Female Labor Supply and Jobless Recovery

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Abstract

Recessions in the U.S. post 1990 have been followed by jobless recoveries, wherein aggregate employment rebounds slowly despite recoveries in aggregate output. In this paper I discuss the contribution of changes in female employment patterns on jobless recoveries. I find that in particular, slowdown in the employment rates of young, married women with children drives the slowdown in aggregate employment. I quantify the extent of the slowdown by using an overlapping generations framework to model the savings as well as labor supply decisions for married as well as single households with children. I further discuss the importance of incorporating family friendly policies in order to reverse the slowdown in female employment and its impact on recoveries during recent recessions.

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1 Introduction

2 Empirical Evidence

2.1 Data Description/Sample Selection

In this paper, I use the Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS) as available through the Integrated Public Use Microdata Series. The CPS is administered jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics at both the household as well as individual level and is considered to be the primary source of official labor force statistics for the U.S. government.

For my analysis, I consider individual level observations pertaining to the working-age population, that is, aged 16-65. I drop those who reside in institutionalized quarters such as prisons, psychiatric wards or are in the armed forces. I then proceed to calculate the employment-to-population ratios for subgroups of the population which vary by gender, age, marital status, parental status and education to identify subgroups which showed a change in the employment recovery patterns for the recessions in the past 50 years. In particular the recessions considered are 1973-1975, 1981-1982, 1990-1991, 2001-2001 and 2007-2009. I classify those as employed if they either reported to have worked for pay or for profit or worked for at least fifteen hours in a family business or farm in the preceding week. Those who reported to be temporarily absent from work due to illness, vacation, bad weather or labor dispute were also considered to be employed.

2.2 Decomposition Analysis

2.2.1 Age

To analyze changes in employment recovery patterns for different age groups, I divide the population into 5 age bins: 16-24, 25-34, 35-44, 45-54, 55-65. Panel (a) in Figure 1 displays deviations in the average employment-to-population ratio from the pre-recession business cycle peak for each of these subgroups. I find that the recovery patterns did not change significantly for the older cohorts whereas for the cohorts aged less than 44, the recoveries were significantly faster in the recessions which occurred before 1990 and have thereafter slowed down. Panel (b) reports the results of the analysis when I further subdivide the population in each group by gender. I find that the aggregate patterns are driven by the younger female cohorts, whereas the younger male cohorts have always displayed slow recoveries. Further, recovery patterns look similar for both genders among older cohorts and have not changed significantly across the recessions.

In order to test whether age is a proxy for time of marriage, I conduct the same analysis but restrict the population to include only married individuals. The results shown in Figure 2 are very similar to Figure 1, which negates the fact that the differences in age are due to differences in marital status.

2.2.2 Children

Since the recovery patterns have primarily changed for younger women, I proceed to test whether the presence of young children is relevant for the jobless recoveries that we see today. The CPS gives a measure of the number of young children aged less than 5 which live in the same household as the parent. Figure 3 shows results of the married population now divided according to the presence of children. I find that households which have children show changes in the recovery patterns between recessions that occurred pre and post 1990, with the recent ones being more jobless as compared to the previous ones, in the aggregate. Again, when divided by gender, the patterns in aggregate employment to population ratio is reflected by the female population, whereas the recovery patterns for men have always been similar.

2.2.3 Marital status

Further, in order to check whether the presence of children is the sole driving factor in this distinction, I look at the recovery patterns of individuals with children but divide them based on marriage. In this case, single households consist of all individuals including those divorced, widowed or never married. Figure 4 displays the results. I find that although single households with children have also undergone changes in their recovery patterns over the last recessions, the changes are starker for those which are married hence showcasing that marriage is also relevant for the jobless recoveries.

2.2.4 Education

I conduct my last decomposition based on education levels. In particular, I divide the population into 4 groups: less than a High School (HS) degree, just a HS degree, some college education and those with at least a college degree. Figure 5 shows the employment to population ratios for the different education groups. I find that although the changes have been starker for those with a HS degree and some college experience, recoveries in employment have become weaker over time for all these groups. Hence I conclude that education differences do not drive changes in the recovery patterns.

3 Model

3.1 Overview

The economy is populated by agents who are heterogenous along the following dimensions: gender ($g = \{m, f\}$), age (j), marital status (single, s or partnered, p) and assets (k). The number of children that a household has depends on the age, gender and marital status of the household. I assume that the total mass of men is the same as the total mass of women which is equal to 1.

Our model period is one year long and we assume that agents live for J periods and discount the future at the rate of β. In every period, both single and partnered households decide how much to save, how much to work in the market and how much to work at home. Households face gender specific market wages $w_t(g)$ and rental rate r_t. There is a home production technology which uses the time spent at home as an input and produces a good that gives utility to households. This can be interpreted as home-produced child care which cannot be outsourced. Partnered households face age-specific divorce shocks, whereas single households face age-specific marriage shocks.

There is a representative firm which employs labor and uses capital for production.

Wages and rental rates are determined in equilibrium. Female wages are subject to a gender wage gap.

3.2 Single Households

At each time period, t, single households of gender g, with assets k and age j have a time endowment of 1 and face gender specific market wages $w_t(g)$ and rental rate r_t. Agents choose own consumption c, savings k', labor to be supplied to the market n and labor to be supplied at home, n^h subject to their budget constraint which is the sum of their labor income, $w_t(g)n$, and asset income, $(1+r_t)k$. Agents are not allowed to borrow ($k' \geq 0$).

A home production technology converts the time spent at home to produce child care c^h. Agents derive utility from own consumption, child care production which is subject to an equivalence scale $\chi^h_{s,t}$ and own leisure, which is equal to $1-n-n^h$. The equivalence scale $\chi^h_{s,t}$ depends on the number of children at home and accordingly scales the utility derived from child care. I assume that $\chi^h_{s,t}$ varies across age and gender of households.

