From Trend to Cycle: the Changing Careers of Married Women and Business Cycle Risk

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Research Question

How has the rise in married women's labor impacted U.S. business cycle dynamics?

Our Contribution

- Different theories of the rise in participation/employment for married women have different implications for cyclical volatility.
- We will:
  1. Provide a unified theory of secular trends and cyclical dynamics.
  2. Evaluate how changes in demographics, family formation, & married women's labor supply has impacted US cycles from 1970 onwards.

Empirical Motivation

Married Women's Trends: 1950-2010

- Increase employment by 50%
- Increase average hours by 40%
- Increase contribution to aggregate hours by 25%. Now account for 20%

Married Women's Business Cycle

- Married women have 40-50% lower hours volatility.
- Reduce aggregate hours volatility by 12%.
- Moderate increase in hours volatility over time? Hard to tell.

Why do Women have Lower Cyclical Volatility? (Data)

- Regression of log transition rate on log unemployment rate:

Transition rate	Estimated coefficient
E-to-E	0.0024***
	(0.0008)
E-to-U	0.3648***
	(0.0560)
E-to-N	-0.2616***
	(0.0363)

CPS monthly data 1995-2013; prime-age individuals (25-54 years); seasonally adjusted using X13-ARIMA-SEATS

Why do Women have Lower Cyclical Volatility? (Theory)

Normal Times.

- Characterized by flexible labor supply
- More likely to be part-time
- Frequent movements between employment (E) and not in the labor force (N)

Recessions.

- Less likely to quit to leave the labor force (procyclical E-to-N).
- E-to-E falls less than implied by lay-off rates.
- Hours volatility mostly from extensive margin- 22% hours, 78% employment

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To understand married women's cyclicality, we need a theory of their careers: the paths of when they EN or NE and why.

Careers of married women

- **Career Women**: annual hours $\geq 1,500$
- **Part-time**: $400 \geq$ annual hours $< 1,500$
- **NiLF**: annual hours < 400
- **Lifecycle**:
  - annual hours $\geq 1,500$ when age 40-54
  - annual hours ≤ 600 when age 25 and 39
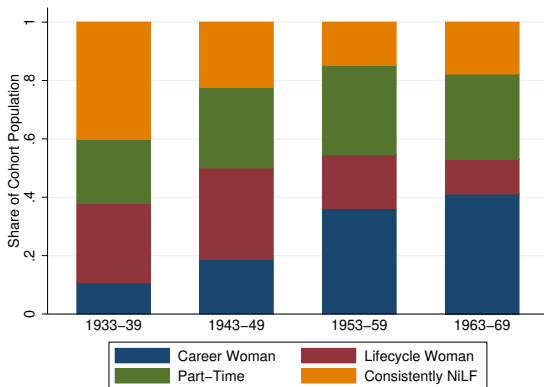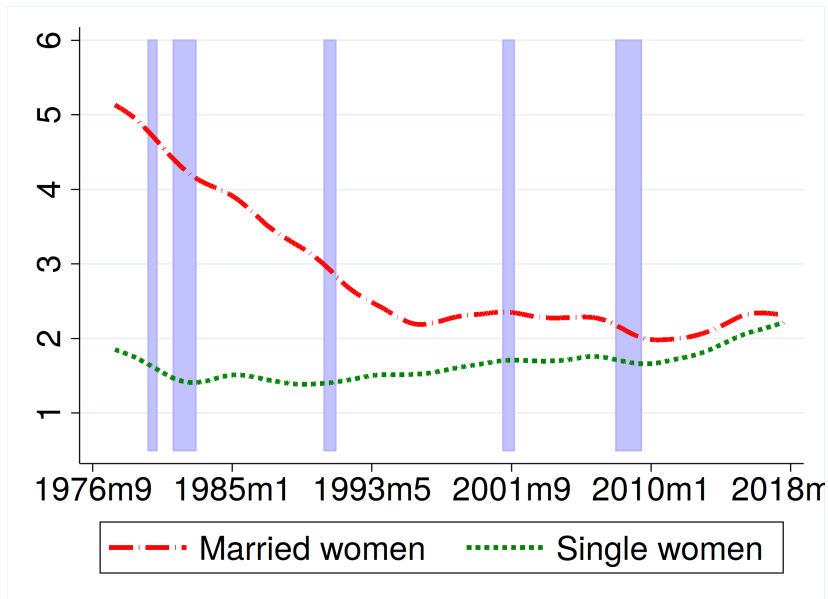
Increased attachment

Figure: Employment to Not in the labor force (E-to-N)

Preliminary Results

Comparative statics on a stationary life-cycle model.

