Review of Economic Dynamics 56 (2025) 101271

Contents lists available at ScienceDirect

Review of Economic Dynamics

journal homepage: www.elsevier.com/locate/red

Full Length Article

Does the added worker effect matter? ☆

Nezih Guner [a], Yuliya A. Kulikova [b,c], Arnau Valladares-Esteban [d,*]

[a] *CEMFI and Banco de España, Spain*
[b] *Okinawa Institute of Science and Technology, Japan*
[c] *International Institute for Applied Systems Analysis, Austria*
[d] *University of St. Gallen and SEW, Switzerland*

ARTICLE INFO

JEL classification:
D1
E32
J21
J22

Keywords:
Added worker effect
Household labor supply
Intra-household insurance
Female employment
Cyclicality

ABSTRACT

In the US, the likelihood of a married woman entering the labor force in a given month increases by 60% if her husband loses his job, known as the added worker effect. However, only 1.5% to 3.5% of married women entering the labor force in a given month can be added workers. This raises the question of whether the added worker effect can significantly impact aggregate labor market outcomes. Building on Shimer (2012), we introduce a new methodology to evaluate how joint transitions of married couples across labor market states affect aggregate participation, employment, and unemployment rates. Our results show that the added worker effect significantly impacts aggregate outcomes, increasing married women's participation and employment by 0.72 and 0.65 percentage points each month. Additionally, the added worker effect reduces the cyclicality of married women's participation and unemployment, lowering the correlation between GDP's cyclical components and participation by 4.5 percentage points and unemployment by 8 percentage points.

1. Introduction

In the US, more than 60% of labor force participants between ages 25 and 54 are married.[1] The entry of married women into the labor market has increased dramatically the share of two-earner households over the last decades. In 1960, only 35% of married women aged 25 to 54 were in the labor force. Today, about 74% of them are.[2] Thus, most workers today make labor market decisions jointly with a partner.

Married-couple households with two potential earners can cope better with adverse labor market shocks than single-person households. If one household member experiences an adverse employment or wage shock, the other can adjust their labor supply to compensate. This paper presents a new methodology for assessing how couples' joint labor market dynamics impact the aggregate

☆ A previous version of this paper was circulated under the title "Labor Market Dynamics of Married Couples." We thank the editor, Loukas Karabarbounis, three anonymous referees, Micole De Vera, Eric French, Javier López Segovia, Francesc Obiols, Alessandro Ruggieri, Andrew Sheppard, and participants of the SAEe and EEA Annual Meetings and at the internal seminar series at the Bank of Spain for their helpful comments. We thank Feng Qui for her excellent research assistance. Guner acknowledges support from the Spanish Ministry of Economy and Competitiveness Grant ECO2014-54401-P. The views expressed herein are those of the authors and not necessarily those of Banco de España. All errors are ours.

* Corresponding author.
E-mail addresses: nezih.guner@cemfi.es (N. Guner), yuliya.kulikova@gmail.com (Y.A. Kulikova), arnau.valladares@gmail.com (A. Valladares-Esteban).

[1] The figure is based on the Current Population Survey (CPS). For the 2000-2018 period, about 62% of men and 60% of women in the labor force were married.

[2] There is extensive literature that studies the rise of married women's labor force participation. See recent reviews by Doepke and Tertilt (2016), Albanesi et al. (2023), and Greenwood et al. (2023).

https://doi.org/10.1016/j.red.2025.101271
Received 15 March 2021; Received in revised form 28 January 2025

Available online 6 February 2025

participation, employment, and unemployment of married men and women. We apply this methodology to determine the aggregate impact of the added worker effect (AWE), the increase in the likelihood of individuals entering the labor force when their partners lose their jobs and move from employment to unemployment. We use data from 1976 to 2021 from the Current Population Survey (CPS), the primary US data source for studying labor market dynamics in the US. We show that the AWE increases female labor force participation and employment, and decreases their cyclicality.

We first estimate the AWE following the standard approach in the labor economics literature. We run a regression where the dependent variable is an indicator of a non-participating individual entering the labor force, and the main right-hand-side variable is an indicator of their partner losing their job, together with controls for observable characteristics. We estimate both the contemporaneous and dynamic added worker effects. The contemporaneous AWE uses transitions when one spouse loses a job, and the other enters the labor force in the same period. For the dynamic effect, we include entries into the labor force in a given period associated with a partner losing a job in the past (lags) or the future (leads). The CPS allows us to consider transitions in up to four consecutive months. We also differentiate between entries into the labor force associated with partners' involuntary job losses and quits.

For the pre-COVID period, between 1976 and 2019, we find that the probability of a wife entering the labor force is 6 percentage points (p.p.) higher if her husband loses his job. This is a substantial effect since the unconditional monthly probability of a non-participant wife entering the labor force is 9.8%, i.e., the AWE increases this probability by 60%. We also find a significant added worker effect for husbands. The probability of husbands entering the labor force is 6.7 p.p. higher when their wives lose their jobs, with an 18.6% unconditional probability of entering the labor force for non-participant husbands. When we separate movements from non-participation to employment and unemployment, the AWE increases mainly the probability of movements into unemployment.

The AWE is slightly larger in expansions than in recessions. While the difference is not statistically significant, it can reflect the higher job-finding probabilities during expansions that make entry into the labor force more likely. The AWE has increased for wives since 1980: the estimated effect was 4.7 p.p. in the 1980s, while it was 7.5 p.p. in the 2010s. There is no clear trend in the AWE for husbands. The COVID-19 years (2020-2021) are associated with a smaller AWE, particularly for husbands. The AWE is 0.18 p.p. for husbands during this period and not statistically different from zero. For wives, the AWE is about half of what is estimated for the 1976-2019 period, 3.7 p.p.

Next, we calculate the *number of added workers* in the economy: the total number of individuals who enter the labor force in a given month and whose partners make an E to U move, either contemporaneously or in the previous or following two months. For the 1976-2019 period, an average of 9 million married women aged 25 to 54 were out of the labor force each month. Around 720,000 non-participant married women enter the labor force each month, which is about 8% of all non-participant married women aged 25 to 54. Among those entering the labor force, 1.5% are added workers if we only consider the contemporaneous AWE. The number is higher if we consider leads and lags, 3.5% of women entering the labor force (an average of around 25,000 women per month). As a result, while the probability that an individual will enter the labor force when their partner loses their job is very high, the number of individuals who make such transitions, as a fraction of the entire labor force, is very small. The number of added-worker husbands is much smaller since only about 5% of married men in this age group are out of the labor force.

Finally, we build on Shimer (2012) to develop a new methodology that assesses how couples' joint labor market dynamics shape participation, employment, and unemployment and deploy it to measure the aggregate importance of the AWE, which we refer to as the *aggregate* AWE. Shimer (2012) measures how the probabilities in and out of unemployment affect its cyclicality. The key step in Shimer (2012) is representing the steady-state unemployment rate as a function of transition probabilities. The influence of each transition on unemployment is then measured as the difference between the actual and counterfactual steady-state unemployment rates when a particular transition is replaced by its average over the period.

Our method is based on the fact that, for married couples, individual transitions across labor market states can be broken down into conditional flows that depend on what partners do. For instance, some married women move from non-participation to participation while their husbands experience a job loss, while others do so while their husbands remain employed. We can construct counterfactual individual flows and steady states by replacing any conditional flow with an alternative scenario. Comparing the baseline steady state with the counterfactual steady state helps us understand the role of the counterfactual flow in determining participation, employment, and unemployment rates.

We develop two counterfactual scenarios to measure the aggregate AWE. In the first scenario, we assume that added workers do not move into employment or unemployment but remain out of the labor force. This scenario, which is very easy to interpret, provides an upper bound for the AWE's aggregate influence. In the second scenario, we assume that added workers enter the labor force with the same probability as non-added workers (those who enter the labor force when their partners make any contemporaneous transitions but the E-to-U ones). This scenario is equivalent to setting the regression-implied AWE to zero and represents a lower bound for the aggregate impact of the AWE. For each of these scenarios, we consider both contemporaneous and dynamic versions of the AWE.

We find that despite the small number of added workers, the impact on labor force participation is not negligible and statistically significant. For the 1976-2019 period, under the assumption that added workers do not enter the labor force and considering leads and lags, married women's labor force participation is 0.72 p.p. higher due to the AWE. The monthly average labor force participation of married women during this period was 69%. The effect of the AWE on participation is much higher in some months. For 25% of the months in the sample, the effect is larger than 0.89 p.p. with a maximum effect of 1.8 p.p. The AWE has a lower impact on aggregate female labor force participation under the assumption that added workers enter the labor force with the same probability as non-added workers. For the 1976-2019 period, considering leads and lags, married women's labor force participation is 0.25 p.p. higher because of the AWE. In 25% of the months in the sample, the effect is larger than 0.38 p.p., and the maximum effect is 1.14 p.p.

Our results also show that the sizes of the AWE and the aggregate AWE can differ significantly. While the AWE is slightly larger in expansions, the aggregate AWE is more significant during recessions. In recessions, married women's labor force participation is about 0.93 p.p. higher due to the AWE, whereas the increase is 0.69 p.p. in expansions. Similarly, although the AWE was small during the COVID-19 period, its aggregate effect on married women's labor force participation was significant, leading to a 1.03 p.p. increase. Moreover, while women's AWE has been increasing since 1980, the aggregate AWE has been declining, reflecting a smaller pool of potential added workers due to higher female labor force participation. The differences between the size of the AWE and the aggregate AWE highlight the importance of labor dynamics across labor market states, which our methodology can capture.

Furthermore, while the AWE is larger for transitions from non-participation to unemployment than for transitions from non-participation to employment, the aggregate AWE generates primarily an increase in employment. During the 1976-2019 period, the aggregate AWE increased the employment of married women by 0.65 p.p., while the rise in unemployment is smaller, about 0.06 p.p. Hence, the aggregate AWE highlights secondary earners' role as insurance providers for married households. In 25% of the months in our sample, the AWE raises the employment rate of married women by more than 0.8 p.p.

The AWE also decreases the cyclicality of married female participation, employment, and unemployment. Following Doepke and Tertilt (2016), we measure cyclicality with the correlation between the cyclical components of GDP and the variable of interest (calculated as deviations from a Hodrick-Prescott trend). Again, under the assumption that added workers do not enter the labor force and considering leads and lags, the AWE lowers the correlation between GDP and married women's participation by about 4.5 p.p. This is a significant effect since the correlation between GDP and married women's participation is about 8% in the data. The effect on unemployment is also large. The AWE lowers the correlation between GDP and married women's unemployment by about 8 p.p. This correlation is about -77% in the data. Hence, the AWE is an important contributor to the fact that women's labor market outcomes are less cyclical than those of men, as highlighted by Doepke and Tertilt (2016), Albanesi (2019) and Fukui et al. (2023).

The paper is related to three strands of literature. First, the paper builds on the extensive empirical literature on the AWE, which goes back, at least, to Mincer (1962). Mankart and Oikonomou (2016) document that the added worker effect has grown in recent decades. Within this literature, some papers, such as Stephens (2002), Kohara (2010), and Halla et al. (2020), focus on the unexpected shocks that lead to job loss, such as husband's displacements, plant closures, or bankruptcy. As in Bredtmann et al. (2018), our results show that added workers mainly move from non-participation to unemployment. Although the previous literature primarily focused on the labor force entry by married females, we find that the husband's AWE is relatively smaller than the wife's AWE but statistically significant.

While the existing literature mainly aims at estimating the AWE, we focus on how much the AWE impacts aggregate outcomes. Our approach builds on the analysis by Lundberg (1985), who uses a subset of couples' conditional transitions to assess how a husband's temporary unemployment spell affects the participation and employment of previously non-participant wives. We also draw from more recent empirical literature on labor market fluctuations, such as Blanchard et al. (1990), Fujita and Ramey (2009), Shimer (2012), and Elsby et al. (2015). We depart from Lundberg (1985) in that our methodology allows us to precisely identify in the data the added workers and systematically assess the implications of their labor supply responses following an observed employment-to-unemployment transition by their spouses.

Our methodology presents two key advantages. First, since it builds on the idea that individual transitions can be decomposed into joint conditional transitions, it can be used to study the aggregate impact of any joint labor market dynamics. Second, creating counterfactuals at the level of flows instead of transition probabilities allows for the inclusion of lead and lagged responses and consideration of individual characteristics. In our application, we use both the contemporaneous and dynamic definitions of the AWE and can distinguish between quits and involuntary job losses.

Second, our paper is related to the recent macroeconomics literature that builds models with two-earner households to study how households smooth idiosyncratic income shocks. Ortigueira and Siassi (2013), Rogerson and Wallenius (2018), Birinci (2021), Guner et al. (2023), Wu and Krueger (2021), Bence (2022), Bacher et al. (2022), Casella (2022), and Mankart et al. (2023) are examples in this literature. Following Guler et al. (2012) and Flabbi and Mabli (2018), a set of papers within this literature model joint search behavior of husbands and wives, e.g., Mankart and Oikonomou (2017), Choi and Valladares-Esteban (2020), Pilossoph and Wee (2021), and Wang (2019).