At the beginning of the next period, singles face exogenous age-specific probabilities of marriage, which is denoted by $p_{t+1}(j+1)$. Conditional on receiving a marriage shock, the probability of getting matched to a single of opposite gender, $\tilde{g}$, with next period assets equal to $\tilde{k}'$ is given by $\theta_{t+1}(\tilde{g}, \tilde{k}', j+1)$ which is determined in equilibrium and is described by equation (13) later. Agents maximize their lifetime utility as a single, $V_{s,t}$, which is defined below:

$$\begin{aligned} V_{s,t}(g,k,j) =& max_{\Omega_{s,t}} U(c, \frac{c^h}{\chi^h_{s,t}(g,j)}, 1-n-n^h) \\ &+ \mathbb{1}_{j<J}\beta\Big\{p_{t+1}(j+1)\int_{\tilde{k}'}\theta_{t+1}(\tilde{g},\tilde{k}',j+1)\hat{V}_{p,t+1}(g,k'+\tilde{k}',j+1)d\tilde{k}' \\ &+ \{1-p_{t+1}(j+1)\}V_{s,t+1}(g,k',j+1)\Big\} \end{aligned} \tag{1}$$

subject to:

$$c + k' \leq w_t(g)n + (1 + r_t)k \tag{2}$$

$$c^h \leq A_t^h (n^h)^\psi \tag{3}$$

$$c \geq 0; k' \geq 0; n, n^h \in [0, 1]; n + n^h \in [0, 1] \tag{4}$$

$$\Omega_{s,t} = \{c, n, n^h, k'\}; k' = h_{s,t}(g, k, j)$$

where $\hat{V}_{p,t+1}(g, k' + \tilde{k}', j + 1)$ refers to the lifetime utility of the agent if married to an individual with next period assets equal to $\tilde{k}'$ and is defined by equation $(10 - 11)$ later.

Here equation (3) describes the technology of home production. I assume decreasing returns to scale ($\psi < 1$). A_t^h is the parameter that governs technological progress in home production.

The optimal policy rules for the problem described by equations $(1 - 4)$ is given by $\Omega^*_{s,t} = \{c^*_{s,t}(g, k, j), n^*_{s,t}(g, k, j), {n^h}^*_{s,t}(g, k, j), h^*_{s,t}(g, k, j)\}$

3.3 Partnered Households

At each time period, t, partnered households with household assets k and age j consist of 1 male and 1 female. Each individual has a time endowment of 1 unit. Agents choose joint household consumption c, which is subject to an equivalence scale parameter given by χ, savings k', labor to be supplied to the market by each individual n_m, n_f and labor to be supplied at home by the female, n_f^h subject to their budget constraint which is the sum of their labor income, $w_{m,t}n_m + w_{f,t}n_f$, and asset income, $(1 + r_t)k$. Agents are not allowed to borrow ($k' \geq 0$).

A home production technology converts the time spent at home by the female to produce child care c^h. I assume that married men do not devote time at home towards child care production. This is an extreme assumption. However there is evidence that married women relative to married men spend a significantly larger fraction of their time towards home production (Ramey, 2009).

Each individual derives utility from joint consumption, child care production which is subject to an equivalence scale $\chi_{p,t}^h$ and own leisure, which is equal to $1 - n_m$ for men and $1 - n_f - n_f^h$ for females. The equivalence scale $\chi_{p,t}^h$ depends on the number of children at home and accordingly scales the utility derived from child care. I assume that $\chi^h_{p,t}$ varies with the age of the household.

At the beginning of the next period, partnered households face exogenous age-specific probabilities of divorce, which is denoted by $d_{t+1}(j+1)$. In the event of divorce, I assume that their is an equal division of household assets among the individuals. The household maximizes the sum of individual lifetime utilities weighted by fixed shares, ζ_m and ζ_f, represented by $V_{p,t}$ as described below:

$$\begin{aligned}V_{p,t}(k,j) =& max_{\Omega_{p,t}} \zeta_m U\Big(\frac{c}{\chi}, \frac{c^h}{\chi^h_{p,t}(j)}, 1-n_m\Big) + \zeta_f U\Big(\frac{c}{\chi}, \frac{c^h}{\chi^h_{p,t}(j)}, 1-n_f-n^h_f\Big)\\ &+ \mathbb{1}_{j<J}\beta\Big\{d_{t+1}(j+1)\big\{\zeta_m V_{s,t+1}(m,\frac{k'}{2},j+1) + \zeta_f V_{s,t+1}(f,\frac{k'}{2},j+1)\big\}\\ &+ \{1-d_{t+1}(j+1)\}V_{p,t+1}(k',j+1)\Big\}\end{aligned} \tag{5}$$

subject to:

$$c + k' \leq w_t(m)n_m + w_t(f)n_f + (1+r_t)k \tag{6}$$

$$c^h \leq A^h_t(n^h_f)^\psi \tag{7}$$

$$c_{p,t} \geq 0; k' \geq 0; n_m, n_f, n^h_f \in [0,1]; n_f + n^h_f \in [0,1] \tag{8}$$

$$\zeta_f = 1 - \zeta_m \tag{9}$$

$$\Omega_{p,t} = \{c, n_m, n_f, n^h_f, k'\}; k' = h_{p,t}(k,j)$$

The optimal policy rules for the problem described by equations $(5-9)$ is given by $\Omega^*_{p,t} = \{c^*_{p,t}(k,j), n^*_{p,m,t}(k,j), n^*_{p,f,t}(k,j), {n^h}^*_{p,f,t}(k,j), h^*_{p,t}(k,j)\}$.

The lifetime utility of a female and a male in a marriage is described below respectively:

$$\hat{V}_{p,t}(f,k,j) = U\Big(\frac{c^*_{p,t}}{\chi}, \frac{c^{h*}_{p,t}}{\chi^h_{p,t}}, 1 - n^*_{p,f,t} - n^{h^*}_{p,f,t}\Big) + \mathbb{1}_{j<J}\beta\Big\{d_{t+1}(j+1)V_{s,t+1}\Big(f, \frac{k'^*}{2}, j+1\Big)$$

$$+ \{1 - d_{t+1}(j+1)\}\hat{V}_{p,t}(f, k'^*, j+1)\Big\} \quad (10)$$

$$\hat{V}_{p,t}(m,k,j) = U\Big(\frac{c^*_{p,t}}{\chi}, \frac{c^{h*}_{p,t}}{\chi^h_{p,t}}, 1 - n^*_{p,m,t}\Big) + \mathbb{1}_{j<J}\beta\Big\{d_{t+1}(j+1)V_{s,t+1}(m, \frac{k'^*}{2}, j+1)$$

