accumulated savings likely reduce the necessity for older spouses to increase labor supply after a partner's displacement, contributing to the negative AWE. A promising avenue for future research is to examine the role of institutional access to pensions, social security and other public transfer programs in shaping older households' responses. Differences in program eligibility and benefit generosity may further explain why earlier studies observe positive AWE among older spouses, whereas my results point to coordinated retirement-like behavior. Incorporating these institutional features could clarify how financial preparedness interacts with spousal labor supply decisions later in life.

Table 7: Factors Influencing Early Retirement, Spouses Aged 50–55

	Employed	Real Earnings	Log(Earn)	Log(Earn; imputed)
Re-employed in different MSA	-0.0059	-433.1***	-0.162***	-0.091***
	(0.0050)	(111.0)	(0.0472)	(0.0242)
Never re-employed	-0.052***	-1166***	-0.769***	-0.371***
	(0.0125)	(266.0)	(0.1215)	(0.0618)
Same industry	-0.013**	-150.7	-0.120**	-0.067**
	(0.0062)	(144.5)	(0.0594)	(0.0309)
Household earnings (log)	-0.021***	-1143***	-0.336***	-0.208***
	(0.0043)	(122.1)	(0.0407)	(0.0210)
Mean Dep. Var (Men)				
Number of individuals		29,000		

Notes: Cells report changes in spousal employment, real quarterly earnings and log earnings following displacement. Estimates are based on matched difference-in-differences models controlling for state, year, displaced worker's industry and race fixed effects, as well as state-level unemployment rate, and UI generosity. Standard errors are clustered at the matched pair level. Treatment and control groups are inverse propensity score reweighted within age subgroup. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

Taken together, these patterns reinforce the broader life cycle story: older couples are significantly less responsive in terms of added worker behavior. Rather than increasing labor supply to buffer income losses, older spouses - especially those near traditional retirement ages - are more likely to exit the labor force entirely, suggesting the AWE is largely absent or even negative late in the life cycle. This contrasts the behavior of younger couples with children, where income maintenance needs dominate and spousal employment increases post-displacement.

5 Concluding Remarks

This paper revisits how spouses respond to their partners' job loss by linking restricted U.S. administrative data with census records and using mass-layoffs as plausibly exogenous labor market shocks. The employer-employee matched structure of the LEHD data allows me to cleanly identify involuntary separations, while a two-stage matching strategy constructs a credible control group. Using event studies and matched difference-in-difference models, I provide the first U.S. estimates of the Added Worker Effect (AWE) based on mass-layoff events, and I show that the muted average AWE observed in prior studies conceals offsetting dynamics across households. For young parents, rising childcare costs and financial urgency drive a compensatory labor supply response. In contrast, among younger childless couples, trailing spouse mobility and gender asymmetries in household bargaining often lead women to reduce labor supply to support their partners' re-employment, even at the cost of their own careers. Meanwhile, older spouses - particularly those with sufficient financial resources - are more likely to treat job loss as an opportunity to jointly exit from the labor market. These divergent responses demonstrate how life-cycle stage, family structure, and local labor market conditions jointly determine household-level adjustment.

The key contribution of this paper is not only to provide the first U.S. AWE estimates with clean identification of involuntary separation, but also to show that life-cycle stages - not just demographic characteristics - fundamentally shapes intra-household labor market responses to job displacement. Rather than treating spousal labor supply behavior as uniform or segmenting effects solely by gender or parental status, this paper is the first to decompose the average AWE into competing realities across the life cycle, emphasizing that the timing in the life cycle of which the shock occurs is just as important as who is affected. Supported by administrative evidence on both men and women, and including self-employment as a supplemental margin of adjustment, the results demonstrate that the downstream effects of displacement depend on the interplay of age, parental responsibilities, gender, geographic mobility and couple dynamics. By combining high-quality linked data with a unifying theoretical framework, this paper offers a new perspective on why aggregate AWE estimates in developed economies appear small: they reflect a composition of strong positive responses

among younger parents, muted or negative adjustments among younger childless spouses, and retirement-like exits among older households.

These findings underscore the importance of viewing job loss as a household-level event with heterogeneous consequences depending on where families are in the life cycle. From a policy perspective, this suggests tailoring interventions to household needs at different stages. If the goal of understanding the added worker effect is to measure the capability of household self-insurance, so as to reduce reliance on public welfare, policy makers can suggest promoting programs to help translate labor supply increases into sizable income. This means government could provide targeted vocational training and childcare support for young parents to strengthen their ability to offset income shocks. To navigate mobility constraints, relocation assistance can reduce the costs of joint career adjustment, especially for trailing spouses. Furthermore, policies that promote spousal employment continuity, such as portable health insurance or caregiving credits in retirement systems, may help older couples prevent premature labor force withdrawal. Recognizing the household-level dimension of displacement thus not only advances economic theory but also provides a foundation for more effective, stage-sensitive labor market policy.

Finally, this paper lays the foundation for a few directions of future research. First, long-run consequences of these spousal labor supply adjustments remain to be explores, especially if such adjustments translate into permanent wage penalties or altered career trajectories. Second, data on non-market work (for instance, the American Time Use Survey) could help assess the full welfare cost of spousal reallocation or labor force withdrawal. Last but not least, developing a comprehensive financial cushioning measure that includes both private savings and public transfer programs can help us better understand spousal responses later in life, contributing to the developing literature on joint retirement. In all, future work should continue to shift the lens from the individual to the household in order to fully understand the costs of and the coping strategies to job displacement.