Mankart and Oikonomou (2017) show that a two-agent model with a comparable AWE to that in the data is considerably more accurate at replicating the acyclicality of the participation rate than a single-agent model. In their model, the insurance provided by the family includes two important dimensions. First, individual productivity shocks are uncorrelated within the household. Therefore, two-agent households face significantly less household income volatility than single-agent households. Second, two-agent households use the added workers to further smooth income shocks. We take an accounting approach to isolate the impact of the AWE on aggregate labor market outcomes while remaining agnostic about other important mechanisms that explain the behavior of two-agent households.

The literature modeling two-agent households is closely connected to empirical studies that focus on household insurance. Pruitt and Turner (2020) document that households face substantially less earnings risk than singles. Blundell et al. (2016) estimate that only about 34% of permanent shocks to male wages and 20% of permanent shocks to female wages are passed through to household consumption and that family labor supply is a key insurance channel available to households.

Finally, our work is also related to the papers that show how men and women differ in their labor market fluctuations and the implications of these differences for the aggregate economy, e.g., Albanesi and Şahin (2018), Albanesi (2019), Ellieroth (2022), Fukui et al. (2023), and Coskun and Dalgic (2024). In particular, we highlight one potential factor, the AWE, that can generate gender differences in labor market fluctuations.

The rest of the paper is organized as follows. In Section 2, we describe the data and introduce key concepts. In Section 3, we empirically show the presence of the AWE in the data and present a share of households with an added worker. In Section 4, we describe our methodology and how we apply it to the AWE. Section 5 contains the results. We conclude in Section 6.

2. Data

We use monthly data from the Outgoing Rotation Groups of the CPS from January 1976 until December 2021. Every household (address) that enters the CPS is interviewed for four consecutive months, then is not interviewed (rotated out) for the next eight months and interviewed again (rotated in) for four more months. This procedure implies that eight rotation groups are surveyed monthly, and six of them will be surveyed again next month. As a result, it is possible to match 3/4 of individuals between two consecutive months, 1/2 across three successive months, and 1/4 across four straight months every month. We follow a standard procedure based on matching households with the same identification code as long as household members' characteristics (age, sex, race, and education) are consistent between consecutive months (see Shimer (2012)).

Our sample comprises all married couples living in the same household who report one spouse as the household head. We restrict the sample to couples in which both members are 25 to 54 years old to minimize the effects of schooling and retirement decisions. Moreover, we remove all individuals with missing information on employment status or education level from the sample. Our final sample contains around nine million couples, approximately 16,000 per month.

For each month, we classify each individual in the sample to be in one of three mutually exclusive states: employed (E) are those who have a job, unemployed (U) are those who are looking for a job, and non-participant (N) are those which are not in any of the two previous states. The sum of those in E or U are the labor force participants (P). Using the panel dimension of the CPS, we calculate the transitions across E, U, and N. Following Elsby et al. (2015), we correct possible classification errors by identifying and correcting streams of individual labor market states with unlikely reversals between unemployment and non-participation. Consider, for example, an individual who is recorded as being out of the labor force for two consecutive months, then appears unemployed in the third month and is recorded again as out of the labor force in the fourth month. The recording in the third month is attributed to measurement error, and the individual is re-coded as out of the labor force in that month.[3]

3. The added worker effect

An added worker is a non-participant (N) who moves to either unemployment (U) or employment (E) while their spouse moves from employment (E) to unemployment (U). We use the following regression to measure the relationship between the probability of entering the labor force and the event of a spouse moving from employment to unemployment:

$$\mathbb{1}_{i,NX} = \alpha \cdot \mathbb{1}_{i^*,EU} + \beta X_i + \gamma X_{i^*} + \theta_s + \epsilon_i, \tag{1}$$

where $\mathbb{1}_{i,NX}$ is a dummy variable that takes value 1 if a non-participant i with an employed spouse i^* enters the labor force, moving to $X \in \{E, U, P = E \cup U\}$, and 0 otherwise. $\mathbb{1}_{i^*,EU}$ is a dummy taking value 1 if the employed spouse i^* moves to unemployment and 0 if they remain employed. The control variables, X_i and X_{i^*}, include dummy variables for age, education, race, occupation, industry, and the presence of own children in the household, while θ_s are state fixed effects. The sample consists of all individual monthly transitions from N to $X \in \{E, U, P = E \cup U\}$ within a given period.

The results are presented in Table 1 for married women and in Table 2 for married men. The tables show the estimated α coefficient for three possible transitions from N to $X \in \{E, U, P = E \cup U\}$, that is, the added worker moving into participation (either employment or unemployment), only employment, or only unemployment. 95% confidence intervals are reported in parentheses. We consider two specifications that differ in when the employed spouse loses their job. First, we consider only the added worker entering the labor market in the same month when the employed spouse loses their job. We label this case the *contemporaneous effect*. Second, we expand the time frame to consider the entry of an individual into the labor force in a given month associated with their partner's job losses in a 4-month window, the most consecutive months observable in the CPS. We label this case the *effect with leads and lags*. We estimate Equation (1) for nine different sub-periods. We start with all the available years, 1976-2019, excluding the COVID-19 pandemic period. Then, we split the sample between recessions and expansion periods, according to the National Bureau of Economic Research (NBER) classification. Finally, we report estimates separately for each decade in our sample and the years associated with the COVID-19 pandemic (2020-2021).

For the 1976-2019 period, the upper panel of Table 1 (contemporaneous effect) shows that women married to men who move from E to U are 6 p.p. more likely to enter the labor market than those married to men who remain employed. The unconditional probability of entering the labor market is relatively low for wives, about 9.8%. As a result, the likelihood of a non-participant wife entering the labor market increases by around 61% when her husband moves from E to U. The most important channel is the N to U, the probability of such a move increases by around 147% (a 5.45 p.p. increase with an unconditional probability of 3.7%). In contrast, the increase in the likelihood of a N to E move is only 8.5% (a 0.52 p.p. increase with an unconditional probability of 6.1%).

The relative importance of AWE for husbands is smaller. Men married to women who move from E to U are 6.7 p.p. more likely to enter the labor market than those married to women who remain employed. For the same period, a non-participant husband's

[3] See Appendix Section A.1 for further details.

Table 1
The Added Worker Effect, Married Women.

	1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
Contemporaneous Effect									
N to P	5.967	6.082	5.483	6.521	4.746	5.501	6.105	7.532	3.721
	(5.361, 6.573)	(5.417, 6.746)	(4.022, 6.945)	(4.748, 8.294)	(3.803, 5.689)	(4.150, 6.851)	(4.731, 7.479)	(5.982, 9.081)	(0.286, 7.157)
N to E	0.516	0.645	-0.019	0.495	-0.191	0.223	0.351	2.032	-0.458
	(0.063, 0.970)	(0.144, 1.146)	(-1.057, 1.019)	(-0.735, 1.726)	(-0.844, 0.462)	(-0.798, 1.243)	(-0.703, 1.404)	(0.803, 3.261)	(-3.145, 2.230)
N to U	5.450	5.437	5.502	6.026	4.937	5.278	5.754	5.499	4.179
	(4.959, 5.941)	(4.901, 5.972)	(4.279, 6.725)	(4.555, 7.496)	(4.169, 5.704)	(4.200, 6.357)	(4.611, 6.898)	(4.240, 6.758)	(1.385, 6.974)
Effect with Leads and Lags									
N to P	3.643	3.767	3.142	3.463	2.980	3.613	3.394	4.556	2.402
	(3.219, 4.067)	(3.301, 4.234)	(2.132, 4.151)	(2.230, 4.696)	(2.306, 3.654)	(2.658, 4.569)	(2.451, 4.338)	(3.475, 5.637)	(-0.096, 4.901)
N to E	-0.124	-0.071	-0.196	-0.358	-0.406	-0.200	-0.382	0.635	-0.262
	(-0.448, 0.199)	(-0.428, 0.286)	(-0.951, 0.558)	(-1.242, 0.525)	(-0.895, 0.084)	(-0.939, 0.538)	(-1.120, 0.355)	(-0.212, 1.481)	(-2.292, 1.769)
N to U	3.767	3.838	3.338	3.821	3.386	3.814	3.777	3.921	2.664
	(3.438, 4.096)	(3.477, 4.200)	(2.548, 4.128)	(2.851, 4.791)	(2.866, 3.906)	(3.084, 4.544)	(3.034, 4.520)	(3.068, 4.774)	(0.755, 4.572)

Notes: CPS 1976 to 2021. Each cell reports the estimated coefficient α, expressed in percentage points, from Equation (1). We include all spouses who move from employment to unemployment. We report 95% confidence intervals. We use dummies to non-parametrically control for each category of age, education, race, occupation, industry, and own children in the household of both spouses.

Table 2
The Added Worker Effect, Married Men.

	1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
Contemporaneous Effect									
N to P	6.693	6.825	5.488	5.082	5.427	7.235	7.038	6.677	0.180
	(4.668, 8.719)	(4.690, 8.961)	(-0.770, 11.746)	(-2.315, 12.478)	(0.920, 9.934)	(2.924, 11.547)	(3.130, 10.946)	(2.771, 10.583)	(-9.322, 9.681)
N to E	0.874	0.793	1.989	-3.706	-1.037	0.354	1.574	2.412	1.456
	(-0.780, 2.528)	(-0.940, 2.525)	(-3.353, 7.331)	(-8.016, 0.603)	(-4.259, 2.184)	(-2.865, 3.572)	(-1.786, 4.935)	(-0.975, 5.800)	(-8.377, 11.290)
N to U	5.819	6.033	3.499	8.788	6.464	6.882	5.464	4.265	-1.277
	(4.122, 7.517)	(4.224, 7.842)	(-1.275, 8.272)	(1.615, 15.961)	(2.626, 10.302)	(3.062, 10.702)	(2.230, 8.698)	(1.173, 7.356)	(-8.107, 5.554)
Effect with Leads and Lags									
N to P	3.851	4.075	1.867	5.472	3.596	4.796	3.914	3.001	1.971
	(2.359, 5.342)	(2.495, 5.655)	(-2.613, 6.348)	(-0.548, 11.492)	(0.199, 6.992)	(1.584, 8.007)	(1.090, 6.738)	(0.115, 5.886)	(-5.205, 9.148)
N to E	-0.429	-0.384	-0.299	-3.405	-1.728	0.205	0.076	-0.003	0.153
	(-1.631, 0.774)	(-1.655, 0.887)	(-3.938, 3.339)	(-6.860, 0.050)	(-4.181, 0.726)	(-2.355, 2.766)	(-2.314, 2.466)	(-2.393, 2.387)	(-6.520, 6.825)
N to U	4.280	4.459	2.167	8.877	5.323	4.590	3.838	3.004	1.819
	(3.070, 5.490)	(3.169, 5.749)	(-1.298, 5.631)	(3.158, 14.595)	(2.472, 8.175)	(1.950, 7.231)	(1.575, 6.102)	(0.737, 5.271)	(-4.098, 7.735)

Notes: CPS 1976 to 2021. Each cell reports the estimated coefficient α, expressed in percentage points, from Equation (1). We include all spouses who move from employment to unemployment. We report 95% confidence intervals. We use dummies to non-parametrically control for each category of age, education, race, occupation, industry, and own children in the household of both spouses.

unconditional monthly probability of entering the labor force was around 18.6%. Hence, the wife's movement from E to U is associated with a 36% higher probability of her non-participant husband entering the labor market. As is the case for married women, the effect mainly comes from the N to U moves rather than N to E. The increase in the probability of a N to E move is small, 0.9 p.p., and not statistically significant, whereas the rise in an N to U move is much larger, 5.8 p.p. Given unconditional probabilities of 10.1% and 8.5% of N to E and N to U moves, respectively, the added worker effect increases these moves by around 9% and 68%.

Lower panels, "Effect with Leads and Lags," in Tables 1 and 2 show the results when E to U transitions for the employed spouse are extended to include past and future job losses. The marginal effects are smaller since there is a bigger pool of potential added workers. As with the contemporaneous effect, the AWE mainly operates through moves from N to U. Despite the smaller marginal

Table 3
Shares of Added Workers, Married Women.

1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
Share of Non-participants among Married								
29.736	29.564	31.231	45.119	34.481	25.863	26.160	26.964	26.134
(29.655, 29.819)	(29.478, 29.643)	(31.017, 31.428)	(44.864, 45.383)	(34.328, 34.624)	(25.689, 26.009)	(26.004, 26.342)	(26.773, 27.163)	(25.710, 26.538)
Share of N to P among Non-participants								
7.905	7.906	7.885	6.785	8.064	8.607	8.128	7.234	7.902
(7.853, 7.957)	(7.852, 7.961)	(7.739, 8.031)	(6.644, 6.911)	(7.972, 8.153)	(8.497, 8.719)	(8.000, 8.244)	(7.126, 7.349)	(7.593, 8.235)
Share of Added Workers among N to P								
Contemporaneous Effect								
1.467	1.416	1.919	1.129	1.658	1.524	1.390	1.406	1.838
(1.388, 1.547)	(1.330, 1.497)	(1.668, 2.195)	(0.941, 1.362)	(1.522, 1.800)	(1.370, 1.672)	(1.227, 1.580)	(1.207, 1.608)	(1.245, 2.489)
Effect With Leads And Lags								
3.500	3.406	4.323	2.423	3.935	3.504	3.366	3.563	4.893
(3.375, 3.624)	(3.277, 3.538)	(3.922, 4.700)	(2.119, 2.725)	(3.716, 4.155)	(3.257, 3.760)	(3.085, 3.650)	(3.256, 3.874)	(3.965, 5.990)

Notes: CPS 1976 to 2021. Each cell reports a share in percentage. We include all spouses who move from employment to unemployment. We report 95% confidence intervals from 1,000 bootstraps.

effects, since we identify more individuals as added workers, as will become apparent below, the estimated impact on the aggregate levels of participation, employment, and unemployment might be higher.