$$+ \{1 - d_{t+1}(j+1)\}\hat{V}_{p,t}\Big(m, k'^*, j+1\Big)\Big\} \quad (11)$$

3.4 Firms

There is a representative firm in the economy which at every period, t, rents capital, K_t, at the rental rate, r_t, and hires labor (N_t) at the wage rate, w_t to produce output Y according to the technology $Y_t = A_t K_t^\alpha N_t^{1-\alpha}$. Here A_t is the Total Factor Productivity and α is the capital share of output. I assume male and female labor (N_m and N_f respectively) to be perfect substitutes, such that $N_t = N_{m,t} + N_{f,t}$. I assume that the female wages are subject to a discrimination tax, $\Delta_t \in (0,1)$, such that $w_f = \Delta_t w_{m,t} = \Delta_t w_t$. Thus the gender wage gap, which is defined as the ratio of female wage to male wage is represented by Δ_t.

Given w_t and r_t, the firm chooses its optimal factor demand to maximize its total profits. The firm's problem is given by:

$$max_{K_t,N_t} A_t K_t^\alpha N_t^{1-\alpha} - w_t N_t - (r_t + \delta)K_t. \quad (12)$$

where and δ is the depreciation rate.

3.5 Distribution of households

Let the distribution of single households of gender g, age j and assets k be given by $\mu_{s,t}(g,k,j)$. Let the distribution of partnered households of age j and assets k be given by $\mu_{p,t}(k,j)$. The probability of getting matched to a single of the opposite gender, $\tilde{g}$, with next period assets equal to $\tilde{k}'$, given by $\theta_{t+1}(\tilde{g}, \tilde{k}', j+1)$, is defined as:

$$\theta_{t+1}(\tilde{g}, \tilde{k}', j+1) = \frac{\mu_{s,t+1}(\tilde{g}, \tilde{k}', j+1)}{\int_{k'} \mu_{s,t+1}(\tilde{g}, k', j+1)dk'} \tag{13}$$

Aggregate distributions evolve according to the following rule:

$$\begin{aligned} \mu_{s,t+1}(g,k,j+1) &= \{1 - p_{t+1}(j+1)\} \int_{\{\hat{k}|k=h_{s,t}(g,\hat{k},j)\}} \mu_{s,t}(g,\hat{k},j)d\hat{k} \\ &\quad + d_{t+1}(j+1) \int_{\{\hat{k}|k=\frac{\hat{k}}{2}\}} \mu_{p,t}(\hat{k},j)d\hat{k} \end{aligned} \tag{14}$$

$$\begin{aligned} \mu_{p,t+1}(k,j+1) &= \{1 - d_{t+1}(j+1)\} \int_{\{\hat{k}|k=h_{p,t}(\hat{k},j)\}} \mu_{p,t}(\hat{k},j)d\hat{k} \\ &\quad + \frac{1}{2}p_{t+1}(j+1) \sum_{g} \int_{\tilde{k}} \int_{\{\hat{k}|k=h_{s,t}(g,\hat{k},j)+h_{s,t}(\tilde{g},\tilde{k},j)\}} \mu_{s,t}(g,\hat{k},j)\theta_{t+1}(\tilde{g},\tilde{k},j+1)d\hat{k}.d\tilde{k} \end{aligned} \tag{15}$$

3.6 Equilibrium

A competitive equilibrium is a set of sequences,

$$\{c_{s,t}, n_{s,t}, n^h_{s,t}, h_{s,t}, V_{s,t}, c_{p,t}, n_{p,m,t}, n_{p,f,t}, n^h_{p,f,t}, h_{p,t}, V_{p,t}, \hat{V}_{p,t}, \mu_{s,t}, \mu_{p,t}, \theta_t, w_t, r_t\}_{t=0}^{\infty}$$

that solve the households and firm problems and clear markets for labor, assets and output such that the following conditions are satisfied:

1. $V_{s,t}$ solves the problem for single households which is defined by equations (1)-(4) and $(c_{s,t}, n_{s,t}, n^h_{s,t}, h_{s,t})$ are the associated policy rules.

2. $V_{p,t}$ solves the problem for partnered households which is defined by equations (5)-(9) and $(c_{p,t}, n_{p,m,t}, n_{p,f,t}, n^h_{p,f,t}, h_{p,t})$ are the associated policy rules.

3. $\hat{V}_{p,t}$ is calculated using equations (10)-(11).

4. $\mu_{s,t}$ and $\mu_{p,t}$ describe the aggregate distribution over single and partnered households respectively and are calculated using equations $(14-15)$. Subsequently θ_t is calculated using 13.

5. w_t and r_t are determined competitively and the labor market and asset market clears.

$$w_t = (1-\alpha)A_t K_t^{\alpha} N_t^{-\alpha}. \tag{16}$$

$$r_t = \alpha A_t K_t^{\alpha-1} N_t^{1-\alpha} - \delta \tag{17}$$

$$N_t = N_{m,t} + N_{f,t} \tag{18}$$

$$N_{m,t} = \sum_j \int_k \{n_{s,t}(m,k,j)\mu_{s,t}(m,k,j) + n_{p,m,t}(k,j)\mu_{p,t}(k,j)\}dk \tag{19}$$

$$N_{f,t} = \sum_j \int_k \{n_{s,t}(f,k,j)\mu_{s,t}(f,k,j) + n_{p,f,t}(k,j)\mu_{p,t}(k,j)\}dk \tag{20}$$

$$K_t = \sum_g \sum_j \int_k \{k\mu_{s,t}(g,k,j) + k\mu_{p,t}(k,j)\}dk \tag{21}$$

   Thus, incorporating the gender wage gap, $w_{m,t} = w_t$ and $w_{f,t} = \Delta_t w_{m,t}$.