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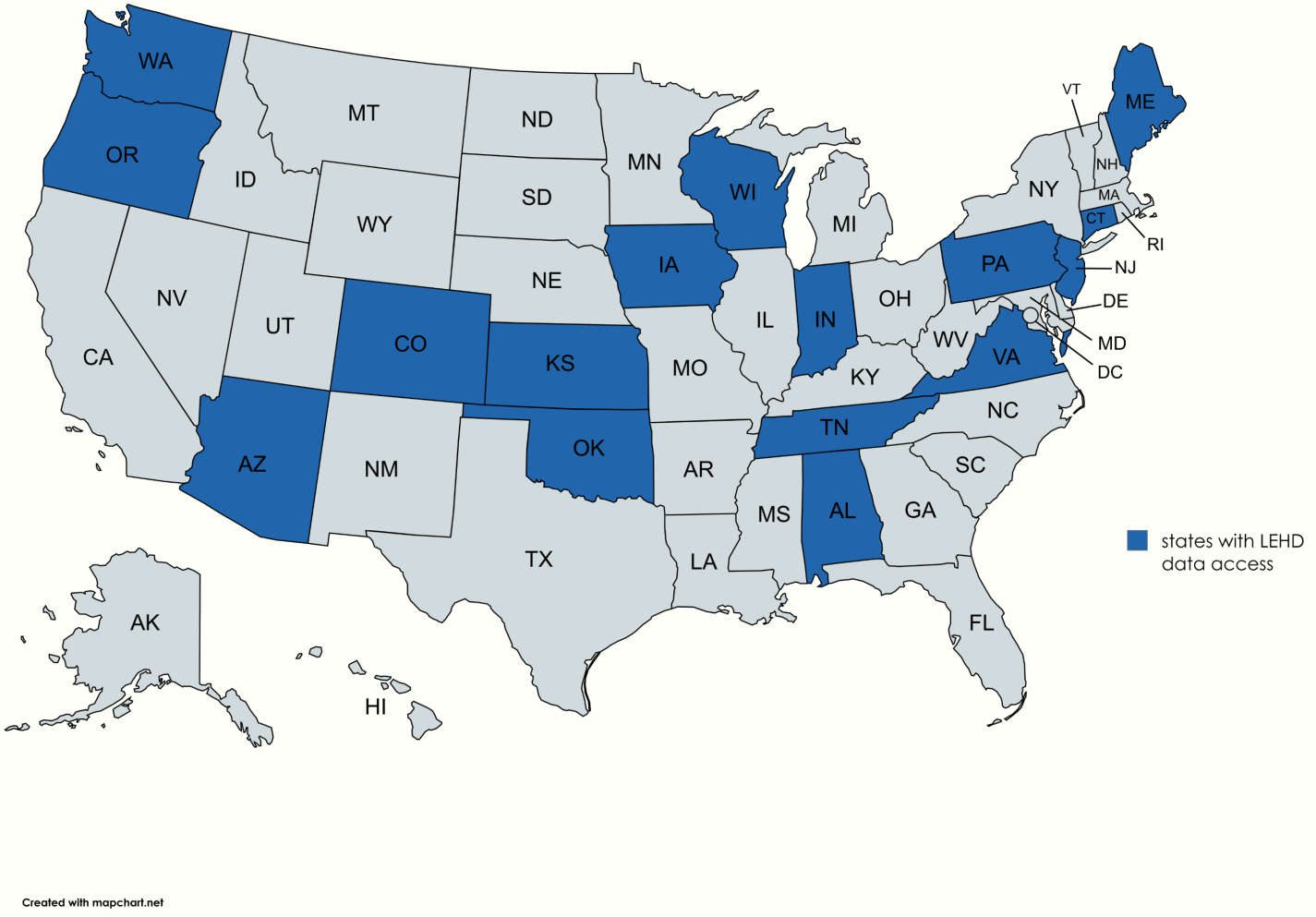
A Contributions of This Study Relative to Existing Literature on the AWE

Paper	Limitations	This Study's Improvements	Estimated AWE
Kawano et al. (2025)	– UI-recipient proxy involuntary job loss – No tenure controls – UI-recipients only	– Clean involuntary mass layoffs – Tenure 3 years – Not restricted to UI recipients	Secondary earner +3% employment Primary earner earnings reduction
Pruitt & Turner (2019)	– Includes voluntary separations – No tenure controls – Omits self-employed – Excludes some tax filers – Focuses only on women – No earnings outcomes	– Uses involuntary mass layoffs – Tenure 3 years – Includes self-employment income – All filing types included – Observes both spouses – Measures earnings and employment	Labor force participation +1.3% (female spouses)
Anderson et al. (2020)	– Bank customers only – Small involuntary layoff sample – Limited subgroup analysis	– Representative administrative data – Large sample of mass layoffs – Explores heterogeneity in mechanisms	Earnings +0.5%-1.5% (female spouses)
Bredtmann et al. (2018)	– Mixes separation types – Self-reported income – 4-year panel – Women only	– Mass-layoff based – Uses admin income data – 11-year panel – Includes both genders	Employment +3.6%-6% (female spouses)
Halla et al. (2020)	– No self-employment earnings – Ages 25–50 only – Women only – No ATUS/time use – Limited discussion of muted AWE	– Adds self-employment income – Includes older spouses – Uses ATUS to test home production – Discusses life-cycle mechanisms	Employment +1% Earnings +2% (female spouses)
Hardoy & Schøne (2014)	– Omits self-employment – Only 3-year window – Women only – Industry match exclusion – No time use or life-cycle view	– Adds self-employment income – 5-year horizon – No gender or industry exclusions – Uses ATUS and life-stage heterogeneity	No overall AWE (female spouses)