For both husbands and wives, the estimates in Tables 1 and 2 show that the AWE is higher in expansions than in recessions, but the difference is not statistically significant. The *contemporaneous* effects for women from the 1980s to 2010s align with estimates by Mankart et al. (2023), who find that the added worker effect has been growing since the 1980s.[4] On the other hand, our estimates show that the AWE was larger in the late 1970s than in the 1980s, and there has been a significant decline during the COVID-19 pandemic.

We report the estimates of Equation (1) without any control variables in Appendix B. While the estimates are slightly larger without controls, they are not statistically different from the ones reported in Tables 1 and 2, and the patterns are similar to the ones documented in Tables 1 and 2. The contemporaneous AWE for married females is 7.3 p.p., while it is 6.0 p.p. with controls.

In Appendix B, we also show results from a more restrictive definition of job loss. Instead of considering all E to U transitions of a partner, we exclude moves where quits are reported as a reason for unemployment. As a result, we only consider the entry of individuals to the labor market associated with an involuntary job loss of their partners, which is more likely to be exogenous. The differences with the benchmark results reported in Tables 1 and 2 are very small and not statistically significant. The contemporaneous AWE for married females is 5.4 p.p. in this case versus 6.0 p.p. in the results we report in the main text.

3.1. *The number of added workers*

We now turn our attention to how many married individuals are added workers each month, which depends on the number of individuals in three groups. First, the number of non-participants, i.e., the pool of workers who might enter the labor market. Second, the number of non-participants who enter the labor market in a given period. Lastly, among those who enter, the number of individuals who have a spouse who moves from E to U in the same month or any adjacent months.

We present these data in Table 3 for married women and in Table 4 for married men. As in Tables 1 and 2, we report estimates for the non-pandemic period 1976-2019, expansions versus recessions, each decade in our sample, and the years associated with the COVID-19 pandemic (2020-2021). The top panels in each table, labeled “Share in Non-participation over all Married,” show the share of husbands and wives who are out of the labor force. The middle panels, labeled “Share who move from N to P (E or U) over Non-participants,” present the share of married non-participants who enter the labor market. Finally, the lower panels display the share of married entrants into the labor market as added workers, i.e., those whose spouse moves from E to U either in the same month (“Contemporaneous Effect”) or in any of the adjacent months we observe (“Effect with Leads and Lags”).

The number of added workers is bounded by workers who lose their jobs. For married women, Table 3 documents that the average share of non-participants is 29.74% of all women. On average, 7.9% of non-participants enter the labor market every month. Among the entrants, 1.47% are married to a husband who moved from E to U in the same period, while 3.5% have a husband who made

[4] The coefficients we report with leads and lags are not directly comparable to those in Mankart et al. (2023). While we define the independent variable $\mathbb{1}^s_{EU}$ in Equation (1) similarly, Mankart et al. (2023) define the dependent variable to include any transition into the labor market during the four-month window that the CPS allows to link. That is, their estimates report the probability of entering the labor market in a four-month window, while we estimate the probability of entering in a given month. Our approach guarantees that the coefficients are comparable across the contemporaneous and dynamic definitions of the AWE.

Table 4
Shares of Added Workers, Married Men.

1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
Share of Non-participants among Married								
4.866	4.904	4.544	3.644	3.675	4.585	5.356	6.267	6.345
(4.829, 4.903)	(4.866, 4.942)	(4.455, 4.637)	(3.549, 3.747)	(3.616, 3.735)	(4.508, 4.653)	(5.269, 5.433)	(6.171, 6.373)	(6.094, 6.605)
Share of N to P among Non-participants								
14.624	14.613	14.771	14.731	15.983	14.204	14.378	13.879	16.965
(14.451, 14.795)	(14.424, 14.796)	(14.262, 15.260)	(14.136, 15.383)	(15.590, 16.373)	(13.888, 14.602)	(14.037, 14.733)	(13.534, 14.218)	(15.946, 17.964)
Share of Added Workers among N to P								
Contemporaneous Effect								
1.075	1.063	1.168	1.295	0.966	1.105	0.959	1.164	1.802
(0.946, 1.209)	(0.937, 1.199)	(0.761, 1.623)	(0.715, 2.186)	(0.717, 1.247)	(0.862, 1.394)	(0.743, 1.175)	(0.892, 1.432)	(1.015, 2.879)
Effect With Leads And Lags								
2.742	2.684	3.229	2.335	2.726	2.901	2.702	2.777	2.716
(2.555, 2.954)	(2.472, 2.893)	(2.631, 3.989)	(1.564, 3.434)	(2.320, 3.212)	(2.456, 3.341)	(2.313, 3.161)	(2.392, 3.206)	(1.735, 3.811)

Notes: CPS 1976 to 2021. Each cell reports a share in percentage. We include all spouses who move from employment to unemployment. We report 95% confidence intervals from 1,000 bootstraps.

that move in the four-month window we observe in the CPS. The shares of wives who are added workers are small, 0.035% with contemporaneous moves and 0.082% with leads and lags. As a result, depending on the specification, an average of between 10,500 and 25,000 married females are added as workers in a given month.[5] To put these numbers in perspective, note that for married men, the monthly probability of moving from E to U is around 1.2%. As a result, the maximum fraction of added worker wives in a given month could be at most 1.2% of all married women, which would correspond to the case where all of the spouses of the men who moved from E to U were non-participants and entered the labor market.

As Table 4 shows, the average share of husbands out of the labor force in the 1976-2019 period is around 4.87%. Out of these non-participants, around 14.62% enter the labor market in an average month. That is, around 0.7% of husbands enter the labor force every month. Among those entering the labor market, around 1.07% have a spouse who moved from E to U in the same month, while 2.74% have a wife who moved in the current month or any of the adjacent months. These imply that monthly shares of added worker husbands are indeed tiny, 0.008% if we only consider contemporary job losses of their wives and 0.02% with past and future job losses. These correspond to an average of 2,500 and 6,500 married males monthly.

4. Calculating the aggregate AWE

The significant size of the AWE, despite the relatively small share of individuals classified as added workers, raises the question of how much the AWE can influence aggregate labor market outcomes. To answer this question, it is crucial to consider the dynamic nature of labor market transitions. Added workers may or may not find jobs, and even if they do, they may not stay on those jobs, among other possibilities that should be considered. This section outlines our methodology for assessing how married couples' joint transitions across employment, unemployment, and non-participation affect labor market outcomes.

4.1. Transition probabilities

We first calculate the flows of individuals across labor market states. Our approach follows the literature, e.g., Shimer (2012) and Elsby et al. (2015), and uses the standard procedure to transform the monthly movements across labor market states into transition probabilities that can be used to compute stationary distributions. We add to the literature by taking the perspective that husbands' and wives' movements across labor market states are not independent but might be interrelated. In particular, we highlight the relationship between transitions at the individual level and those that happen jointly.

We denote the flows from state $Y \in \{E, U, N\}$ to $X \in \{E, U, N\}$, i.e., the number of people in a particular state at $t-1$ and in a possibly different state at period t, as f_{YX}. We then compute transition rates by dividing any given flow from $Y \in \{E, U, N\}$ to $X \in \{E, U, N\}$ by the sum of all flows out of Y, as shown in the following Table 5:

[5] In Appendix B, Table 19 reports the share of added workers when we consider only E to U movements associated with an involuntary job loss, not a quit. The shares are very similar, only slightly smaller.

Table 5
Transition Rates.

$t-1, t$	E	U	N
E	$\frac{f_{EE}}{f_{EE}+f_{EU}+f_{EN}}$	$\frac{f_{EU}}{f_{EE}+f_{EU}+f_{EN}}$	$\frac{f_{EN}}{f_{EE}+f_{EU}+f_{EN}}$
U	$\frac{f_{UE}}{f_{UE}+f_{UU}+f_{UN}}$	$\frac{f_{UU}}{f_{UE}+f_{UU}+f_{UN}}$	$\frac{f_{UN}}{f_{UE}+f_{UU}+f_{UN}}$
N	$\frac{f_{NE}}{f_{NE}+f_{NU}+f_{NN}}$	$\frac{f_{NU}}{f_{NE}+f_{NU}+f_{NN}}$	$\frac{f_{NN}}{f_{NE}+f_{NU}+f_{NN}}$

As noted by Shimer (2012), these transition rates are not the instantaneous probabilities of moving from one state to another. Since the flows are computed using information reported once a month, they do not reflect spells with shorter lives. For example, if an individual reports to be employed in one month, then becomes unemployed and finds a job before the week of the following interview, that unemployment spell is not reflected in the flows computed from the CPS data. We follow the procedure described in Shimer (2012) to correct for this time-aggregation bias to compute transition probabilities.[6]

The transition probabilities for wives are shown in Fig. 1. A married woman's probability of moving from E to U in a recession is, on average, 1.33%, while it is 1.09% in an expansion. At the same time, the likelihood of a wife transitioning from unemployment to employment is 34.41% in an expansion, while it is 31.13% in a recession. Along with the known cyclical patterns, wives' transition probabilities reflect the secular increase in married women's participation, mainly through a steady decrease in the likelihood of married women exiting the labor force from employment. While in the 1970s, the E to N probability was 5.10%, by the 2010s, it had halved to 2.44%.

Fig. 2 reports the instantaneous transition probabilities for husbands from 1976 to 2019. On the one hand, the figures reflect the known cyclical patterns of the ins and outs of employment and unemployment. The E to U probability is, on average, 1.64% in recessions, while it is 1.17% in expansions. At the same time, the probability that an unemployed husband moves from unemployment to employment is 37.86% in expansions, while it is 35.6% in recessions. On the other hand, these transitions also show a slight secular increase in the probability of married men exiting the labor force. The E to N probability has increased from 0.47% in the 1970s to 0.82% in the 2010s. Similarly, the U to N probability has grown from 7.47% in the 1970s to 12.47% in the 2010s. These increases in the likelihood of moving into non-participation, which have contributed to the steady decline of male labor force participation in the US since the mid-1990s, happened at the same time that the chances to move out of non-participation have remained relatively constant or slightly decreased.

The transition probabilities presented in Figs. 1 and 2 are the main building blocks of our analysis. We can use them to build steady-state approximations of the participation, employment, and unemployment rates. In the steady state, the flows in and out of each state have to be equal, i.e.,

$$(\pi_{EU} + \pi_{EN}) \cdot e = \pi_{UE} \cdot u + \pi_{NE} \cdot n,$$
$$(\pi_{UE} + \pi_{UN}) \cdot u = \pi_{EU} \cdot e + \pi_{NU} \cdot n,$$

and

$$(\pi_{NE} + \pi_{NU}) \cdot n = \pi_{EN} \cdot e + \pi_{UN} \cdot u,$$

where π_{YX} is the transition probability from Y to X, for $Y, X \in \{E, U, N\}$, and e, u, and n, are the number of individuals in employment, unemployment, and non-participation respectively. The steady-state conditions can be used to derive the participation, employment, and unemployment shares as

$$e^{ss} = \pi_{UN}\pi_{NE} + \pi_{NU}\pi_{UE} + \pi_{NE}\pi_{UE}, \tag{2}$$
$$u^{ss} = \pi_{EN}\pi_{NU} + \pi_{NE}\pi_{EU} + \pi_{NU}\pi_{EU}, \tag{3}$$

and

$$n^{ss} = \pi_{EU}\pi_{UN} + \pi_{UE}\pi_{EN} + \pi_{UN}\pi_{EN}. \tag{4}$$

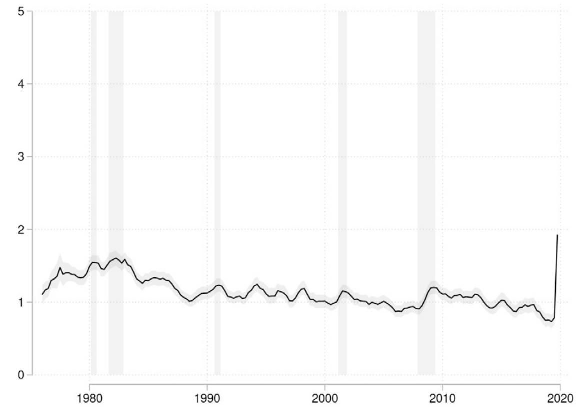
The steady-state rates of participation, employment, and unemployment are then given by

$$\text{Participation Rate}^{ss} = \frac{e^{ss} + u^{ss}}{e^{ss} + u^{ss} + n^{ss}}, \tag{5}$$
$$\text{Employment Rate}^{ss} = \frac{e^{ss}}{e^{ss} + u^{ss} + n^{ss}}, \tag{6}$$

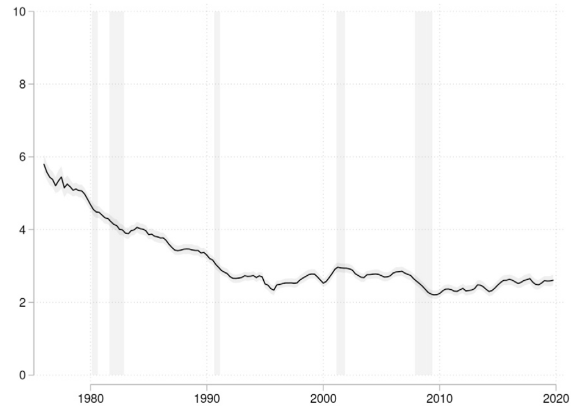
and

$$\text{Unemployment Rate}^{ss} = \frac{u^{ss}}{e^{ss} + u^{ss}}. \tag{7}$$

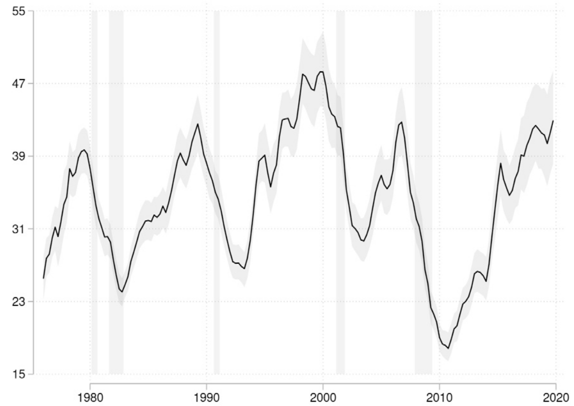
[6] Further details on time-aggregation bias adjustments are provided in Appendix Section A.2.