6. Goods market clears by Walras Law.

4 Model Solution and Parameter Choices

Quantitative assessment of this framework to study the economy's business cycle responses requires the use of numerical methods to solve the model. The first step of the algorithm involves solving for a steady state while calibrating the parameters to match the moments corresponding to that steady state. For my benchmark model, I calibrate my parameters to match a steady state corresponding to 1968. I choose 1968 as the starting year because CPS March ASEC collects data on the number of young children for every individual starting 1968. Next, I incorporate changes in factors which have been discussed in the literature as possible contributors to the secular trend in female labor supply: narrowing of the gender wage gap, technological advancements in home production, decreases in marriage rates, increases in divorce rates, decrease in the fraction of married households, changes in the number of young children at home[1]. I assume that agents in the model have perfect foresight with respect to transitions in each of these

[1]See for example: Heathcote, Storesletten, Violante (2018), Goldin (2014), Jones, Manuelli, McGrattan (2015), Greenwood et al (2005)

factors over time. I study the responses of the economy along the transition path till they reach the final steady state, which in this framework corresponds to 2014. Each period in this model represents 1 year. Since I consider workers aged 16-65, number of age cohorts in the economy, $J = 50$. I use the endogenous grid method to solve for decision rules for each type of household at every time period.

I assume that utility derived by an individual of gender g takes the following functional form: $U_g(c, c^h, 1-n) = \frac{c^{1-\sigma}}{1-\sigma} + \frac{(c^h)^{1-\sigma^h}}{1-\sigma^h} + \eta_g \frac{(1-n)^{1-\phi}}{1-\phi}$. Table 1 lists the parameter choices made in this framework. I assume that agents are risk averse and their coefficient of relative risk aversion with respect to market good, $\sigma = 1$ and with respect to home produced good, $\sigma^h = 1.5$, which are standard in the literature. I assume separability in consumption from home produced good and market good because the former is interpreted as child care in my framework which cannot be substituted by own consumption if agents have children. The equivalence scale parameter, χ, which is used to scale married household's consumption of the market good is chosen to be the OECD equivalence scale corresponding to couple households. The parameters which govern the home production function, ψ, A^h, χ^h will be disciplined further by using moments from the American Time Use Survey.

The preference parameter for leisure for males and females, η_m and η_f respectively and the Pareto weight associated with the male utility, ζ_m, in a married household are jointly calibrated to match the average labor supplied by married men, married women and single women in 1968. ϕ which governs the curvature in the utility function from leisure will be disciplined using a measure of Frisch elasticity of labor supply for households. The parameter choices for capital share of output, α, depreciation rate, δ, and discount factor β result in steady state values of $\frac{K}{Y} = 2.31$, $\frac{I}{Y} = 0.16$ and an annual interest rate, $r = 4.76\%$. The Total Factor Productivity, A, is normalized to 1 in steady state.

I use the ratio of the median income of full-time year-round female to male workers, which is published by the United States Census Bureau from 1968-2014 as the gender wage gap for that time period. I use micro-data on the number of young children, aged less than 5, from the CPS March ASEC data and calculate the average number for a household of every age and marital status for every year between 1968-2014. The average calculated includes households which have no children[2]. I use data from the United States Census Bureau on household type to calculate the fraction of married households for every year between 1968-2014. To calculate the divorce rate for the entire time period of interest, I use a combination of two data sources. First, I use data reported by Doepke and Tertilt (2016) which is available for every year till 1990. Next, I use data reported by the National Center for Family and Marriage Research (NCFMR) for 2000 and for every year between 2008-2014. In both cases, divorce rate is calculated as the number of divorces per 1000 married women aged above 15. I use interpolation to approximate the divorce rates between 1991-1999 and 2001-2007 by using the rates in 1990, 2000 and 2008. Marriage rate is calculated as the ratio of the number of marriages to the number of unmarried women aged 15 and above in a given year. Data on marriage rate is reported by the NCFMR for the years 1970,1980,1990,2000,2008-2014. Again I use interpolation to approximate the marriage rates for every year in between. I assume that the marriage rates in 1968-1969 were the same as in 1970. At this point, marriage rates and divorce rates used are not age-specific. The next step of my analysis would involve using a panel data structure to estimate age-specific marriage and divorce rates for individuals over the entire time period of interest.

5 Results

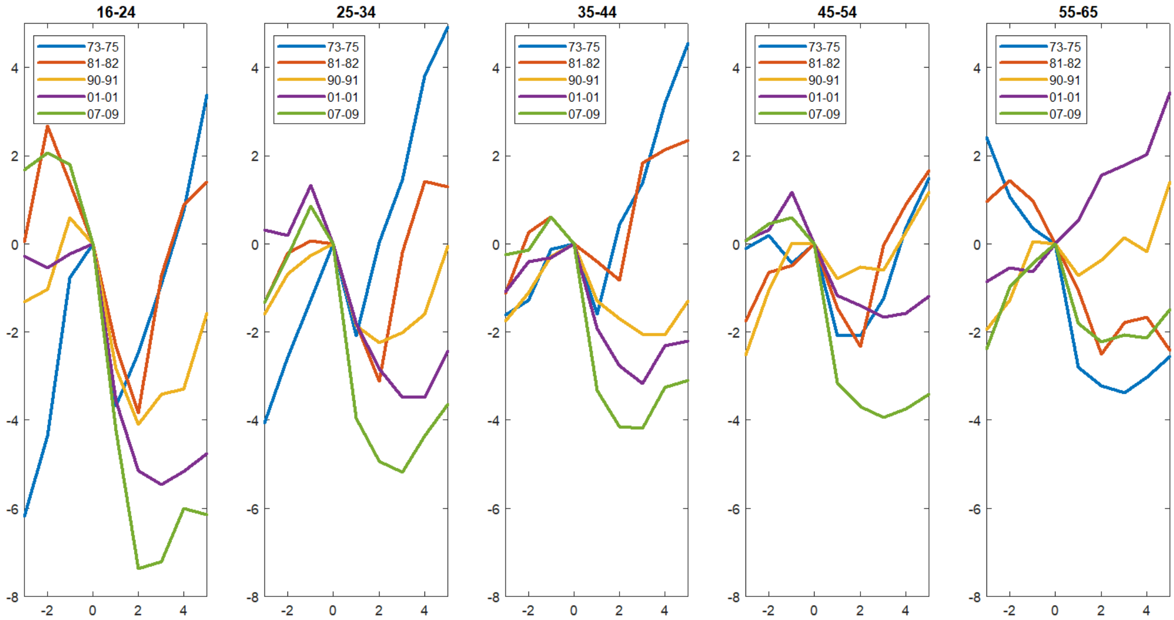
6 Conclusion

[2]For married households, I use information reported by married women, since information on young children provided by married men is missing for 3 years in the data