B States with LEHD Data Access



C Comparison to Prior Literature on Sample Construction

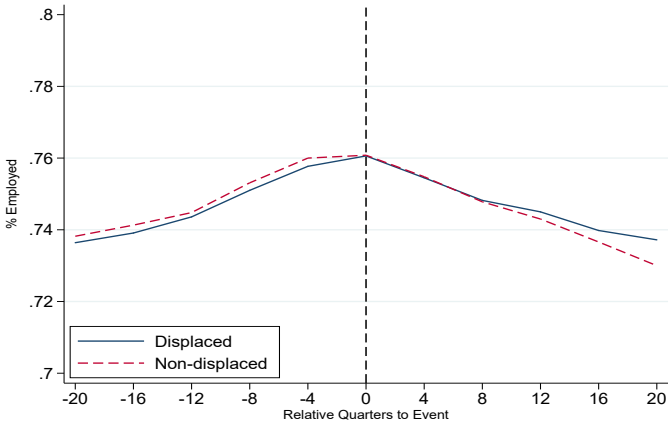
	Jacobson et al. (1993)	**Lachowska et al. (2020)**	**Halla et al. (2020)**	**This Study**
Geographic scope	Pennsylvania	Washington State	Austria	U.S. (multi-state LEHD)
Unit of layoff	Establishment	State–firm	Firm	State–firm
Layoff definition	≥30% drop in 1 year	≥30% drop in 1 year	Firm closure or ≥30% decline	≥30% drop in 1 year
Firm size threshold	≥50 employees	≥50 employees	≥50 employees	≥50 employees
Tenure requirement	≥6 years	≥6 years	≥3 years	≥3 years
Age range	35 to 54	25 to 64	20 to 55	25 to 55
Seasonal worker	Exclude if rehired within 1 quarter	Exclude if rehired within 1 quarter	Exclude short-tenure workers	Exclude if rehired within 4 quarters
Multiple layoffs	Keep first layoff within window	Keep first layoff within window	Keep first layoff within window	Keep first layoff within window
Control group	Non-displaced coworkers, must stay employed	Non-displaced coworkers, must stay employed	Matched by age, sex, and firm size	Workers in non-layoff firms, two-stage matched; may separate post-$tm0$
Outcome variables	UI earnings from main employer	UI earnings (in-state only)	Employment, earnings (registry data)	UI-covered earnings (in- and out-of-state), self-employment income

D Overall AWE by Sex of Spouses

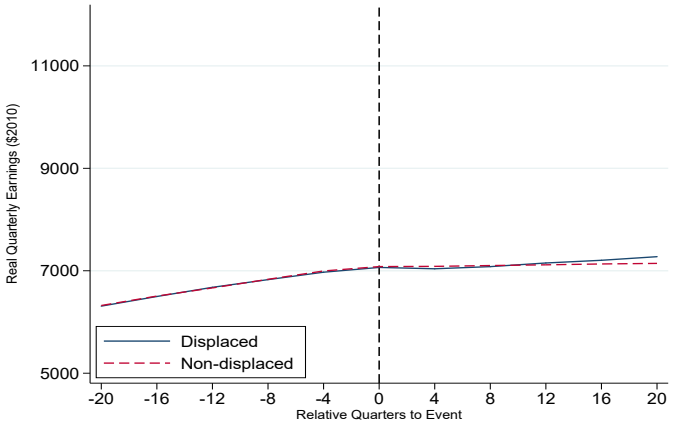
	Employed	Total Earnings	Log Earnings	Log Earnings (imputed)
Male spouses	0.004**	42.93	0.015	0.0077
	(0.0017)	(25.04)	(0.0150)	(0.0076)
Female spouses	-0.002	-219.9***	-0.059***	-0.035***
	(0.0017)	(42.84)	(0.0166)	(0.0089)
Number of individuals			109,000	

Notes: Cells report changes in employment and real quarterly earnings following displacement, by sex of the spouses. Estimates are based on matched difference-in-differences models with individual fixed effect and clustered standard errors at the matched pair level. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