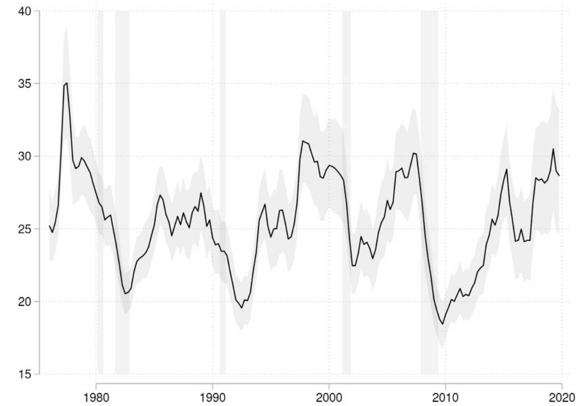
(a) E to U



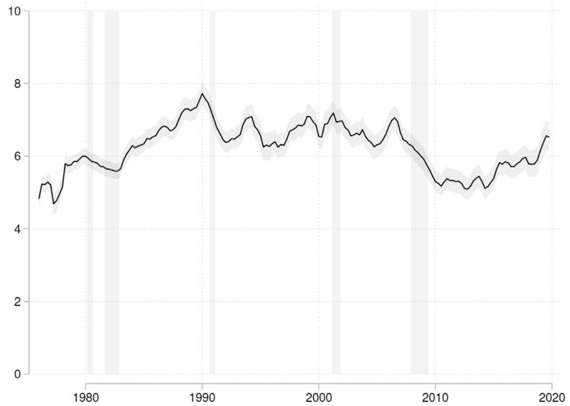
(b) E to N



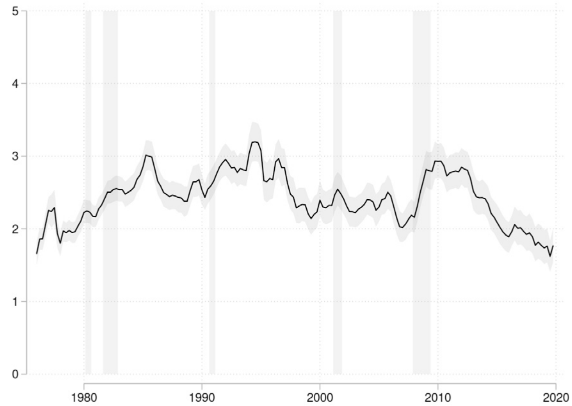
(c) U to E



(d) U to N



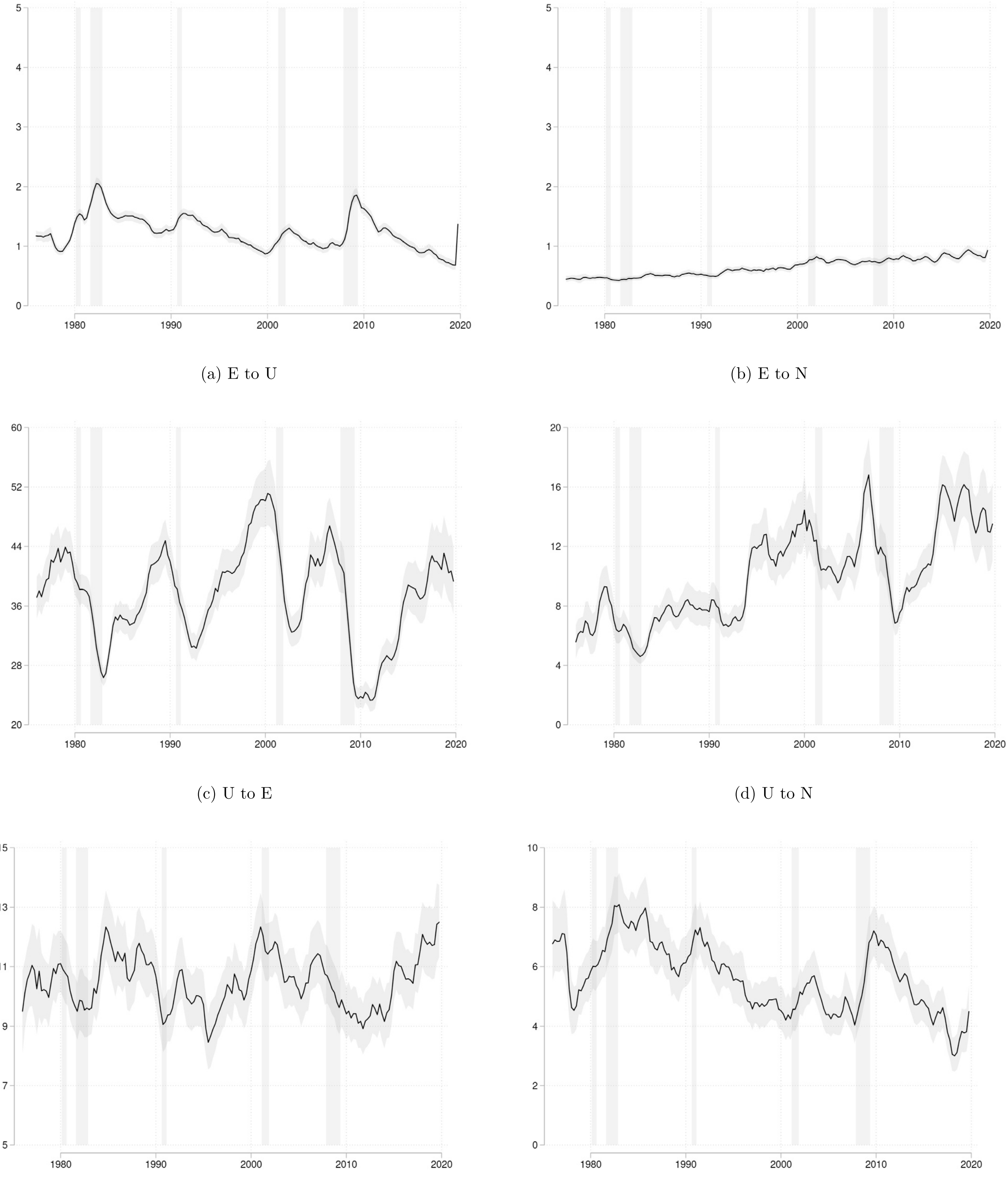
(e) N to E



(f) N to U

Notes: CPS 1976:Q1 to 2019:Q4. All values are in percent. We seasonally adjust monthly estimates using a 12-month moving average and report quarterly averages. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps. The vertical gray areas are NBER recession periods.

Fig. 1. Individual Transition Probabilities, Married Women.



(a) E to U (b) E to N

(c) U to E (d) U to N

(e) N to E (f) N to U

Notes: CPS 1976:Q1 to 2019:Q4. All values are in percent. We seasonally adjust monthly estimates using a 12-month moving average and report quarterly averages. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps. The vertical gray areas are NBER recession periods.

Fig. 2. Individual Transition Probabilities, Married Men.

Fig. 3 compares the steady-state approximation of the participation, employment, and unemployment rates with the data. The methodology provides an accurate replication of the time series of interest. For wives' rates, the R^2 is higher or equal to 94% for all indicators. For husbands, the R^2 is very high, 97% for the unemployment rate and somewhat lower for the participation and employment rates.[7]

4.1.1. Joint conditional transition probabilities

Next, we consider simultaneous labor market transitions by husbands and wives and calculate joint conditional flows. For $Y, X, I, J \in \{E, U, N\}$, we let $f_{YX|IJ}$ denote the number of wives (husbands) who move from Y to X and whose husbands (wives) move from I to J. Since each of the individual transitions is now conditioned on the transitions of their partners, we end up with nine sub-flows. As a result, while we have $3 \times 3 = 9$ possible individual flows, there are $(3 \times 3)^2 = 81$ possible joint conditional flows. As is the case with individual flows, we can follow the same steps: use the joint conditional flows to compute transition rates and adjust those for time-aggregation bias to obtain transition probabilities, which we denote by $\pi_{YX|IJ}$ for $Y, X, I, J \in \{E, U, N\}$.

Table 6 presents the average joint conditional transitions for the sample period without the pandemic years (1976-2019). The top panel consists of the transition probabilities of husbands conditional on the wives' movements. For example, the top left quadrant contains the nine transition probabilities of husbands whose wives move from employment to employment. The bottom panel presents the transition probabilities of wives conditional on the husbands' movements.

The joint transitions in Table 6 display three key features. First, there are significant gender differences in movements across labor market states. Husbands are, on average, more attached to the labor force than wives. Conditional on the same transition of the spouse, the persistence of husbands' employment (π^H_{EE}) is higher than that of wives (π^W_{EE}). The only exception is that $\pi^H_{EE|NU} \approx \pi^W_{EE|NU}$. Husbands are also less likely to move out of the labor force, conditional on the transition of their spouse, i.e.,

$$\pi^H_{YN|IJ} \leq \pi^W_{YN|IJ} \quad \text{for all } Y, I, J \in \{E, U, N\}.$$

Note that this implies that non-participation persistence among wives is always higher than among husbands.

Second, we observe *joint movers*; given any transition by an individual, their spouse is more likely to make the same movement. The conditional probability of a particular transition tends to be the highest if one's partner also experiences the same transition. Hence, for any transition YX,

$$\pi^W_{YX|YX} \geq \pi^W_{YX|IJ} \text{ and } \pi^H_{YX|YX} \geq \pi^H_{YX|IJ} \text{ for all } I, J \in \{E, U, N\}.$$

Consider what happens to a woman whose husband transits from employment to unemployment (E to U). The probability that the wife also transits from employment to unemployment is 4.28%. This probability is larger than the corresponding E to U probability for any other transition of the man. For example, if the husband stays on the job, this probability is just 0.78%, and it is 2.15% when the husband moves from N to U. This 4.28% probability is also four times higher than the unconditional probability of females transiting from E to U (1.12%). We observe similar patterns for other conditional transitions for wives and husbands. These joint moves might reflect correlated shocks that husbands and wives receive, as they live in the same locations and are likely to work in similar broadly-defined sectors or occupations due to assortative mating. They can also reflect the coordination of labor supply decisions, as emphasized by Guler et al. (2012).