1. **Returns to experience** $\Uparrow$
   - Inter-temporal intensive & extensive margin
   - Increases hours through "career women".
   - Employment/Population falls < 1ppt **more** during recessions

2. **Gender wage gap** $\Downarrow$
   - Intra-temporal intensive & extensive margins
   - Increases hours through mostly "life-cycle" women.
   - Employment/Population falls > 1ppt **less** during recessions

3. **Fixed cost of working** $\Downarrow$
   - Intra-temporal, extensive margin
   - Increases hours through "part-time women".
   - Employment/Population falls > 1ppt **more** during recessions

A Life-Cycle Model of Women's Careers & Business Cycles

Environment & Choices

- Two-person household consisting of husband and wife
- Stochastic ageing (τ): young, prime-age, near-retirement, retired
- Married men: an exogenous income process w/ state m.
    - Employed; Recently Unemployed; Unemployed; Dead; Divorced.
- Married women: face gender wage gap & make labor supply choices.
    - Employed choose hours $(\ell \in (0,1))$ and can quit $(Q \in \{0,1\})$
    - Unemployed choose search intensity $(s \in [0,1])$
- Recessions $z \in \{z_\ell, z_h\}$ are periods of low job-finding and high job-loss probabilities; wage reduction

Married Women's Types

- Ex-ante:
  - Value of non-employment (κ)
  - Fixed ability (ω)

- Ex-post:
  - Stochastic value of non-employment ($\epsilon \sim \pi(\epsilon'|\epsilon, \tau)$)
  - Experience ($e \in [\underline{e}, \bar{e}]$): grows when employed; decays when non-employed

Preferences & Technologies

- Utility while employed:
  - $\frac{c^{1-\sigma}}{(1-\sigma)} - \mu \frac{\ell^{1+\eta}}{(1+\eta)} - \kappa - \epsilon$
- Utility while unemployed
  - $\frac{c^{1-\sigma}}{(1-\sigma)}$
- Wage Earnings: $\phi(z) w(\omega, e) \ell$
  - $w(\omega, e) = \phi^w (\omega + \gamma e^\xi)$
- Home Production: $h(\omega) n^{\nu_h}$
  - $h(\omega) = \bar{h} + z_h * \omega$
- Experience
  - $e' = (1 - \delta) e + \theta_e e \ell^\psi$
- Search
  - $Pr(job) = s^{\nu_s} \lambda(z)$

Value Function

State: $S = \{e, \epsilon, \tau, a; m, z\}$; experience, transitory cost of work, age, assets, husband's state, recession state

- Employed

$$V^e_{\kappa,\omega}(S) = \max_{\ell \in (0,1]} u(c, \ell) - \kappa - \epsilon +$$
$$\beta \mathbf{E}_{S'}(\xi(z) \max\{V^e_{\kappa,\omega}(S'), V^n_{\kappa,\omega}(S')\} + (1 - \xi(z))V^n_{\kappa,\omega}(S'))$$
$$st \quad c + a' = \phi(z)(y(m) + w(\omega, e)\ell) + h(\omega)(1 - \ell)^{\nu_h} + a$$
$$e' = (1 - \delta)e + \theta_e e \ell^{\psi}$$

- Non-Employed

$$V^n_{\kappa,\omega}(S) = \max_{s \in [0,1]} u(c) + \beta \mathbf{E}_{S'}(s^{\nu_s} \lambda(z) V^e_{\kappa,\omega}(S') + (1 - s^{\nu_s} \lambda(z))V^n_{\kappa,\omega}(S'))$$
$$st \quad c + a' = \phi(z)(y(m)) + h(\omega)(1 - s)^{\nu_h} + a$$
$$e' = (1 - \delta)e$$

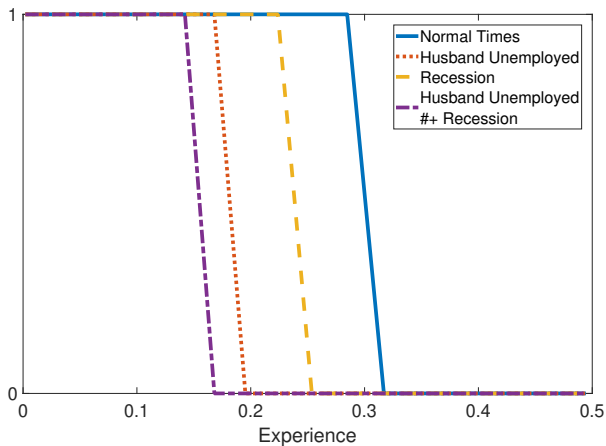Focus on the Quit Choice: $V^n > V^e$

What Drives Quits?