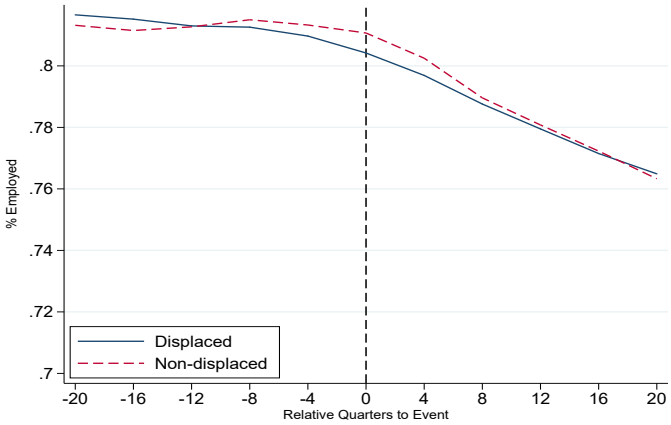
E Overall AWE by Spousal Sex



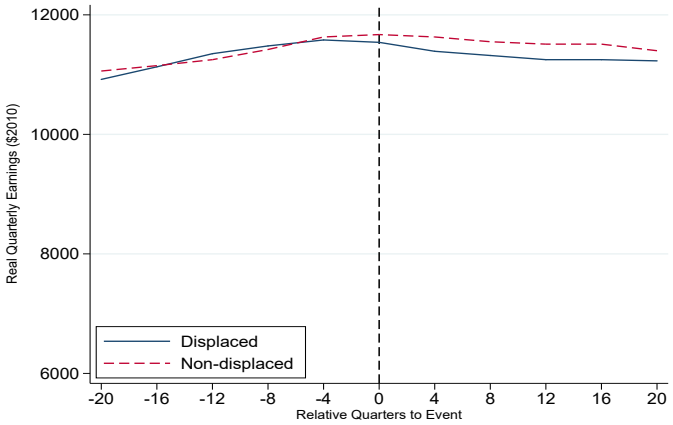
(a) Female Spouses: Employment



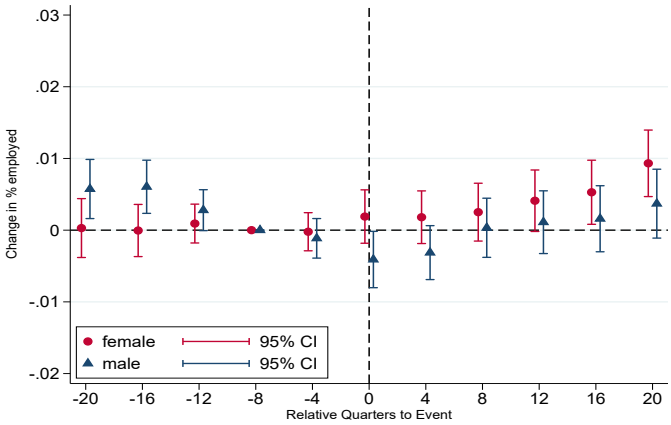
(b) Female Spouses: Real Quarterly Earnings