Finally, we also observe the AWE, the increase in labor force participation in response to the spouse's unemployment. A non-participant wife whose husband loses his job, i.e., moves from employment to unemployment, is more likely to enter the labor force, either as employed (7.56%) or unemployed (6.01%), than a non-participant wife whose husband keeps his job (6.11% and 1.63%):

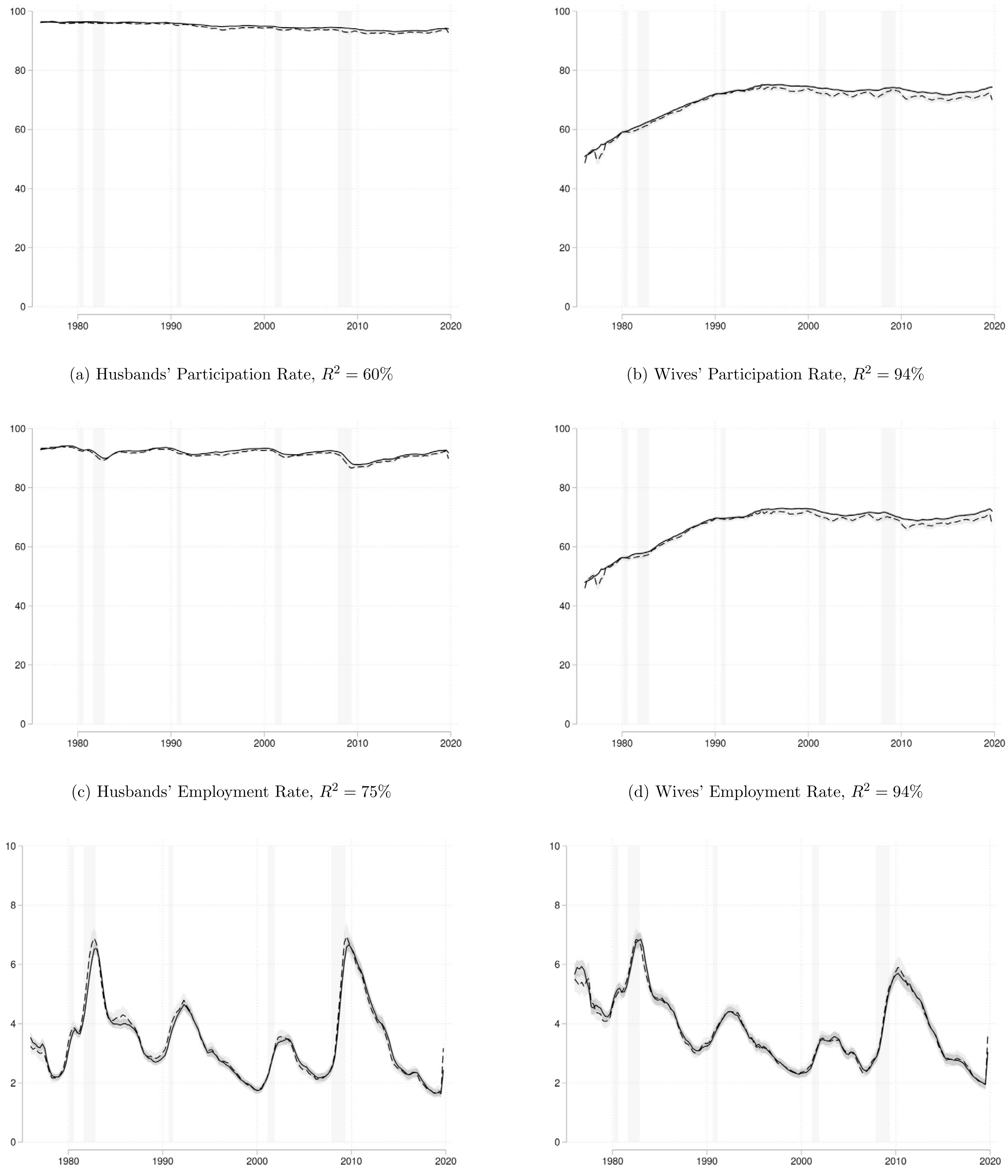
$$\pi^W_{NU|EU} + \pi^W_{NE|EU} \geq \pi^W_{NU|EE} + \pi^W_{NE|EE}.$$

Similarly, a non-participant husband whose wife moves from employment to unemployment enters the labor market as employed with a probability of 11.24% and as unemployed with an 8.69% probability. This is more often than if his wife remains employed (10.01% and 4.52%):

$$\pi^H_{NU|EU} + \pi^H_{NE|EU} \geq \pi^H_{NU|EE} + \pi^H_{NE|EE}.$$

The AWE and joint moves can have opposite effects on female employment. The AWE can mitigate the decline in female employment during a recession since women whose husbands lost their jobs enter the labor force, and some find jobs. On the other hand, others whose husbands become unemployed might choose to move from employment to unemployment. Such joint moves can be triggered, for example, by joint search in different labor markets. In contrast to the AWE, these joint moves will lower the aggregate female employment.

[7] The reason for these lower R^2 estimates for the participation and employment rates, 60% and 75%, respectively, is that there is not much variation in husbands' participation and employment rates over time. Therefore, minor deviations of the steady-state approximation from the data result in high penalties when computing the R^2.



(a) Husbands' Participation Rate, $R^2 = 60\%$

(b) Wives' Participation Rate, $R^2 = 94\%$

(c) Husbands' Employment Rate, $R^2 = 75\%$

(d) Wives' Employment Rate, $R^2 = 94\%$

(e) Husbands' Unemployment Rate, $R^2 = 97\%$

(f) Wives' Unemployment Rate, $R^2 = 98\%$

Notes: CPS 1976:Q1 to 2019:Q4. All values are in percent. The solid line is the data. The dashed line is the steady-state approximation. We seasonally adjust monthly estimates using a 12-month moving average and report quarterly averages. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps. The vertical gray areas are NBER recession periods.

Fig. 3. Goodness of Fit of the Steady-State Approximation.

Table 6
Joint Conditional Transition Probabilities.

Wife		Husband Employed			Husband Unemployed			Husband Non-participant		
Transitions		E	U	N	E	U	N	E	U	N
Husband Employed	E	96.24 (96.22, 96.27)	0.78 (0.77, 0.79)	2.97 (2.95, 2.99)	91.69 (91.34, 92.06)	4.28 (3.99, 4.54)	4.03 (3.77, 4.28)	83.26 (82.66, 83.82)	1.43 (1.23, 1.64)	15.31 (14.76, 15.88)
	U	26.23 (25.91, 26.53)	54.84 (54.49, 55.22)	18.93 (18.67, 19.20)	25.11 (23.33, 26.96)	59.72 (57.82, 61.79)	15.17 (13.54, 16.52)	29.12 (26.36, 31.84)	43.89 (40.60, 46.88)	26.99 (24.27, 29.79)
	N	6.11 (6.06, 6.16)	1.63 (1.60, 1.65)	92.26 (92.21, 92.32)	7.56 (6.98, 8.06)	6.01 (5.55, 6.50)	86.42 (85.78, 87.09)	15.19 (14.40, 15.98)	1.57 (1.32, 1.84)	83.24 (82.38, 84.02)
Husband Unemployed	E	94.39 (94.09, 94.69)	1.94 (1.77, 2.11)	3.67 (3.43, 3.91)	96.27 (96.09, 96.45)	1.84 (1.72, 1.96)	1.89 (1.77, 2.02)	94.61 (93.99, 95.32)	1.32 (1.00, 1.64)	4.07 (3.46, 4.68)
	U	35.68 (33.95, 37.52)	45.82 (44.14, 47.98)	18.50 (16.77, 19.78)	16.65 (15.55, 17.66)	70.51 (69.36, 71.92)	12.84 (12.03, 13.72)	20.77 (18.36, 23.94)	37.95 (34.34, 40.86)	41.28 (37.93, 44.70)
	N	8.53 (7.94, 9.11)	3.60 (3.22, 3.97)	87.87 (87.25, 88.57)	4.56 (4.24, 4.89)	5.67 (5.33, 6.01)	89.77 (89.31, 90.23)	5.75 (4.88, 6.79)	2.76 (2.09, 3.46)	91.49 (90.29, 92.60)
Husband Non-participant	E	89.28 (88.80, 89.81)	1.31 (1.12, 1.52)	9.41 (8.90, 9.89)	95.72 (95.14, 96.25)	2.15 (1.77, 2.54)	2.13 (1.73, 2.57)	96.18 (96.06, 96.30)	1.13 (1.06, 1.20)	2.69 (2.58, 2.79)
	U	32.87 (29.96, 36.55)	48.07 (44.56, 51.54)	19.06 (16.03, 21.44)	20.18 (16.27, 23.17)	63.21 (59.03, 67.94)	16.60 (13.67, 19.84)	21.07 (19.91, 22.24)	58.42 (56.78, 59.91)	20.51 (19.44, 21.70)
	N	23.97 (23.12, 24.86)	2.82 (2.47, 3.18)	73.21 (72.24, 74.13)	6.75 (5.82, 7.72)	10.65 (9.34, 11.70)	82.60 (81.34, 84.15)	3.24 (3.11, 3.38)	1.40 (1.31, 1.49)	95.36 (95.19, 95.52)

Husband		Wife Employed			Wife Unemployed			Wife Non-participant		
Transitions		E	U	N	E	U	N	E	U	N
Wife Employed	E	98.62 (98.60, 98.63)	0.88 (0.87, 0.89)	0.50 (0.50, 0.51)	94.15 (93.83, 94.47)	4.78 (4.48, 5.04)	1.07 (0.93, 1.23)	95.32 (95.16, 95.46)	1.25 (1.18, 1.33)	3.43 (3.30, 3.57)
	U	29.22 (28.86, 29.58)	63.67 (63.28, 64.05)	7.11 (6.92, 7.31)	31.96 (29.53, 34.26)	63.99 (61.60, 66.56)	4.05 (3.17, 5.18)	42.43 (40.29, 44.48)	45.88 (43.72, 48.16)	11.69 (10.24, 13.12)
	N	10.01 (9.82, 10.21)	4.52 (4.38, 4.66)	85.47 (85.23, 85.70)	11.24 (9.95, 13.15)	8.69 (7.17, 9.87)	80.07 (77.91, 81.82)	29.33 (27.83, 30.80)	3.07 (2.50, 3.64)	67.59 (66.20, 69.13)
Wife Unemployed	E	96.83 (96.59, 97.06)	2.20 (2.00, 2.39)	0.98 (0.83, 1.11)	96.89 (96.74, 97.04)	2.46 (2.34, 2.59)	0.64 (0.57, 0.71)	97.03 (96.77, 97.26)	1.78 (1.59, 1.97)	1.20 (1.03, 1.37)
	U	44.48 (41.99, 46.23)	49.93 (48.00, 52.28)	5.59 (4.80, 6.78)	20.99 (19.81, 22.15)	75.21 (74.01, 76.61)	3.80 (3.23, 4.28)	30.55 (28.24, 32.47)	53.04 (50.82, 55.38)	16.42 (14.81, 18.50)
	N	13.06 (11.69, 15.06)	6.28 (4.71, 7.18)	80.66 (78.65, 82.77)	7.18 (6.34, 8.18)	6.54 (5.72, 7.27)	86.28 (85.00, 87.47)	8.24 (6.81, 9.59)	4.76 (3.94, 6.14)	87.00 (85.14, 88.46)
Wife Non-participant	E	96.65 (96.50, 96.80)	1.26 (1.18, 1.35)	2.09 (1.96, 2.20)	95.53 (95.20, 95.82)	3.77 (3.50, 4.05)	0.70 (0.57, 0.83)	98.37 (98.35, 98.40)	0.97 (0.95, 0.99)	0.65 (0.64, 0.67)
	U	44.29 (42.20, 46.46)	48.15 (45.83, 50.05)	7.56 (6.51, 8.96)	24.11 (21.77, 25.89)	71.19 (69.29, 73.75)	4.70 (3.65, 5.89)	31.10 (30.51, 31.72)	60.51 (59.87, 61.19)	8.39 (8.00, 8.76)
	N	43.58 (42.04, 45.11)	4.46 (3.80, 5.12)	51.96 (50.47, 53.53)	14.94 (13.43, 16.79)	18.79 (17.04, 20.89)	66.26 (63.67, 68.26)	7.89 (7.68, 8.10)	3.14 (3.01, 3.27)	88.97 (88.72, 89.22)

Notes: CPS 1976 to 2019. All values are in percent. Each sub-panel represents the transition probabilities of husbands (upper panel) or wives (lower panel) conditional on the transitions of wives or husbands, respectively. Rows correspond to states in period $t-1$, columns in period t. We seasonally adjust monthly estimates using a 12-month moving average and report quarterly averages. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps.

4.2. The aggregate AWE

We now present our methodology to assess how the joint transitions across employment, unemployment, and non-participation shape aggregate labor market outcomes and how we apply it to compute the aggregate impact of the AWE. To this end, first note that any individual flow can be represented as a sum of conditional joint flows. For example, the number of married women moving from non-participation to unemployment (f_{NU}) is the sum of flows of married women moving from non-participation to unemployment whose husbands stay employed ($f_{NU|EE}$), whose husbands move from employment to unemployment ($f_{NU|EU}$), and so forth. Considering all potential nine moves by husbands, we can write f_{NU} as

$$f_{NU} = \sum_{I,J \in \{E,U,N\}} f_{NU|IJ}. \tag{8}$$

In general, we can write each individual flow (f_{YX}) as the sum of the nine joint conditional flows to assess how individual transitions are affected by those of their spouse:

$$f_{YX} = \sum_{I,J \in \{E,U,N\}} f_{YX|IJ} \qquad \text{for } Y, X \in \{E,U,N\}. \tag{9}$$

To assess the aggregate impact of the AWE, we focus on individual flows from N to E and N to U, conditional on spouses moving from E to U. These flows are the sum of $f_{NE|EU}$ and $f_{NU|EU}$, while the flows of non-added workers are all the N to E and N to U flows where the spouse is moving from any state to another except E to U. Let us define the non-added-worker flows as:

$$f_{NX|\neg EU} = f_{NX|EE} + f_{NX|EN} + f_{NX|UE} + f_{NX|UU} + \ldots + f_{NX|NN} \qquad \text{for } X \in \{U,N\}. \tag{10}$$

As a result, we can now rewrite the individual flows as (Table 7):

Table 7
Decomposed Flows.