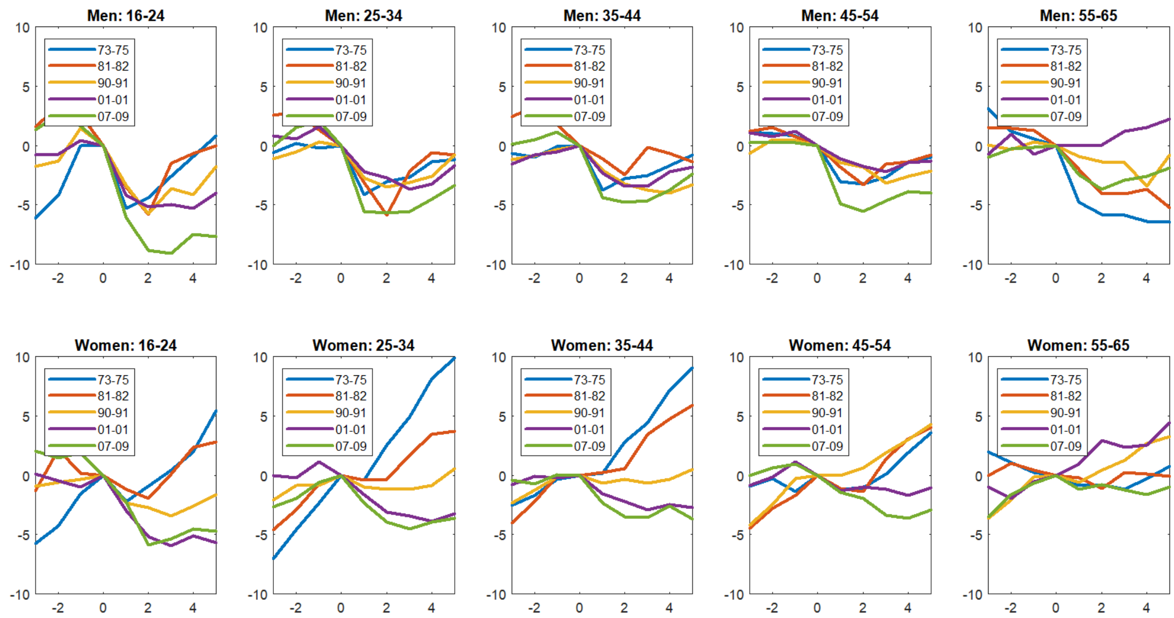
Table 1: Parameter Choices

Parameter	Value
β	0.98
α	0.27
δ	0.069
A	1.0
σ	1
σ^h	1.5
χ	1.7
ϕ	4
η	[0.63, 1.1090]
ζ_m	0.6413
A^h	0.5
ψ	0.2
χ^h	1.5