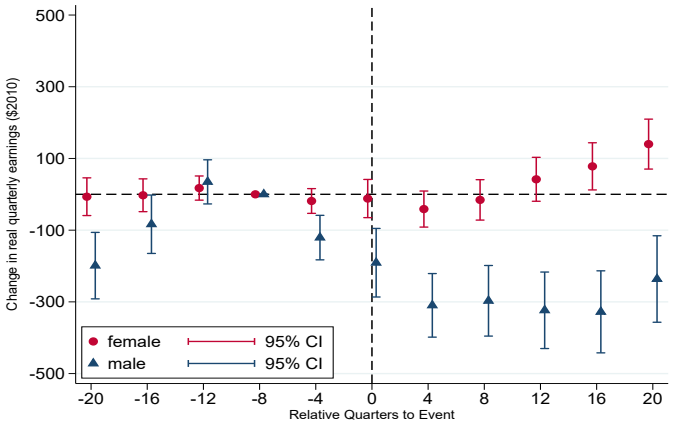
(c) Male Spouses: Employment



(d) Male Spouses: Real Quarterly Earnings



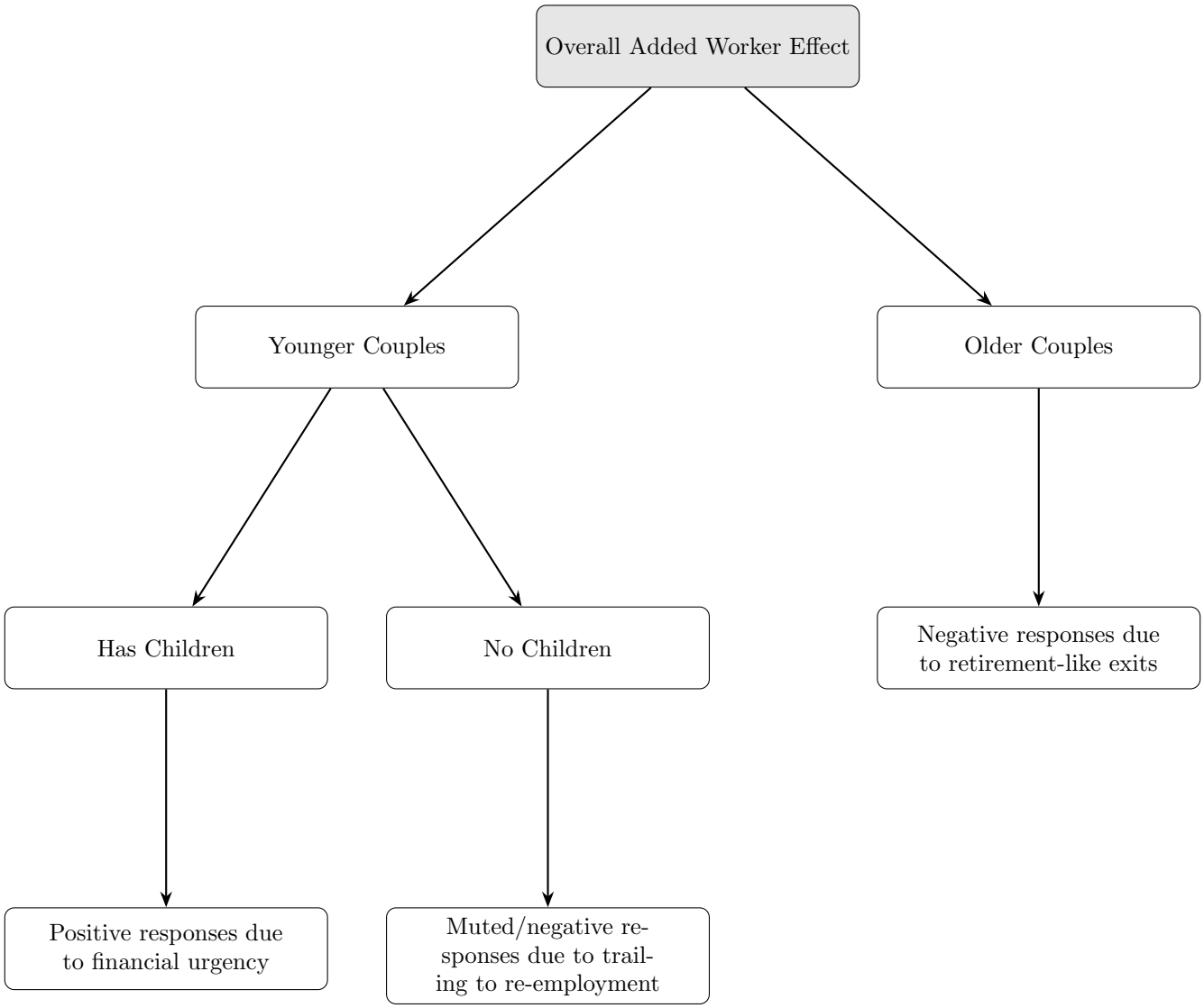
(e) Spousal Employment by Sex



(f) Spousal Earnings by Sex

Notes: Panels on the left show event studies of spouses aged 25-49; panels on the right show event studies of spouses aged 50-55. FSRDC Project Number 1875. (CBDRB-FY25-P1875-R12505).

F Mechanisms Driving Life-Cycle Differences in the AWE



G Heterogeneity in the AWE: A Household Labor Supply Model

The empirical results reveal substantial heterogeneity in spousal labor supply responses to job displacement, varying by age of the spouses, parental status, and local labor market conditions. In particular, I find positive AWE among younger parents, muted or negative responses among childless younger spouses, and retirement-like exits among older spouses. The latter two responses are especially prominent when correlated shock is present in the local labor market, and when the displaced worker decide to relocate or remain out of the labor force. To situate these patterns in a unified framework, this section presents a simple two-period theoretical model that formalizes household labor supply decisions under income shocks, highlighting how life-cycle stages, family composition, and correlated shocks interact to generate the heterogeneous AWE responses observed in the data.

G.1 Model Setup and Deriving the AWE

The added worker effect (AWE) describes that change in spousal labor supply (Δh_{sp}) in response to a partner's job displacement, where the displaced worker's earnings drop from $w_{dw}h_{dw}$ to zero. This model quantifies the AWE by deriving optimal spousal labor hours (h_{sp}) using a household utility maximization framework, accounting for consumption and leisure preferences under budget and time constraints.

The household utility follows a Cobb-Douglas function, balancing consumption and leisure of both the displaced worker and their spouse:

$$U(C, L_{sp}, L_{dw}; Z) = \alpha(Z)ln(C) + (1-\alpha(Z))[\beta(Z)ln(L_{sp}) + (1-\beta(Z))ln(L_{dw})] \tag{4}$$

where C is household consumption, L_i is leisure for person $i \in \{dw, sp\}$ (displaced worker or spouse), and $h_i = T - L_i - t(Z)$ represents labor hours. The displaced worker's hours (h_{dw}) are exogenous, with $h_{dw} > 0$ pre-displacement and $h_{dw} = 0$ post-displacement. Parameters $\alpha(Z) \in (0,1)$ and $\beta(Z) \in (0,1)$ denote the preference weights for consumption relative to total leisure and spousal leisure relative to the displaced worker's leisure, respectively. Household-specific characteristics (Z) vary across life-cycle stages.

The household faces budget and time constraints:

$$\begin{aligned} C &= w_{sp}H + w_{dw}h_{dw} + Y - c(Z) \\ L_s &= T - t(Z) - h_{sp} \end{aligned} \tag{5}$$

where w_i is the wage of person i, Y is non-labor income of the household, $c(Z)$ captures household-specific costs (e.g. childcare or relocation), T is the total time endowment, and $t(Z)$ is time spent on non-market activities like childcare, which equals zero for childless or older spouses. I denote post-displacement variables with a prime (e.g. $\alpha(Z)'$, w'_{sp}, $t(Z)'$, $c(Z)'$).

Substituting constraints into the utility function, the Lagrangian is as follows:

$$\begin{aligned} \mathcal{L} =& \alpha(Z)ln(C) + (1-\alpha(Z))[\beta(Z)ln(L_{sp}) + (1-\beta(Z))ln(L_{dw})] \\ &+ \lambda[w_{sp}h_{sp} + w_{dw}h_{dw} + Y - c(Z) - C] + \mu[T - t(Z) - h_{sp} - L_{sp}] \end{aligned} \tag{6}$$

Maximizing household utility with respect to consumption, spousal leisure, and spousal labor market work hours renders the following first-order conditions:

$$\begin{aligned} \frac{\partial \mathcal{L}}{\partial C} &: \lambda = \frac{\alpha(Z)}{C} \\ \frac{\partial \mathcal{L}}{\partial L_{sp}} &: \mu = (1-\alpha(Z))\beta(Z)\frac{1}{L_{sp}} \\ \frac{\partial \mathcal{L}}{\partial h_{sp}} &: \mu = \lambda w_{sp} \end{aligned} \tag{7}$$