$t-1, t$	E	U	N
E	f_{EE}	f_{EU}	f_{EN}
U	f_{UE}	f_{UU}	f_{UN}
N	$f_{NE|EU} + f_{NE|\neg EU}$	$f_{NU|EU} + f_{NU|\neg EU}$	$f_{NN|EU} + f_{NN|\neg EU}$

Having distinguished between the added-worker and the non-added-worker flows, we can then construct counterfactual transition rates in which the added workers do not enter the labor market, i.e., we add $f_{NE|EU}$ and $f_{NU|EU}$ to the N to N flow, as shown in the following table. Alternatively, if it is assumed that added workers enter the labor force at the same rate as non-added workers, we can simply add $f_{NE|EU}$ and $f_{NU|EU}$ to the N to N flow (Table 8).

Table 8
Counterfactual Transition Rates.

$t-1, t$	E	U	N
E	$\frac{f_{EE}}{f_{EE}+f_{EU}+f_{EN}}$	$\frac{f_{EU}}{f_{EE}+f_{EU}+f_{EN}}$	$\frac{f_{EN}}{f_{EE}+f_{EU}+f_{EN}}$
U	$\frac{f_{UE}}{f_{UE}+f_{UU}+f_{UN}}$	$\frac{f_{UU}}{f_{UE}+f_{UU}+f_{UN}}$	$\frac{f_{UN}}{f_{UE}+f_{UU}+f_{UN}}$
N	$\frac{f_{NE|\neg EU}}{f_{NE}+f_{NU}+f_{NN}}$	$\frac{f_{NU|\neg EU}}{f_{NE}+f_{NU}+f_{NN}}$	$\frac{f_{NN}+f_{NE|EU}+f_{NU|EU}}{f_{NE}+f_{NU}+f_{NN}}$

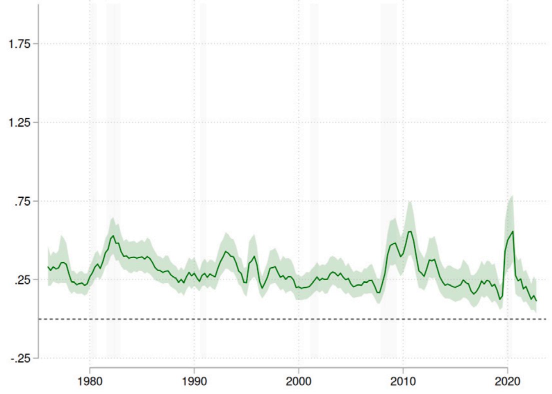
Using these counterfactual transition rates, we can then compute counterfactual transition probabilities and counterfactual steady-state levels of participation, employment, and unemployment using the procedure described by Equations (2) to (7) in Section 4.1. Note that these counterfactual steady-states reflect what would happen if the AWE did not exist. Therefore, we can measure the aggregate AWE by the difference between the counterfactual steady-states and the baseline steady-states.[8] As a caveat, note that since the counterfactual steady state is constructed under the assumption that only the AWE transitions, i.e., N to P transitions, are affected, the proposed methodology can miss potential general equilibrium effects. In particular, the entry of women (or men) into the labor force can impact other transitions, which are assumed to remain unchanged in the counterfactuals.

A key advantage of our methodology is that it can accommodate different definitions of the flows involved in the construction of the counterfactual, in this case, $f_{NX|EU}$ and $f_{NX|\neg EU}$ for $X \in \{U,N\}$. For example, we can focus on only those E to U transitions associated with a spouse's involuntary job loss or consider E to U transitions in any of the months we observe in the CPS to assess the impact of lagged and anticipated responses. Our approach allows these combinations because it is always possible to construct flows, which are simply counts of people, irrespective of how small the subsample of individuals that fulfill the targeted criteria is.

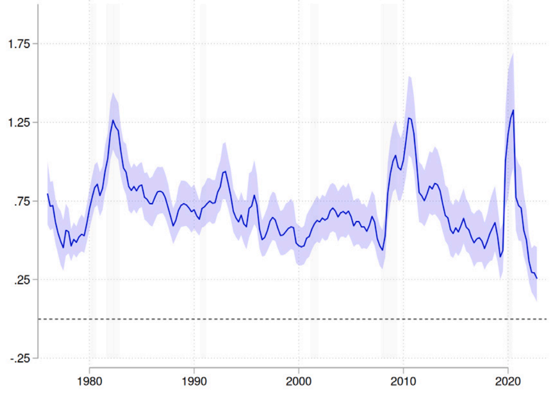
5. Results

In this section, we apply the methodology described in Section 4 to measure the aggregate impact of the AWE on participation, employment, and unemployment. We do this under the assumption that the added workers remain out of the labor force instead of moving into employment or unemployment. This counterfactual represents an upper bound of the aggregate AWE as some of the added workers might have entered the labor force even if their husbands had not moved from E to U. In Section 5.2 below, we report results under the alternative counterfactual, where added workers enter the labor force at the same rate as non-added workers. As

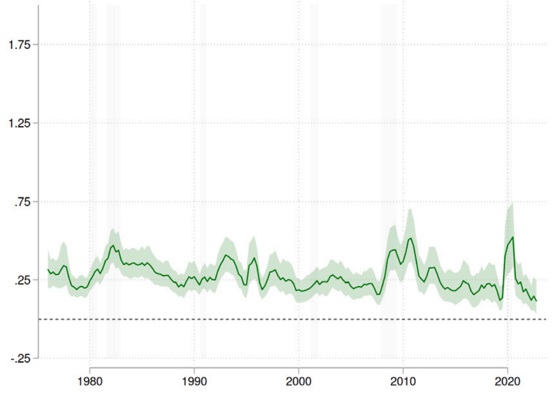
[8] An alternative approach would be to disturb the Markov chain in Table 6, and trace out what happens to different outcomes. Such an approach was used by Lundberg (1985). Using data from The Seattle and Denver Income Maintenance Experiments conducted between 1969 and 1973, she finds that higher transitions from employment to unemployment or lower transitions from unemployment to employment for husbands generate an AWE for wives.



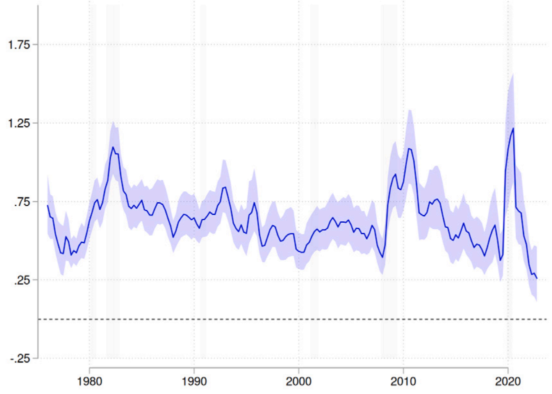
(a) Participation, Contemporaneous Effect



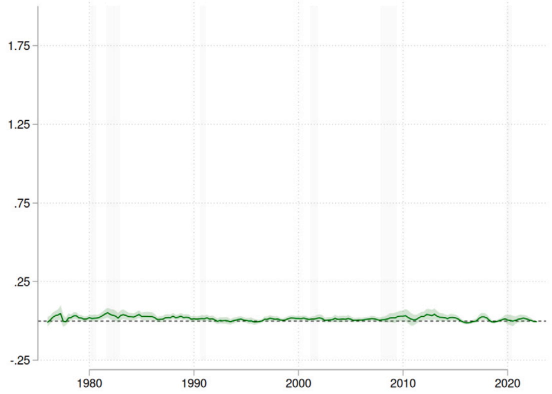
(b) Participation, Effect with Leads and Lags



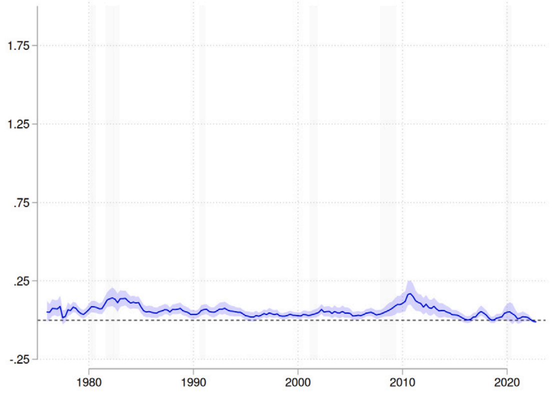
(c) Employment, Contemporaneous Effect



(d) Employment, Effect with Leads and Lags



(e) Unemployment, Contemporaneous Effect



(f) Unemployment, Effect with Leads and Lags

Notes: CPS 1976:Q1 to 2021:Q4. All values are the difference, in percentage points, between the steady-state approximation of the data and the counterfactual steady-state. In the counterfactual, added workers do not enter the labor market and remain classified as non-participants. We include all spouses who move from employment to unemployment. We seasonally adjust monthly estimates using a ratio to moving average. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps. The vertical gray areas are NBER recession periods.

Fig. 4. The Aggregate AWE, Married Women.

Table 9
The Aggregate AWE, Married Women, Participation.

	1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
SS	68.971	69.132	67.610	54.425	64.695	73.203	72.235	70.934	71.530
	(68.805, 69.127)	(68.959, 69.300)	(67.181, 68.036)	(53.887, 55.014)	(64.384, 65.011)	(72.914, 73.512)	(71.900, 72.557)	(70.576, 71.333)	(70.545, 72.481)
Contemporaneous Effect									
Mean	0.306	0.294	0.411	0.278	0.367	0.308	0.278	0.279	0.406
	(0.289, 0.323)	(0.276, 0.311)	(0.358, 0.471)	(0.233, 0.328)	(0.336, 0.399)	(0.276, 0.342)	(0.246, 0.316)	(0.239, 0.321)	(0.258, 0.560)
Max	0.915	0.876	0.783	0.496	0.715	0.705	0.755	0.850	1.617
	(0.724, 1.306)	(0.696, 1.294)	(0.606, 1.090)	(0.372, 0.716)	(0.588, 0.931)	(0.562, 0.963)	(0.555, 1.087)	(0.614, 1.294)	(0.815, 2.555)
P25	0.187	0.178	0.256	0.197	0.261	0.186	0.165	0.137	0.107
	(0.164, 0.210)	(0.155, 0.204)	(0.186, 0.331)	(0.136, 0.259)	(0.223, 0.302)	(0.145, 0.224)	(0.124, 0.210)	(0.092, 0.183)	(0.040, 0.200)
P75	0.403	0.388	0.543	0.353	0.458	0.416	0.358	0.381	0.419
	(0.371, 0.434)	(0.358, 0.422)	(0.445, 0.650)	(0.275, 0.443)	(0.402, 0.514)	(0.354, 0.485)	(0.303, 0.426)	(0.317, 0.463)	(0.257, 0.667)
Effect with Leads and Lags									
Mean	0.721	0.697	0.928	0.576	0.871	0.684	0.667	0.708	1.026
	(0.694, 0.748)	(0.668, 0.725)	(0.841, 1.013)	(0.507, 0.650)	(0.822, 0.922)	(0.632, 0.734)	(0.609, 0.721)	(0.646, 0.781)	(0.642, 1.295)
Max	1.808	1.735	1.619	0.990	1.606	1.345	1.416	1.703	2.957
	(1.508, 2.359)	(1.415, 2.359)	(1.319, 2.108)	(0.782, 1.352)	(1.324, 2.031)	(1.088, 1.860)	(1.095, 1.939)	(1.324, 2.359)	(1.800, 4.368)
P25	0.513	0.504	0.638	0.437	0.672	0.508	0.474	0.449	0.428
	(0.477, 0.549)	(0.467, 0.541)	(0.496, 0.794)	(0.327, 0.531)	(0.599, 0.749)	(0.441, 0.582)	(0.405, 0.551)	(0.362, 0.542)	(0.231, 0.647)
P75	0.891	0.859	1.182	0.703	1.033	0.831	0.827	0.910	1.337
	(0.839, 0.941)	(0.811, 0.909)	(1.029, 1.356)	(0.582, 0.833)	(0.948, 1.139)	(0.743, 0.925)	(0.730, 0.934)	(0.794, 1.049)	(0.918, 1.858)

Notes: CPS 1976 to 2021. All values are the difference, in percentage points, between the steady-state approximation of the data and the counterfactual steady-state. In the counterfactual, added workers do not enter the labor market and remain classified as non-participants. We include all spouses who move from employment to unemployment. We seasonally adjust monthly estimates using a ratio to moving average. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps.

described in Section 3, the marginal increase in the probability of entering the labor market when their spouse moves from E to U is similar for husbands and wives. However, the number of added workers among married males is much smaller than that of married females. As a result, this section focuses on the aggregate AWE of married females.[9]

Fig. 4 plots the aggregate impact of the AWE on the level of participation, employment, and unemployment for married females. Each line in the figures is the difference between the baseline steady-states, which we compute with the flows observed in the data as described in Section 4.1, and the steady-states obtained with the counterfactual flows.[10] For each outcome, the left-hand-side and right-hand-side figures show the contemporaneous and dynamic effects, respectively. In Tables 9, 10, and 11, we present a battery of summary statistics associated with the time series in Fig. 4 to describe more precisely the aggregate AWE of married women.