Figure 1: Slowing recoveries for workers of different Ages



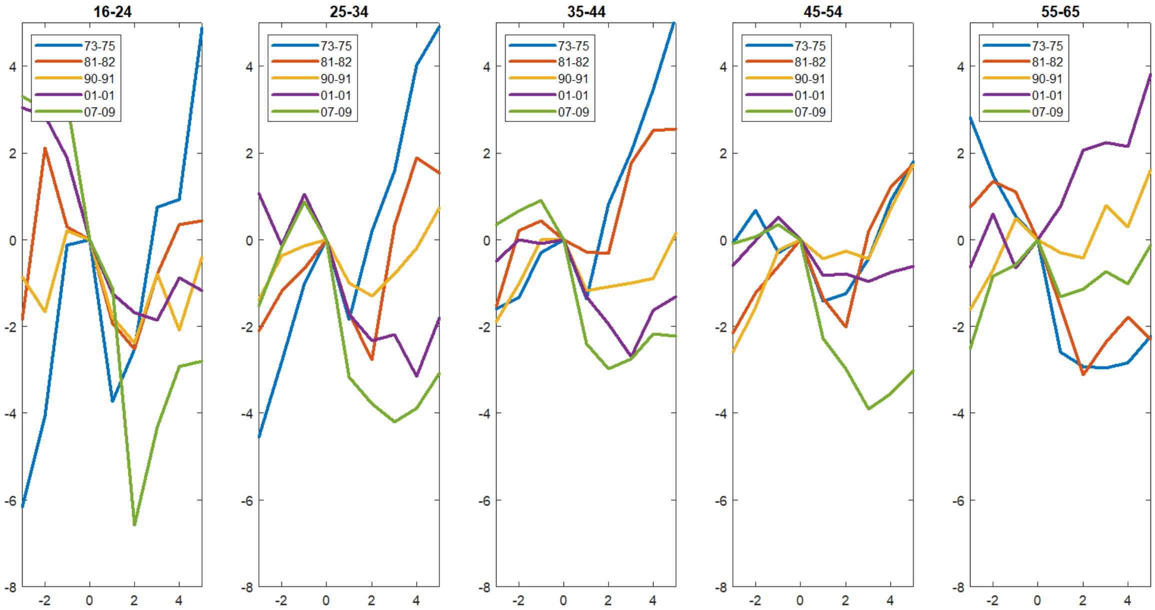
(a) All workers



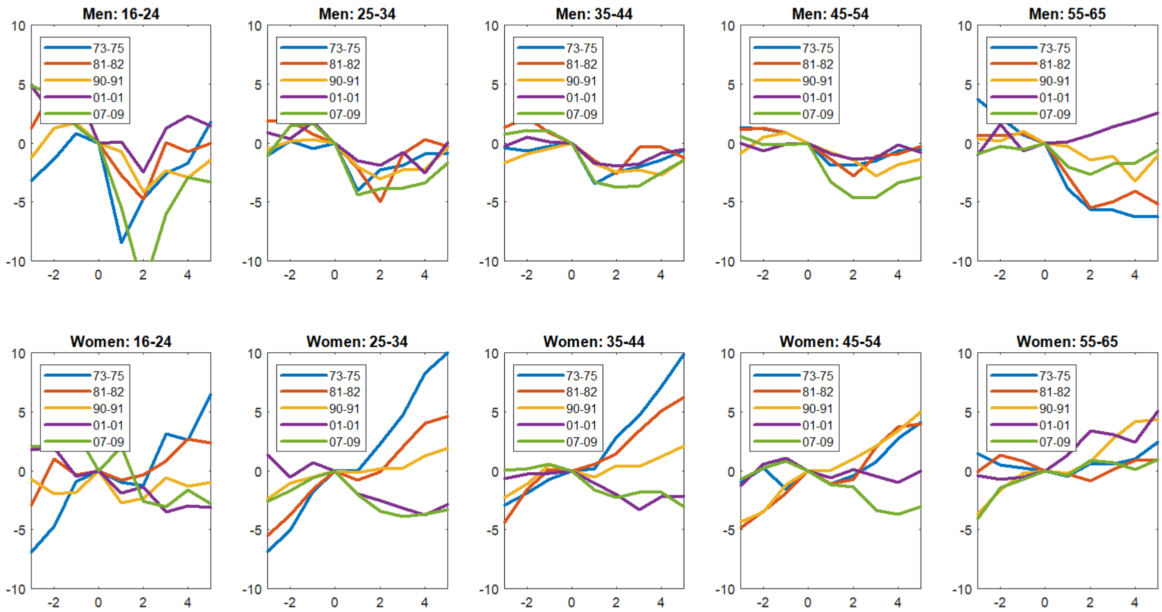
(b) Men and Women workers

Notes: This figure graphs the employment-to-population of workers divided into 5 age categories (16-24, 25-34, 35-44, 45-54, 55-65) during the last 5 recessions and the subsequent recoveries. The x-axis measures time (in years) whereas the y-axis measures the employment to population ratio. I normalize each series to zero at the pre-recession peak. Each series is calculated by aggregating microdata from the March ASEC of the CPS.