Combining the three first-order conditions with the budget and time constraints, the expression for optimal spousal labor market work hours is:

$$h_{sp} = \frac{\alpha(Z)(T - t(Z))}{(1-\alpha(Z))\beta(Z) + \alpha(Z)} - \frac{(1-\alpha(Z))\beta(Z)(w_{dw}d_{dw} + Y - c(Z))}{((1-\alpha(Z))\beta(Z) + \alpha(Z))w_{sp}} \tag{8}$$

Note that if spousal wage is zero, the household compares utility from working versus not working:

$$\begin{aligned} U_{work,w_{sp}=0} - U_{notwork,w_{sp}=0} &= (1-\alpha(Z))\beta(Z)ln(T-t(Z)-h_{sp}) - (1-\alpha(Z))\beta(Z)ln(T-t(Z)) \\ &= (1-\alpha(Z))\beta(Z)ln\frac{T-t(Z)-h_{sp}}{T-t(Z)} \end{aligned}$$

which is negative for any positive work hours h_{sp}, implying that spouses only choose to work in the labor market if household utility of working at a given positive wage is strictly larger than that from not working (participation condition).
Moreover, h_{sp} may take on negative values if the income effect in the household ($w_{dw}h_{dw} + Y$) is sufficiently large. To ensure the non-negative labor hours, equation (8) becomes:

$$h_{sp} = max\left(0, \frac{\alpha(Z)(T-t(Z))}{(1-\alpha(Z))\beta(Z)+\alpha(Z)} - \frac{(1-\alpha(Z))\beta(Z)(w_{dw}d_{dw}+Y-c(Z))}{((1-\alpha(Z))\beta(Z)+\alpha(Z))w_{sp}}\right) \tag{9}$$

Post-displacement, with $w_{dw}h_{dw} \to 0$, spousal hours are:

$$h'_{sp} = max\left(0, \frac{\alpha(Z)'(T-t(Z)')}{(1-\alpha(Z)')\beta(Z)'+\alpha(Z)'} - \frac{(1-\alpha(Z)')\beta(Z)'(Y-c(Z)')}{((1-\alpha(Z)')\beta(Z)'+\alpha(Z)')w'_{sp}}\right) \tag{10}$$

The AWE is the change in spousal labor hours

$$AWE = \Delta h_{sp} = \begin{cases} h'_{sp} - h_{sp}, & \text{if work in both periods} \\ h'_{sp}, & \text{if transition from not working to working} \\ -h_{sp}, & \text{if transition from working to not working} \\ 0, & \text{if not working in either period} \end{cases}$$

G.2 Group-Specific Parameters and AWE

I characterize households by life-cycle stages: group 1 (young parents), group 2 (young childless spouses), and group 3 (spouses over 50). Preferences are ordered as $\alpha(Z_1) > \alpha(Z_2) > \alpha(Z_3)$ and $\beta(Z_1) < \beta(Z_2) < \beta(Z_3)$, reflecting stronger consumption preference and lower leisure preference for young parents, as well as the opposite for spouses over 50 years old.

G.2.1 Strong Positive AWE among Young Parents

For young parents (group 1), parameters are:

$$\alpha(Z_1) = \alpha_1 + \alpha_N N + \alpha_Y Y_{low} + \alpha_{NY} N Y_{low}$$

$$\beta(Z_1) = \beta_1$$

$$t(Z_1) = t_0 N {A_c}^{-1}$$

$$c(Z_1) = c_0 N$$

where α_1 is the baseline consumption preference, $\alpha_N N$) and $\alpha_Y Y_{low}$ increase with the number of children (N) and low-income status (Y_{low}) and $\alpha_{NY} N Y_{low}$ is a negative interaction term reflecting empirical evidence that larger families limit spousal labor supply.
Leisure preference is low for these young parents ($\beta(Z_1) = \beta_1$). Childcare time, $t(Z_1)$, decreases with age of the youngest child (A_c)

while childcare cost, $c(Z_1)$, increases with the number of children in the household. Spousal wage is $w_{sp} = w_{sp}^0 > 0$ if employed. Pre- and post-displacement hours are:

$$h_{sp} = max\left(0, \frac{\alpha(Z_1)(T - t_0 N {A_c}^{-1})}{(1-\alpha(Z_1))\beta(Z_1) + \alpha(Z_1)} - \frac{(1-\alpha(Z_1))\beta(Z_1)(w_{dw}d_{dw} + Y - c_0 N)}{((1-\alpha(Z_1))\beta(Z_1) + \alpha(Z_1))w_{sp}^0}\right)$$

$$h'_{sp} = max\left(0, \frac{\alpha(Z_1)(T - t_0 N {A_c}'^{-1})}{(1-\alpha(Z_1))\beta(Z_1) + \alpha(Z_1)} - \frac{(1-\alpha(Z_1))\beta(Z_1)(Y - c_0 N)}{((1-\alpha(Z_1))\beta(Z_1) + \alpha(Z_1))w_{sp}^0}\right)$$

Consumption and leisure preferences ($\alpha(Z_1)$, β_1) remain stable across the two periods for young parents. Young parents face tighter budge constraints due to higher N and lower Y, increasing $\alpha(Z_1)$ and favoring labor market participation. Pre-displacement, young children increase $t(Z_1)$, reducing available work time and potentially leading to non-participation. Post-displacement, as children age ($A'_c > A_c$), time constraints relax, and the loss of displaced worker's earnings incentivizes spousal work. The AWE is:

$$\Delta h = \begin{cases} h'_s > 0, & \text{if transition from not working to working} \\ h'_{sp} - h_{sp} = \frac{(1-\alpha(Z_1))\beta(Z_1)w_{dw}h_{dw}}{[(\alpha(Z_1)+(1-\alpha(Z_1))\beta(Z_1)]w_{sp}^0} > 0, & \text{if working in both periods} \end{cases}$$

The positive AWE aligns with empirical evidence of young parents increasing work hours or entering the workforce following their partners' job loss.