- Shock increases fixed cost of work
- Husband's income increases

Why do they quit less in recessions?

- Insurance: High risk that husband's income will decrease.
- Job hoarding: Harder to re-enter employment
- At the same time, wages fall so that limits quant. response

# Quit Policy Response to Fixed Cost of Work Shock

Who quits by Career-type

Taxonomy of Careers

- Career Women: Consistently work full-time.
    - High wage / Low cost of work types.
- Part-Time Women: Consistently work part-time.
    - Low wage / Low cost of work types.
- **Life-cycle Women**: Mostly NiLF when young, consistently employed prime age and older. .
    - High wage / High cost of work draw when young
- **NiLF Women**: Mostly do not work unless husband's income falls.
    - Low wage / High cost of work types.

Change in Quits during Recession
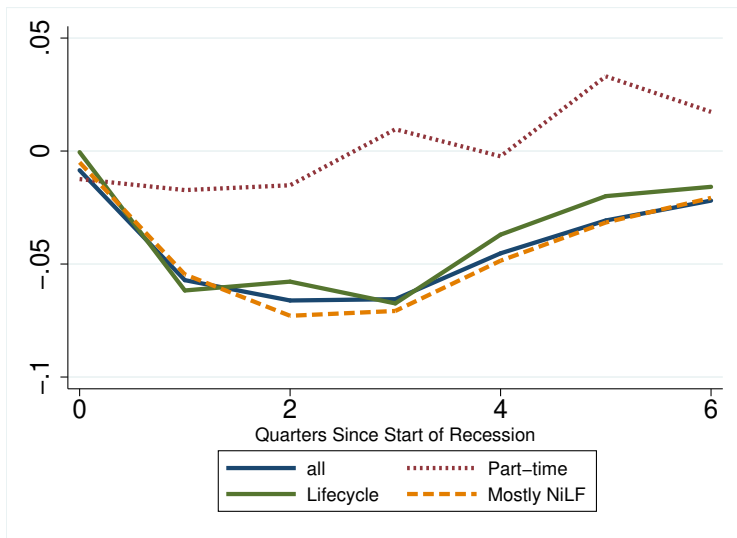
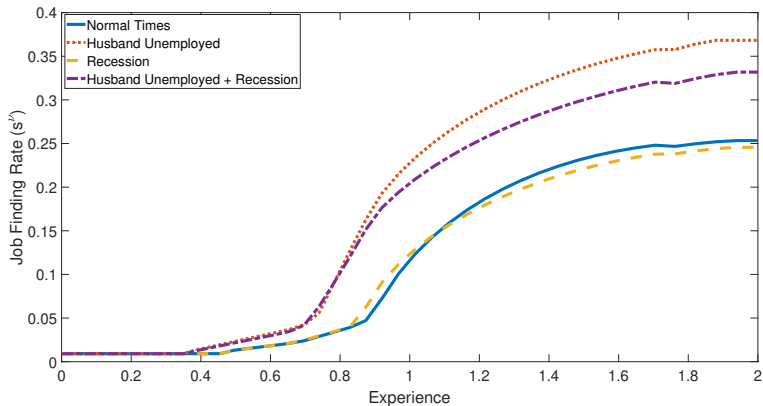Impulse response from 1940's cohort model data

Cyclicality of (Re)-Joining the Labor Force

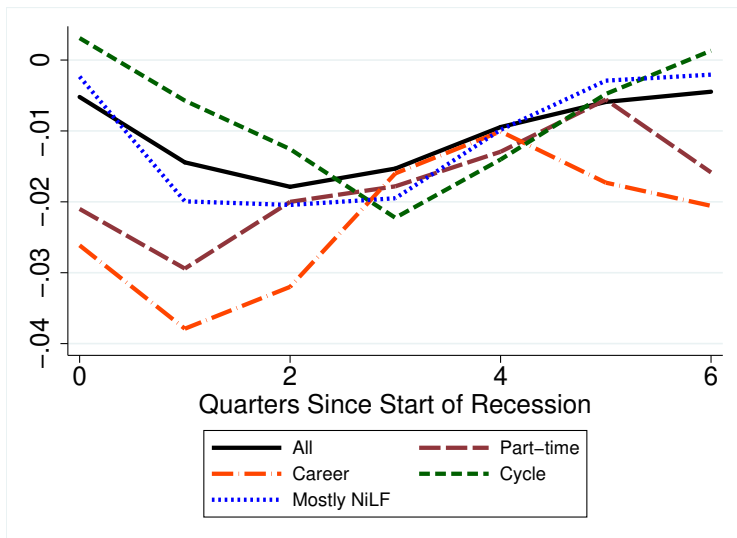$$Pr(job) = s^{\nu_s} \lambda(z)$$

In recessions:

- Search more for insurance: High risk that husband's income will decrease.
- Search less because wages are low.
- Search less because job finding rate $\lambda(z)$ is low.

Search Policy Response to Fixed Cost of Work Shock

Change in Overall Employment during Recession

Quarters Since Start of Recession

All	Part–time
Career	Cycle
Mostly NiLF	

Impulse response from 1940s cohort model data

From Trend to Cycle

Theory 1: Returns to Experience Increase

Changes inter-temporal return to work by raising tomorrow's wage

- Trend:
    - Most increase from "Career Women" with high EE attachment.
- Cycle- Aggregate volatility increases moderately:
    - Composition: toward career women w/ higher volatility.
    - Within career types, volatility decreases.

Theory 2: Gender Wage Gap Decreases

Increases intra-temporal benefit to working.

- Trend:
    - Most increase from "life-cycle" women by making them more likely to return to work in middle-age.
- Cycle- Aggregate volatility decrease:
    - Composition: towards life-cycle women w/ lowest volatility.
    - Within career types, volatility decreases.

Theory 3: Fixed Cost of Work Decreases

Decreases intra-temporal cost of work

- Trend:
    - Most increase from shifting middle-lower productivity "life-cycle" women to "part-time".
    - Thick part of the distribution of wage types.
- Cycle- Aggregate volatility increases:
    - Composition: Part time women are always working and so have high volatility
    - Within career types, volatility change varies.

From Theory to Trend
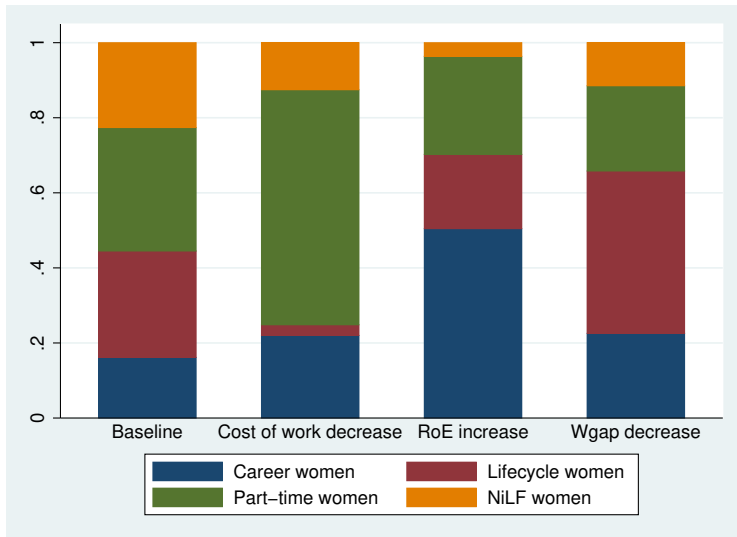
From Theory to Cycle

Percentage point change *relative to the baseline*

- Drop in employment during recessions
- Share of the population

	Return to Exp ↑		Wage Gap ↓		Cost of Work ↓	
	Empl	Pop Share	Empl	Pop Share	Empl	Pop Share
Part-Time	-0.5	-5	-0.4	-5	-0.1	+40
Career	-0.2	+33	-0.2	+4	+0.3	+4
Life-Cycle	-0.8	-10	-0.1	+12	-0.7	-27
Mostly NiLF	-0.4	-18	0.0	-11	+0.4	-17
All	+0.7		-1.4		+1.8	

Reminder: Part-Time and Career women have the highest
volatility. Life-cycle women the lowest.

Summary + Future work

How has the rise in married women's labor impacted U.S. business cycle dynamics?

- Three empirically evident theories of rise in married women's hours.
- Each has strikingly different implications for
  - Change in married women's career paths
  - Change in business cycle volatility

Remaining work

- Tighten up the baseline calibration
- Estimate contributions of theories to trend
- Evaluate implications for changes in cyclicality including change in age and marriage demographics.