Figure 2: Recoveries for *married* workers of different Ages



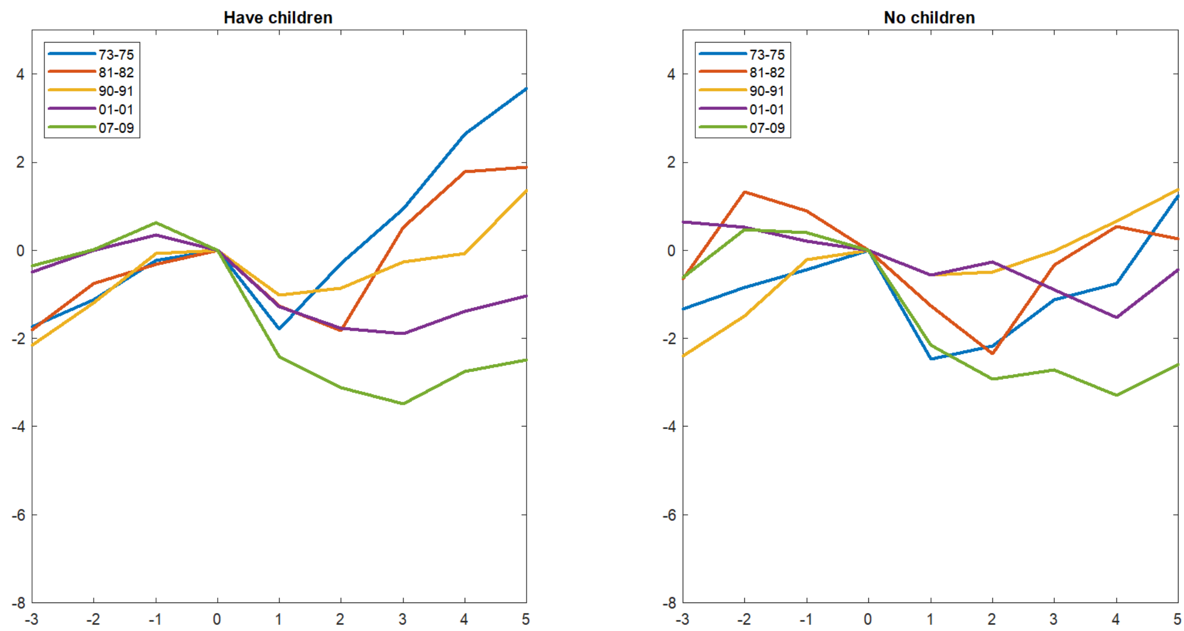
(a) All workers



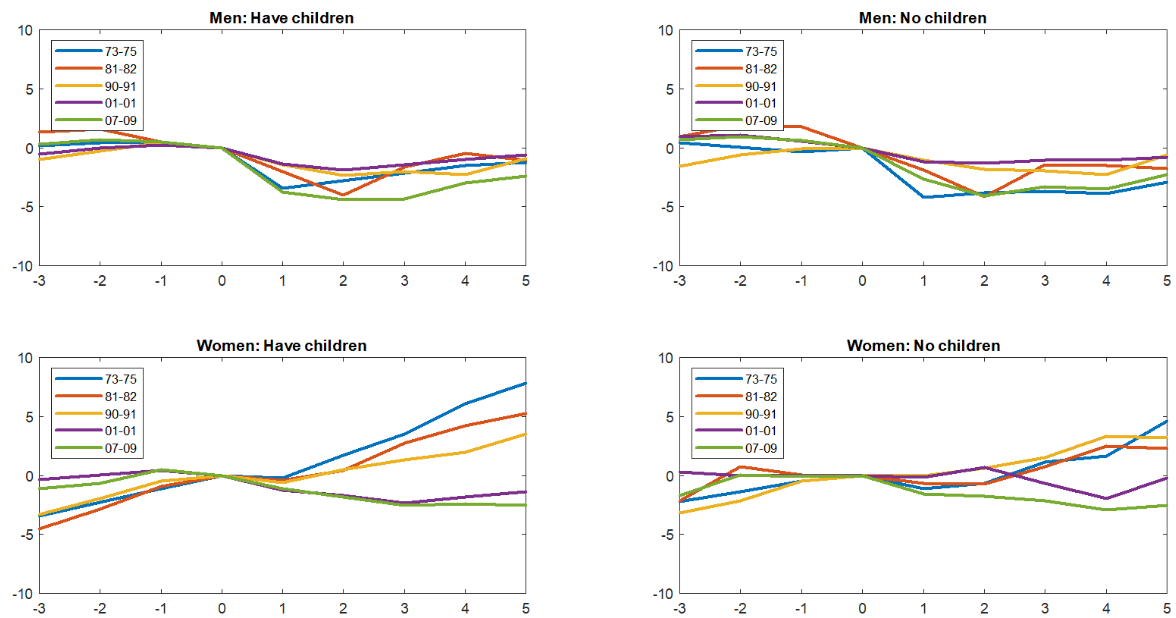
(b) Men and Women workers

Notes: This figure graphs the employment-to-population of workers divided into 5 age categories (16-24, 25-34, 35-44, 45-54, 55-65) during the last 5 recessions and the subsequent recoveries. The x-axis measures time (in years) whereas the y-axis measures the employment to population ratio. I normalize each series to zero at the pre-recession peak. Each series is calculated by aggregating microdata from the March ASEC of the CPS.

Figure 3: Recoveries for married workers differing by presence of *children*



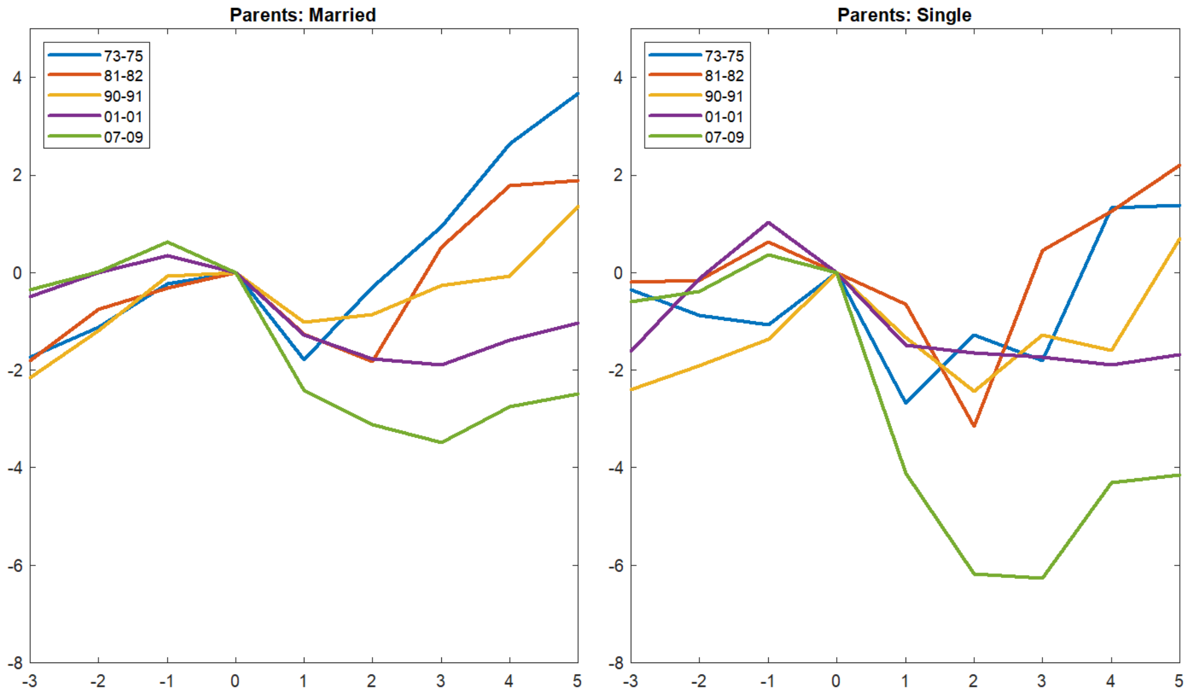
(a) All workers



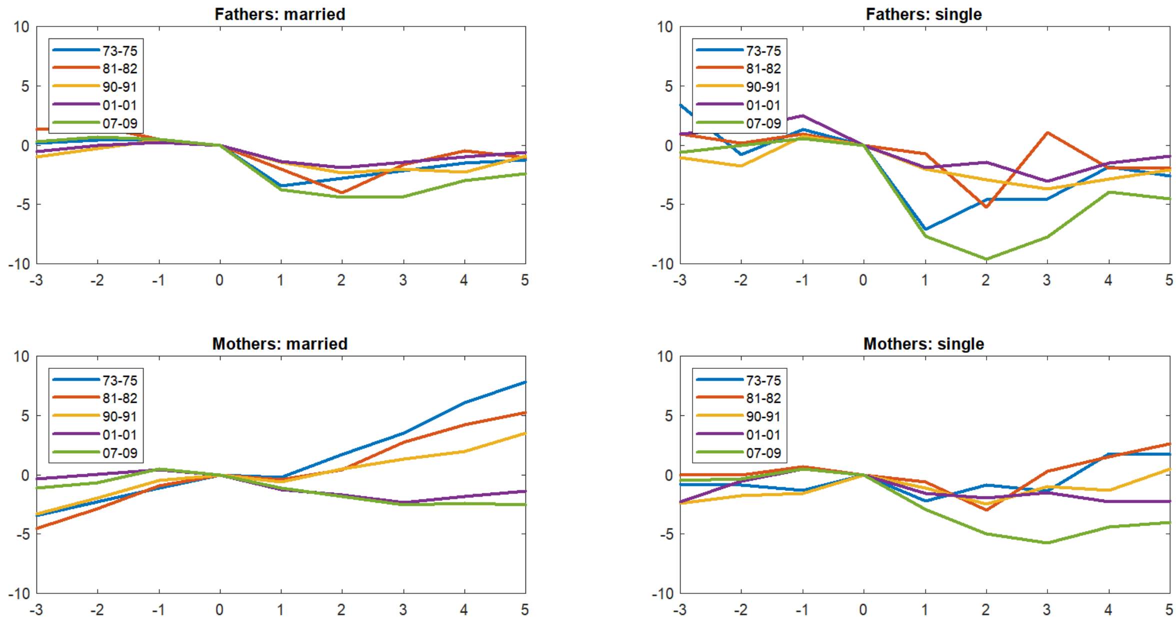
(b) Men and Women workers

Notes: This figure graphs the employment-to-population of married workers divided into 2 groups based on the presence of children during the last 5 recessions and the subsequent recoveries. The x-axis measures time (in years) whereas the y-axis measures the employment to population ratio. I normalize each series to zero at the pre-recession peak. Each series is calculated by aggregating microdata from the March ASEC of the CPS.