As in Section 3, Tables 9, 10, and 11 report results for nine periods: the pre-COVID-19 years (1976-2019), expansions, recessions, each decade in our sample, and the years associated with the COVID-19 pandemic (2020-2021). The first row in each table presents the average level of participation, employment, or unemployment in the baseline steady-states. Each remaining row reports the difference between the baseline steady-states and the steady-states obtained with the counterfactual flows. We present results using the contemporaneous and dynamic definitions of the AWE. For each definition of the AWE and each period, we report four statistics: the average effect over all months in the period, the maximum effect, and the 25th and the 75th percentiles.

We highlight four key insights. First, the impact of the AWE on aggregate indicators is significant despite the modest number of added workers. As discussed in Section 3, the share of added workers among married women is between 0.035% and 0.082%, depending on the definition. The magnitude of the aggregate AWE depends on whether we consider the contemporaneous or dynamic AWE. In Table 9, for the 1976-2019 period, the contemporaneous AWE raises the participation rate of married women by 0.306 p.p. When the AWE also includes anticipatory and lagged responses, it increases the participation rate for the same period by 0.721 p.p. The participation rate for married females was 68.9% during this period.

[9] We present the results for men as added workers in Appendix D. The AWE increases, on average, husbands' participation by 0.147 p.p., employment by 0.135 p.p., and unemployment by 0.007 p.p. In the baseline steady-state, the average participation rate of married men is 94.4%, the employment rate is 91.2%, and the unemployment rate is 3.4%.

[10] Some papers, e.g., Kudlyak and Lange (2018), point out potential problems with the classification error correction that we apply to the data. Fig. 5 in Appendix Section A.3 compares the aggregate AWE when we correct classification errors with the results that use the raw data. The difference between the two approaches is rather small.

Table 10
The Aggregate AWE, Married Women, Employment.

	1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
SS	66.379	66.607	64.454	51.883	61.682	70.715	69.904	68.404	68.501
	(66.207, 66.548)	(66.435, 66.774)	(64.016, 64.885)	(51.330, 52.499)	(61.373, 62.001)	(70.406, 71.022)	(69.577, 70.248)	(68.008, 68.788)	(67.564, 69.445)
Contemporaneous Effect									
Mean	0.282	0.271	0.375	0.252	0.331	0.292	0.259	0.258	0.373
	(0.266, 0.299)	(0.254, 0.288)	(0.324, 0.432)	(0.210, 0.298)	(0.301, 0.363)	(0.260, 0.325)	(0.228, 0.293)	(0.218, 0.297)	(0.236, 0.521)
Max	0.873	0.840	0.725	0.463	0.661	0.680	0.705	0.806	1.469
	(0.683, 1.261)	(0.662, 1.253)	(0.557, 1.031)	(0.352, 0.663)	(0.540, 0.878)	(0.533, 0.927)	(0.512, 1.031)	(0.572, 1.253)	(0.725, 2.356)
P25	0.170	0.163	0.235	0.173	0.235	0.173	0.153	0.124	0.097
	(0.150, 0.192)	(0.143, 0.187)	(0.172, 0.312)	(0.119, 0.227)	(0.198, 0.273)	(0.135, 0.210)	(0.112, 0.194)	(0.081, 0.165)	(0.034, 0.182)
P75	0.372	0.360	0.492	0.326	0.412	0.394	0.337	0.351	0.392
	(0.341, 0.400)	(0.328, 0.389)	(0.405, 0.599)	(0.255, 0.412)	(0.358, 0.467)	(0.337, 0.465)	(0.286, 0.394)	(0.289, 0.423)	(0.240, 0.644)
Effect with Leads and Lags									
Mean	0.651	0.631	0.823	0.515	0.773	0.626	0.609	0.640	0.945
	(0.625, 0.677)	(0.605, 0.657)	(0.743, 0.902)	(0.457, 0.588)	(0.729, 0.822)	(0.578, 0.675)	(0.555, 0.663)	(0.582, 0.706)	(0.629, 1.207)
Max	1.593	1.543	1.417	0.887	1.397	1.250	1.300	1.498	2.575
	(1.324, 2.082)	(1.253, 2.077)	(1.150, 1.892)	(0.704, 1.221)	(1.158, 1.758)	(1.006, 1.746)	(0.993, 1.823)	(1.181, 2.076)	(1.601, 3.798)
P25	0.465	0.457	0.582	0.390	0.598	0.465	0.433	0.412	0.394
	(0.431, 0.500)	(0.419, 0.490)	(0.449, 0.715)	(0.286, 0.478)	(0.528, 0.666)	(0.401, 0.526)	(0.359, 0.502)	(0.329, 0.496)	(0.221, 0.598)
P75	0.806	0.781	1.041	0.642	0.923	0.765	0.759	0.822	1.275
	(0.762, 0.852)	(0.731, 0.827)	(0.905, 1.201)	(0.532, 0.760)	(0.841, 1.011)	(0.684, 0.854)	(0.662, 0.861)	(0.711, 0.949)	(0.885, 1.744)

Notes: CPS 1976 to 2021. All values are the difference, in percentage points, between the steady-state approximation of the data and the counterfactual steady-state. In the counterfactual, added workers do not enter the labor market and remain classified as non-participants. We include all spouses who move from employment to unemployment. We seasonally adjust monthly estimates using a ratio to moving average. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps.

The aggregate AWE is larger when we consider leads and lags; the labor force participation is 7.2 p.p. higher when we include dynamic effects and only 3.1 p.p. when the analysis is restricted to contemporaneous effects. This happens because there are more added workers with the dynamic specification. While the contemporaneous effect only counts wives who went into the labor force with a husband who lost the job the same month, the effect with leads and lags also considers wives who enter with a husband who might lose his job in adjacent months. As Table 3 shows, the share added workers in all N to P is 3.5% when we consider leads and lags but only 1.5% when we restrict the attention to the contemporaneous effects. Indeed, the AWE itself is larger with the contemporaneous effects, 6 p.p. versus 3.6 p.p. (Table 1), but the larger number of added work with lead and lags generates a more significant aggregate effect.

In Fig. 4, which shows the outcome of specification with leads and lags, we can see that the aggregate AWE is much larger in certain months. For the participation rate (Table 9), focusing on the results with leads and lags, for 25% of months in the sample, the effect is larger than 0.9 p.p. with a maximum effect of 1.8 percentage points. For employment (Table 10), for 25% of months in the sample, the effects are larger than 0.8 p.p., while the maximum effect is 1.59 p.p.

Second, the AWE can be an important insurance mechanism for married couples. The aggregate effect of the AWE on participation is, by construction, the composite of the impact on employment and unemployment.[11] As shown in Section 3, the AWE mainly operates by initially moving added workers from non-participation to unemployment. However, once all the dynamics of the transitions across labor market states are taken into account, the initial movement from N to U results mainly in an increase in employment. For example, focusing on the dynamic definition with leads and lags between 1976 and 2019, the AWE raises employment (Table 10), on average, by 0.651 p.p., while it only raises unemployment by 0.06 p.p. (Table 11). Most of the increase in participation, 0.721 p.p. (Table 9), is due to increased employment rather than unemployment.

Third, the results in Tables 9, 10, and 11 and Fig. 4 also show that the aggregate AWE is more significant during recessions. With leads and lags, in an average month during recessions, the labor force participation of married women is higher by about 0.9 percentage points due to AWE, whereas the increase is 0.7 p.p. during expansions. Also, during recessions, the increase in the participation rate due to AWE is larger than 1.18 p.p. for 25% of months. The impact of AWE is even larger on employment and unemployment rates. As Tables 10 and 11 document, with leads and lags, the AWE increases the employment rate by 0.82 p.p. during recessions (versus 0.63 p.p. in expansion) and the unemployment rate by 0.088 p.p. (versus 0.057 in expansions).

[11] Note that, as the employment and unemployment rates are defined over different denominators, the statistics for participation only approximate the sum of the effect on employment plus the impact on unemployment.

Table 11
The Aggregate AWE, Married Women, Unemployment.

	1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
SS	3.815	3.705	4.767	4.697	4.713	3.410	3.229	3.590	4.270
	(3.773, 3.864)	(3.659, 3.753)	(4.619, 4.913)	(4.525, 4.879)	(4.606, 4.811)	(3.330, 3.491)	(3.140, 3.318)	(3.492, 3.690)	(4.011, 4.564)
Contemporaneous Effect									
Mean	0.017	0.016	0.022	0.022	0.027	0.008	0.013	0.016	0.002
	(0.013, 0.020)	(0.012, 0.019)	(0.009, 0.037)	(0.009, 0.039)	(0.020, 0.036)	(0.002, 0.014)	(0.007, 0.020)	(0.007, 0.025)	(-0.024, 0.029)
Max	0.144	0.139	0.103	0.105	0.120	0.071	0.086	0.119	0.062
	(0.106, 0.235)	(0.099, 0.234)	(0.056, 0.167)	(0.055, 0.223)	(0.083, 0.181)	(0.045, 0.125)	(0.054, 0.152)	(0.071, 0.203)	(0.015, 0.139)
P25	-0.005	-0.006	-0.003	-0.006	0.003	-0.008	-0.005	-0.008	-0.015
	(-0.008, -0.002)	(-0.009, -0.002)	(-0.015, 0.011)	(-0.022, 0.009)	(-0.007, 0.013)	(-0.015, -0.002)	(-0.010, 0.001)	(-0.014, -0.003)	(-0.032, -0.001)
P75	0.034	0.033	0.041	0.046	0.049	0.023	0.027	0.035	0.026
	(0.028, 0.040)	(0.027, 0.040)	(0.021, 0.068)	(0.024, 0.073)	(0.036, 0.065)	(0.014, 0.035)	(0.016, 0.038)	(0.020, 0.051)	(0.000, 0.065)
Effect with Leads and Lags									
Mean	0.060	0.057	0.088	0.060	0.087	0.045	0.049	0.059	0.026
	(0.054, 0.066)	(0.051, 0.063)	(0.065, 0.111)	(0.037, 0.083)	(0.074, 0.101)	(0.035, 0.055)	(0.038, 0.061)	(0.044, 0.074)	(-0.015, 0.079)
Max	0.322	0.304	0.245	0.181	0.261	0.151	0.190	0.298	0.111
	(0.231, 0.455)	(0.221, 0.436)	(0.162, 0.410)	(0.109, 0.295)	(0.186, 0.410)	(0.104, 0.245)	(0.135, 0.275)	(0.194, 0.435)	(0.042, 0.525)
P25	0.018	0.016	0.038	0.016	0.043	0.016	0.015	0.005	-0.011
	(0.011, 0.024)	(0.009, 0.023)	(0.013, 0.065)	(-0.012, 0.041)	(0.027, 0.059)	(0.003, 0.028)	(0.003, 0.027)	(-0.009, 0.019)	(-0.050, 0.024)
P75	0.091	0.087	0.125	0.099	0.121	0.070	0.075	0.094	0.057
	(0.081, 0.102)	(0.076, 0.099)	(0.087, 0.172)	(0.064, 0.145)	(0.099, 0.147)	(0.056, 0.088)	(0.058, 0.096)	(0.067, 0.124)	(0.018, 0.110)

Notes: CPS 1976 to 2021. All values are the difference, in percentage points, between the steady-state approximation of the data and the counterfactual steady-state. In the counterfactual, added workers do not enter the labor market and remain classified as non-participants. We include all spouses who move from employment to unemployment. We seasonally adjust monthly estimates using a ratio to moving average. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps.

Finally, as we show in Table 1 in Section 3, the marginal increase in the probability of a married female entering the labor market when their spouse moves from E to U increased between 1980 and 2019. Yet, the aggregate AWE on the participation rate declined during this period. Focusing on the results with lead and lags, the increase was 0.87 p.p. during 1980-1989 and then declined to 0.71 p.p. during 2010-2019. Indeed, given the rise in female labor force participation, the relative importance of AWE was quite lower in the later sub-period. In contrast, while the AWE itself was small during the COVID-19 pandemic, it had a much bigger aggregate impact on the participation and employment rates, increasing them by about 1 p.p.

5.1. Cyclicality of labor market outcomes

Table 12 shows the impact of the AWE on the cyclicality of female participation, employment, and unemployment, under the assumption that added workers do not enter the labor force and considering leads and lags. Following Doepke and Tertilt (2016), we measure cyclicality with the correlation between the cyclical components of GDP and the variable of interest (calculated as deviations from a Hodrick-Prescott trend). With leads and lags, the AWE lowers the correlation between GDP and married women's participation by about 4.5 p.p. This is a significant effect since the correlation between GDP and married women's participation is about 8% in the data. The effect on unemployment is also large. The AWE lowers the correlation between GDP and married women's unemployment by about 8 p.p. This correlation is about -77% in the data.

5.2. Alternative definition of the counterfactual probability of entering the labor force

Table 13 replicates Table 9 under the alternative assumption that added workers enter the labor force with the same probability as non-added workers whose partners make any labor market transitions except the E to U one (recall Equation (10)). While all the patterns we report in Table 9 hold with this alternative counterfactual, the effects are, not surprisingly, smaller. For the effect with lead and lags, the aggregate AWE increases the participation rate by 0.25 p.p. in contrast to an increase of 0.72 p.p. under the first specification. The rise in the employment rate is also smaller (0.20 p.p versus 0.65 p.p), while the increase in the unemployment rate is the same as in the first specification. Tables 20 and 21 in Appendix C replicate Tables 10 and 11. As was the case with the first specification, all aggregate effects with the second alternative are statistically different from zero.