G.2.2 Muted or Negative AWE among Childless Young Spouses

Childless young spouses (group 2) face different incentives than young parents, as they have no childcare responsibilities but are exposed to correlated labor market shocks and potential relocation costs following a partner's job displacement. This subsection examines their labor supply response, predicting a muted or negative AWE due to moderate consumption preferences, increased leisure preferences, reduced wages, and relocation frictions.
The parameters for childless young spouses are:

$$\alpha(Z_2) = \alpha_2$$

$$\beta(Z_2) = \beta_2 + \beta_S S + \beta_R R$$

$$t(Z_2) = t_R R$$

$$c(Z_2) = \begin{cases} 0, & \text{pre-displacement} \\ c_R R, & \text{post-displacement} \end{cases}$$

where $\alpha(Z_2) = \alpha_2 < \alpha(Z_1)$ reflects lower consumption preference compared to young parents, due to the absence of child-related expenses. The leisure preference $\beta(Z_2)$ includes a baseline β_2, a term $\beta_S S$ where $S \geq 0$ represents correlated labor market shocks (e.g. spouse work in the same industry as the displaced worker, with $\beta_S > 0$), and a term $\beta_R R$ where $R \in 0, 1$ indicates relocation ($\beta_R > 0$ capturing dis-utility from relocation). Time spent on non-market activities includes $t_R R$ where $t_R > 0$ reflects time demands from relocation, such as job search or settling in a new location). Relocation costs $c(Z_2) = c_R R$ apply post-displacement, with $c_R > 0$ being the fixed financial cost incurred only if relocation occurs. The spousal wage is $w_{sp} = w_{sp}^0(1 - \delta_S S - \delta_R R)$, where $\delta_S > 0$ and $\delta_R > 0$ capture wage reductions due to correlated shocks and relocation penalties for the spouse, respectively.
Pre-displacement spousal hours are:

$$h_{sp} = max\left(0, \frac{\alpha_2(T - t(Z_2))}{(1-\alpha_2)(\beta_2 + \beta_S S) + \alpha_2} - \frac{(1-\alpha_2)(\beta_2 + \beta_S S)(w_{dw}d_{dw} + Y)}{((1-\alpha_2)(\beta_2 + \beta_S S) + \alpha_2)w_{sp}^0(1 - \delta_S S)}\right)$$

Post-displacement, with $w_{dw}h_{dw} = 0$ and potential relocation, spouse's optimal hours are:

$$h'_{sp} = max\left(0, \frac{\alpha_2(T - t(Z_2)')}{(1-\alpha_2)(\beta_2 + \beta_S S' + \beta_R R) + \alpha_2} - \frac{(1-\alpha_2)(\beta_2 + \beta_S S' + \beta_R R)(Y - c_R R)}{((1-\alpha_2)(\beta_2 + \beta_S S' + \beta_R R) + \alpha_2) w^0_{sp}(1 - \delta S' - \delta_R R)}\right)$$

where S' is the post-displacement shock magnitude, $t(Z_2)' = t_R R$, and $R \in \{0, 1\}$ indicates relocation. The relocation cost $c_R R$ subtracts from Y regardless of labor supply, creating an income effect that encourages higher hours, but this is counteracted by increased leisure preference ($\beta_R R$), reduced available time ($t_R R$), and lower wages ($\delta_R R$) when relocation happens, potentially leading to lower to zero hours.
In the pre-displacement period, moderate consumption preference (α_2) supports moderate spousal labor supply, but larger shocks (S) reduces w_{sp} and raise leisure preference $\beta(Z_2)$, potentially leading to non-participation. Post-displacement, larger correlated shocks ($S' > S$) further reduces w'_{sp} and increase leisure preference, discouraging work. If relocation occurs, the frictions (β_R, t_R, δ_R) discussed above would dampen labor supply, often resulting in muted or negative changes in hours despite the income effect from c_R.
The AWE is:

- Negative if transitioning from working to not working (e.g. relocation frictions dominate): $\Delta h = -h_{sp} < 0$
- Muted or negative if working both periods with larger post-displacement shocks ($S' > S$) or relocation, as reduced w'_{sp}, increased $\beta(Z_2)'$ and time/wage penalties lower h'_{sp}.
- Positive if $S' = S$ and $R = 0$ (no relocation or shock change):

$$\Delta h_{sp} = h'_{sp} - h_{sp} = \frac{(1 - \alpha(Z_2))(\beta_2 + \beta_S S) w_{dw} h_{dw}}{[(\alpha(Z_2) + (1 - \alpha(Z_2))(\beta_2 + \beta_S S)] w^0_{sp}(1 - \delta_S S)} > 0$$

Hence, the muted or negative AWE among childless young spouses arises from: (1) moderate consumption preference ($\alpha_2 < \alpha(Z_1)$), reducing the incentive to work; (2) increased leisure preference due to correlated shocks ($\beta_S S'$) and relocation ($\beta_R R$); (3) reduced wages ($w'_{sp} < w_{sp}$ if $S' > S$ or $R = 1$); (4) time cost from relocation ($t_R R$); and (5) financial cost from relocation ($c_R R$) that may be offset by labor but are dampened by frictions. These factors increase non-participation or reduce hours in the post-period, consistent with empirical findings of limited labor supply response.