Figure 4: Recoveries for workers with children differing by *marital status*



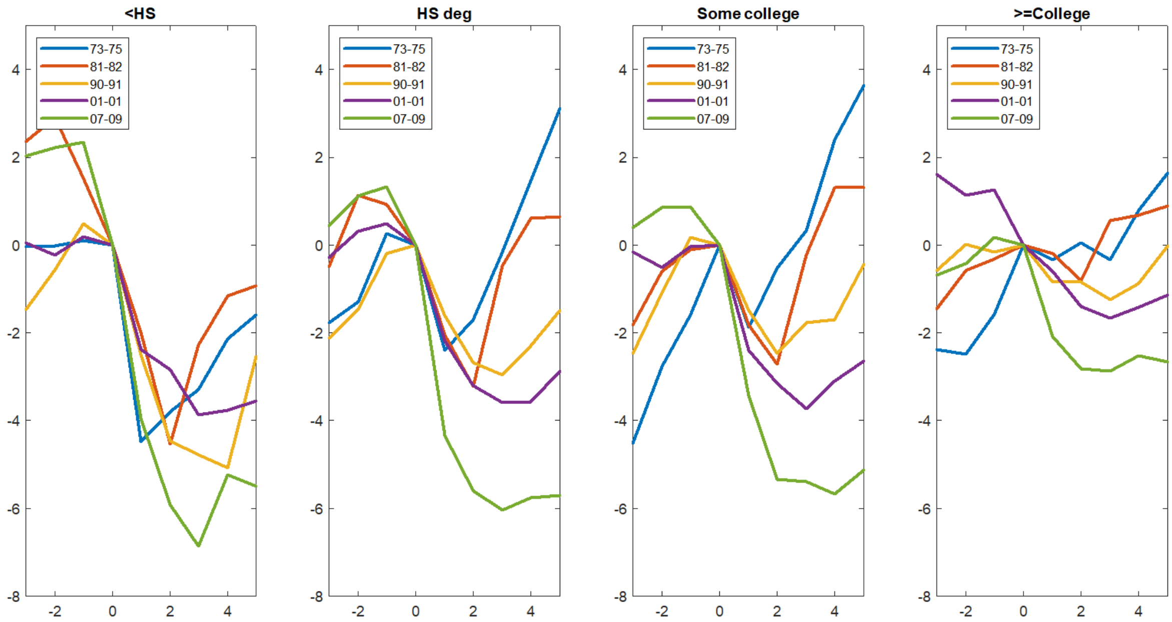
(a) All workers



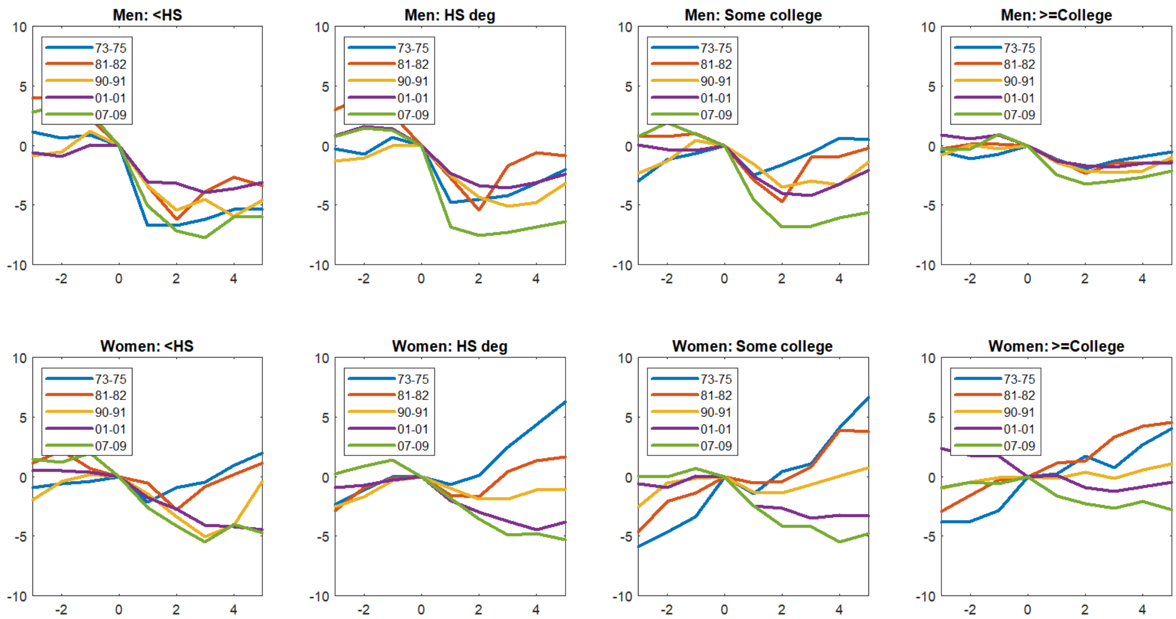
(b) Men and Women workers

Notes: This figure graphs the employment-to-population of workers with children divided into 2 groups based on their marital status during the last 5 recessions and the subsequent recoveries. I assume that singles include all those who are divorced, widowed or never married. The x-axis measures time (in years) whereas the y-axis measures the employment to population ratio. I normalize each series to zero at the pre-recession peak. Each series is calculated by aggregating microdata from the March ASEC of the CPS.

Figure 5: Recoveries for workers differing by *education level*



(a) All workers



(b) Men and Women workers

Notes: This figure graphs the employment-to-population of workers which are divided into 4 categories based on their education levels (<HS, with HS degree, some college, $\geq$ college degree) during the last 5 recessions and the subsequent recoveries. I assume that singles include all those who are divorced, widowed or never married. The x-axis measures time (in years) whereas the y-axis measures the employment to population ratio. I normalize each series to zero at the pre-recession peak. Each series is calculated by aggregating microdata from the March ASEC of the CPS.