Table 12
The Effect of the AWE on the Cyclicality of Married Women's Rates.

	Participation Rate	Employment Rate	Unemployment Rate
Contemporaneous Effect	-2.641 (-3.882, -1.358)	-0.103 (-0.398, 0.190)	-4.275 (-6.224, -2.554)
Effect with Leads and Lags	-4.475 (-6.377, -2.394)	-0.817 (-1.413, -0.339)	-8.118 (-10.802, -4.930)

Notes: CPS 1976 to 2021. All values are the difference, in percentage points, between the following two objects. One is the correlation between the GDP's cyclical component and the cyclical component of the steady-state approximation of the data. The second is the correlation between the GDP's cyclical component and the counterfactual steady-state's cyclical component. In the counterfactual, added workers do not enter the labor market and remain classified as non-participants. We include all spouses who move from employment to unemployment. All series are detrended using the Hodrick–Prescott filter with a smoothing parameter of 1,600. We seasonally adjust monthly estimates using a ratio to moving average. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps.

Table 13
The Aggregate AWE, Married Women, Participation.
(Added Workers Enter the Labor Force with the same Probability as Non-Added Workers)

	1976 to 2019	Expansions	Recessions	1976 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	2020 to 2021
SS	68.971 (68.805, 69.127)	69.132 (68.959, 69.300)	67.610 (67.181, 68.036)	54.425 (53.887, 55.014)	64.695 (64.384, 65.011)	73.203 (72.914, 73.512)	72.235 (71.900, 72.557)	70.934 (70.576, 71.333)	71.530 (70.545, 72.481)
Contemporaneous Effect									
Mean	0.117 (0.100, 0.133)	0.113 (0.096, 0.129)	0.151 (0.100, 0.205)	0.094 (0.050, 0.143)	0.122 (0.092, 0.152)	0.130 (0.099, 0.160)	0.108 (0.076, 0.140)	0.116 (0.074, 0.153)	0.188 (0.051, 0.336)
Max	0.660 (0.490, 1.008)	0.646 (0.472, 1.008)	0.479 (0.302, 0.764)	0.292 (0.184, 0.490)	0.417 (0.298, 0.628)	0.507 (0.377, 0.746)	0.485 (0.328, 0.764)	0.606 (0.411, 1.008)	0.877 (0.313, 1.765)
P25	0.016 (-0.004, 0.038)	0.012 (-0.009, 0.035)	0.041 (-0.024, 0.109)	0.025 (-0.038, 0.086)	0.040 (0.003, 0.078)	0.014 (-0.026, 0.053)	0.011 (-0.031, 0.051)	-0.007 (-0.051, 0.035)	-0.024 (-0.094, 0.062)
P75	0.197 (0.172, 0.223)	0.194 (0.167, 0.222)	0.240 (0.163, 0.346)	0.168 (0.102, 0.240)	0.192 (0.146, 0.244)	0.231 (0.180, 0.295)	0.185 (0.135, 0.239)	0.203 (0.143, 0.275)	0.267 (0.115, 0.496)
Effect with Leads and Lags									
Mean	0.250 (0.224, 0.276)	0.248 (0.223, 0.275)	0.266 (0.183, 0.345)	0.175 (0.106, 0.245)	0.262 (0.216, 0.310)	0.240 (0.192, 0.284)	0.229 (0.178, 0.281)	0.293 (0.233, 0.358)	0.479 (0.108, 0.725)
Max	1.137 (0.865, 1.680)	1.123 (0.848, 1.680)	0.763 (0.511, 1.178)	0.512 (0.325, 0.831)	0.833 (0.612, 1.193)	0.860 (0.608, 1.312)	0.754 (0.546, 1.120)	1.086 (0.765, 1.680)	1.427 (0.781, 2.689)
P25	0.090 (0.059, 0.121)	0.088 (0.054, 0.121)	0.095 (-0.011, 0.190)	0.062 (-0.031, 0.149)	0.111 (0.047, 0.177)	0.085 (0.017, 0.144)	0.084 (0.011, 0.151)	0.093 (0.016, 0.170)	0.077 (-0.097, 0.253)
P75	0.378 (0.339, 0.424)	0.377 (0.337, 0.424)	0.412 (0.286, 0.559)	0.275 (0.178, 0.396)	0.383 (0.317, 0.465)	0.368 (0.295, 0.457)	0.363 (0.284, 0.461)	0.454 (0.347, 0.564)	0.770 (0.460, 1.170)

Notes: CPS 1976 to 2021. All values are the difference, in percentage points, between the steady-state approximation of the data and the counterfactual steady-state. In the counterfactual, added workers enter the labor market with the same probability as non-added workers. We include all spouses who move from employment to unemployment. We seasonally adjust monthly estimates using a ratio to the moving average. The data is corrected for classification errors as described in Appendix Section A.1. Probabilities are corrected for time-aggregation bias as described in Appendix Section A.2. We report 95% confidence intervals from 1,000 bootstraps.

5.3. Involuntary job losses versus quits

The analysis so far considers all job losses. However, the CPS allows us to distinguish between involuntary job losses and quits. As the AWE might be more strongly associated with involuntary job losses, in Tables 22, 23, and 24 in Appendix Section C.2, we calculate aggregate AWE when only E to U transitions due to involuntary job losses are considered. With fewer E to U transitions of the partners, the aggregate AWE is smaller. However, since most E to U are associated with involuntary job losses, the impact of this alternative specification is relatively minor. Using the counterfactual steady state where we set N to P transition to zero, and considering leads and lags, we find that the AWE increases by 0.58 p.p. (Table 22), while with all E to U transitions considered, the increase was 0.72 p.p. The increases in employment rate (0.53 p.p. versus 0.65 p.p) and unemployment rate (0.051 p.p and 0.060 p.p.) are also smaller. To put these results in perspective, it is worth highlighting that the share of unemployed workers who quit their jobs in our sample is small. Around 10% for married men and around 13% for married women.

6. Conclusions

We propose a new method to measure the contribution of the AWE to aggregate labor market outcomes. While our focus is on the aggregate effects of the AWE, the methodology is flexible and can be used to measure how any joint transition affects labor market outcomes.

For the 1976-2019 period, we find that a wife not in the labor force is 6 p.p. more likely to enter if her husband loses his job. The unconditional monthly probability of a non-participant wife entering the labor force is 9.8%, implying that the AWE has a substantial effect. Although the number of women who are added workers each month is small, between 10,500 and 25,000, the aggregate impact of AWE is significant. It increases married female labor force participation by 0.7 p.p. The increase in participation is mainly due to a rise in employment rather than unemployment, which highlights the AWE's role as an insurance provider for married couples. The AWE also decreases the cyclicality of married female participation, employment, and unemployment.

Appendix A. Supplementary material

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.red.2025.101271.

Data availability

Data will be made available on request.

References

Albanesi, Stefania, 2019. Changing Business Cycles: the Role of Women's Employment. Working Paper 25655. National Bureau of Economic Research.
Albanesi, Stefania, Şahin, Ayşegül, 2018. The gender unemployment gap. Rev. Econ. Dyn. 30, 47–67.
Albanesi, Stefania, Olivetti, Claudia, Petrongolo, Barbara, 2023. Families, labor markets, and policy. In: Lundberg, Shelly, Voena, Alessandra (Eds.), Handbook of Family Economics, vol. 1. Elsevier B.V., pp. 255–326. Chapter 5.
Bacher, Annika, Grübener, Philipp, Nord, Lukas, 2022. Joint Search over the Life Cycle.
Bence, Bardòczy, 2022. Spousal Insurance and Amplification of Business Cycles.
Birinci, Serdar, 2021. Spousal Labor Supply Response to Job Displacement and Implications for Optimal Transfers. Working Paper 2019-020C. Federal Reserve Bank of St. Louis.
Blanchard, Oliver Jean, Diamond, Peter, Hall, Robert E., Murphy, Kevin, 1990. The cyclical behavior of the Gross flows of U.S. workers. Brookings Pap. Econ. Act. 1990 (2), 85–155.
Blundell, Richard, Pistaferri, Luigi, Saporta-Eksten, Itay, 2016. Consumption inequality and family labor supply. Am. Econ. Rev. 106 (2), 387–435.
Bredtmann, Julia, Otten, Sebastian, Rulff, Christian, 2018. Husband's unemployment and wife's labor supply: the added worker effect across Europe. Ind. Labor Relat. Rev. 71 (5), 1201–1231.
Casella, Sara, 2022. Women's Labor Force Participation and the Business Cycle.
Choi, Sekyu, Valladares-Esteban, Arnau, 2020. On households and unemployment insurance. Quant. Econ. 11 (1), 437–469.
Coskun, Sena, Dalgic, Husnu C., 2024. The emergence of procyclical fertility: the role of breadwinner women. J. Monet. Econ. 142, 103523.
Doepke, Matthias, Tertilt, Michele, 2016. Families in macroeconomics. In: Taylor, John B., Uhlig, Harald (Eds.), Handbook of Macroeconomics, vol. 2. Elsevier B.V., pp. 1789–1891. Chapter 23.
Ellieroth, Kathrin, 2022. Spousal Insurance, Precautionary Labor Supply, and the Business Cycle.
Elsby, Michael, Hobijn, Bart, Şahin, Ayşegül, 2015. On the importance of the participation margin for labor market fluctuations. J. Monet. Econ. 72, 64–82.
Flabbi, Luca, Mabli, James, 2018. Household search or individual search: does it matter? J. Labor Econ. 36 (1), 1–46.
Fujita, Shigeru, Ramey, Garey, 2009. The cyclicality of separation and job finding rates. Int. Econ. Rev. 50 (2), 415–430.
Fukui, Masao, Nakamura, Emi, Jón , Steinsson, 2023. Women wealth effects, and slow recoveries. Am. Econ. J. Macroecon. 15 (1), 269–313.
Greenwood, Jeremy, Guner, Nezih, Marto, Ricardo, 2023. The great transition: Kuznets facts for family-economists. In: Lundberg, Shelly, Voena, Alessandra (Eds.), Handbook of Family Economics, vol. 1. Elsevier B.V., pp. 389–441. Chapter 7.
Guler, Bulent, Guvenen, Faith, Violante, Giovanni, 2012. Joint-search theory: new opportunities and new frictions. J. Monet. Econ. 54 (4), 352–369.
Guner, Nezih, Kaygusuz, Remzi, Ventura, Gustavo, 2023. Rethinking the welfare state. Econometrica 91 (6), 2261–2294.
Halla, Martin, Schmieder, Julia, Weber, Andrea, 2020. Job displacement, family dynamics and spousal labor supply. Am. Econ. J. Appl. Econ. 12 (4), 253–287.
Kohara, Miki, 2010. The response of Japanese wives' labor supply to husbands' job loss. J. Popul. Econ. 23 (4), 1133–1149.
Kudlyak, Marianna, Lange, Fabian, 2018. Measuring Heterogeneity in Job Finding Rates among the Non-Employed Using Labor Force Status Histories. Working Paper 2017-20. Federal Reserve Bank of San Francisco.
Lundberg, Shelly, 1985. The added worker effect. J. Labor Econ. 3 (1), 11–37.
Mankart, Jochen, Oikonomou, Rigas, 2016. The rise of the added worker effect. Econ. Lett. 143, 48–51.
Mankart, Jochen, Oikonomou, Rigas, 2017. Household search and the aggregate labour market. Rev. Econ. Stud. 84 (4), 1735–1788.
Mankart, Jochen, Oikonomou, Rigas, Pascucci, Francesco, 2023. The Rise of Household Insurance.
Mincer, Jacob, 1962. Labor Force Participation of Married Women: A Study of Labor Supply. Princeton University Press, pp. 63–105.
Ortigueira, Salvador, Siassi, Nawid, 2013. How important is intra-household risk sharing for savings and labor supply? J. Monet. Econ. 60 (6), 650–666.
Pilossoph, Laura, Wee, Shu Lin, 2021. Household search and the marital wage premium. Am. Econ. J. Macroecon. 13 (4), 55–109.
Pruitt, Seth, Turner, Nicholas, 2020. Earnings risk in the household: evidence from millions of US tax returns. Am. Econ. Rev. Insights 2 (2), 237–254.
Rogerson, Richard, Wallenius, Johanna, 2018. Household time use among older couples: evidence and implications for labor supply parameters. Q. J. Econ. 134 (2), 1079–1120.

Shimer, Robert, 2012. Reassessing the ins and outs of unemployment. Rev. Econ. Dyn. 15 (2), 127–148.
Stephens, Melvin, 2002. Worker displacement and the added worker effect. J. Labor Econ. 20 (3), 504–537.
Wang, Haomin, 2019. Intra-household risk sharing and job search over the business cycle. Rev. Econ. Dyn. 34, 165–182.
Wu, Chunzan, Krueger, Dirk, 2021. Consumption insurance against wage risk: family labor supply and optimal progressive income taxation. Am. Econ. J. Macroecon. 13 (1), 79–113.