G.2.3 Retirement-Like Exits among Spouses over 50

Spouses over 50 (group 3) exhibit a strong preference for leisure, driven by age and reduced consumption needs, leading to retirement-like labor market exits following a partner's job displacement. This subsection of the model predicts a negative AWE for older spouses, as low consumption preferences, high leisure preferences, correlated labor market shocks, non-reemployment of the displaced worker, and potential relocation frictions discourage labor supply.
The parameters for older spouses are:

$$\alpha(Z_3) = \alpha_3$$

$$\beta(Z_3) = \beta_3 + \beta_A A + \beta_S S + \beta_R R + \beta_E(1 - E)$$

$$t(Z_3) = t_R R + t_E(1 - E)$$

$$c(Z_3) = \begin{cases} 0, & \text{pre-displacement} \\ c_R R, & \text{post-displacement} \end{cases}$$

where $\alpha(Z_3) = \alpha_3 < \alpha(Z_2) < \alpha(Z_1))$ reflects the lowest consumption preference among groups, due to minimal household expenses (e.g. no childcare). Leisure preference $\beta(Z_3)$ includes a baseline β_3, a term $\beta_A A$ increasing with spousal age (A, with $\beta_A > 0$), a term $\beta_S S$ capturing correlated labor market shocks ($S \geq 0$, with $\beta_S > 0$), a term $\beta_R R$ for relocation dis-utility, and a term $\beta_E(1 - E)$ for non-reemployment penalty. In the last term, $beta_E > 0$ and $E \in 0, 1$ indicates reemployment of the displaced worker. Time-spent on non-market activities includes $t_R R$ and $t_E(1 - E)$, with $t_R > 0$ and $t_E > 0$ representing time demands from relocation and joint retirement activities. Relocation costs apply post-displacement as $c_R R$ being the fixed cost incurred only if the household relocates.

The spousal wage is $w_{sp} = w^0_{sp}(1 - \delta_S S - \delta_R R - \delta_E(1 - E))$, with all the δ parameters strictly positive, reflecting wage reductions due to shocks, relocation and non-reemployment.
Therefore, pre-displacement spousal hours are:

$$h_{sp} = max\left(0, \frac{\alpha_3(T - t(Z_3))}{(1-\alpha_3)(\beta_3 + \beta_S S + \beta_A A) + \alpha_3} - \frac{(1-\alpha_3)(\beta_2 + \beta_S S + \beta_A A)(w_{dw} d_{dw} + Y)}{((1-\alpha_3)(\beta_3 + \beta_S S + \beta_A A) + \alpha_3) w^0_{sp}(1 - \delta_S S)}\right)$$

Post-displacement hours, accounting for non-reemployment and relocation, are:

$$h'_{sp} = max\left(0, \frac{\alpha_3(T - t(Z_3)')}{(1-\alpha_3)\beta(Z_3)' + \alpha_3} - \frac{(1-\alpha_3)\beta(Z_3)'(Y - c_R R)}{((1-\alpha_3)\beta(Z_3)' + \alpha_3) w^0_{sp}(1 - \delta_S S' - \delta_R R - \delta_E(1 - E))}\right)$$

where S' and A'_{sp} are post-displacement shock magnitude and spousal age, $t(Z_3) = t_R R + t_E(1 - E)$, and $E \in 0, 1$ indicates reemployment ($E = 1$) or non-reemployment of the displaced worker. The relocation cost subtracts from total Y, encouraging higher hours via income effect, but frictions (β_R, t_R, δ_R) and non-reemployment penalties (β_E, t_E, δ_E) counteracts this, often leading to low or zero hours, mimicking retirement-like exits.
In the pre-displacement period, low consumption preference and high leisure preference result in minimal labor supply, with some of the spouses already out of the labor market. Post-displacement, increased shocks ($S' > S$) and aging ($A'_{sp} > A_{sp}$) further elevate $\beta(Z_3)'$, reducing w'_{sp} and discouraging work. Non-reemployment ($E = 0$) adds penalties and push toward joint retirement. Relocation ($R = 1$) introduces frictions that reduce labor supply of the trailing spouse. The AWE is:

- Negative if transitioning from working to not working (e.g. due to relocation or non-reemployment): $\Delta h = -h_{sp} < 0$
- Muted or negative if working both both periods with larger shocks ($S' > S$), aging ($A'_{sp} > A_{sp}$), relocation ($R = 1$), or non-reemployment ($E = 0$), as $h'_{sp} < h_{sp}$ due to higher $\beta(Z_3)'$ and lower w'_{sp}.
- Positive but small if $S' = S$, $E = 1$, and $R = 0$:

$$\Delta h_{sp} = h'_{sp} - h_{sp} = \frac{(1-\alpha_3)(\beta_3 + \beta_S S + \beta_A A) w_{dw} h_{dw}}{[(\alpha_3 + (1-\alpha_3)(\beta_3 + \beta_S S + \beta_A A)] w^0_{sp}(1 - \delta_S S)} > 0$$

To sum up, the negative AWE among spouses over 50 likely arises from (1) low consumption preference that reduces work incentives; (2) high leisure preference that is amplified by aging, shocks, relocation and non-reemployment; (3) wage reductions due to similar frictions, and (4) time and financial costs from relocation, and (5) non-reemployment encourages joint retirement.
This negative AWE, combined with the muted AWE of childless young spouses, offsets the positive AWE of young parents, explaining the empirically observed muted average AWE across households.