# A Social Norm on Working Hours and Business Cycles

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# Introduction

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- There have been recent advances in modeling aggregate labor supply.
  - The importance of extensive margin *(Heckman, 1984; Hansen, 1985).*
  - Part- and full-time work dynamics *(Daniel and Lale, 2019).*
  - Adjustment along both intensive and extensive margins *(Rogerson and Wallenius, 2009; Chang et al., 2019).*

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  - Part- and full-time work dynamics *(Daniel and Lale, 2019).*
  - Adjustment along both intensive and extensive margins *(Rogerson and Wallenius, 2009; Chang et al., 2019).*
- What is missing in the literature is the role of **a social norm on working hours**—*working for around 40 hours per week*.

# Introduction

- In fact, the social norm plays a crucial role in household's labor supply decision.
  - Due to the social norm, more than 40 percent of US households work for around 40 hours per week.
  - It affects a decision of part- or full-time work and the transition between them.

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  - Due to the social norm, more than 40 percent of US households work for around 40 hours per week.
  - It affects a decision of part- or full-time work and the transition between them.

- This paper studies ***the role of the social norm*** in shaping
  - i) cross-sectional distribution of hours,
  - ii) its business-cycle implications.

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- **Data:** summarize empirical facts on working hours distributions and part- and full-time work dynamics.

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- **Data:** summarize empirical facts on working hours distributions and part- and full-time work dynamics.

- **Model:** develop a heterogeneous-agent model with **a social norm on hours worked.**
  1) Market incompleteness**:** household-level idiosyncratic shocks
     - Rich household heterogeneity
  2) ***Social norm on working hours:*** utility costs when deviating from 40 hours
     - Disperse hours distribution with a spike at 40 hours
     - Three employment status: nonemployment, part- and full-time
     - Both lumpy and smooth labor supply decisions
     - Heterogeneous intensive and extensive labor supply elasticities

# What I Find

- **Empirical Analysis**
  - Disperse hours distribution with a spike at 40 hours.
  - Relatively many income- and wealth-poor are binding to the social norm.
  - Among the intensive margins, full-time worker's hours adjustment is more important rather than the transition between PT and FT.

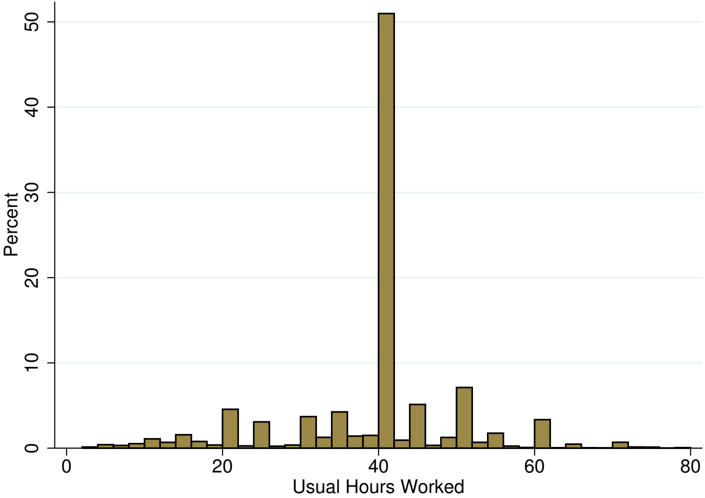
# What I Find

- **Empirical Analysis**
  - Disperse hours distribution with a spike at 40 hours.
  - Relatively many income- and wealth-poor are binding to the social norm.
  - Among the intensive margins, full-time worker's hours adjustment is more important rather than the transition between PT and FT.

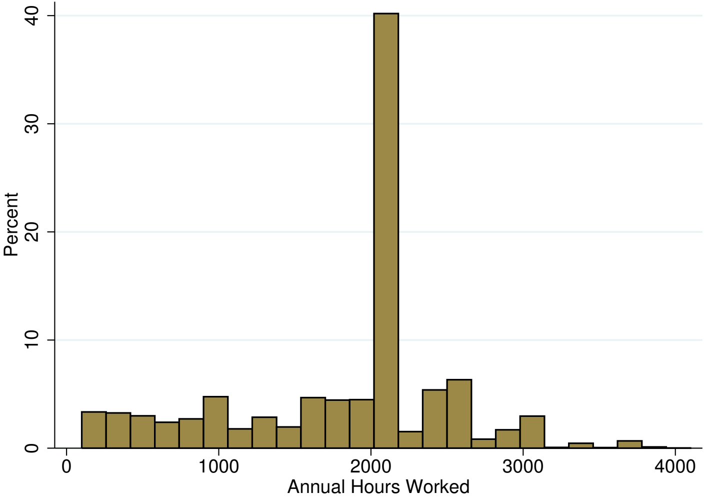
- **Model part:**
  - The social norm plays a crucial role in replicating the distribution of working hours.
  - It can explain the relative importance of full-time worker's hours adjustment.

# Some Facts on Hours Worked

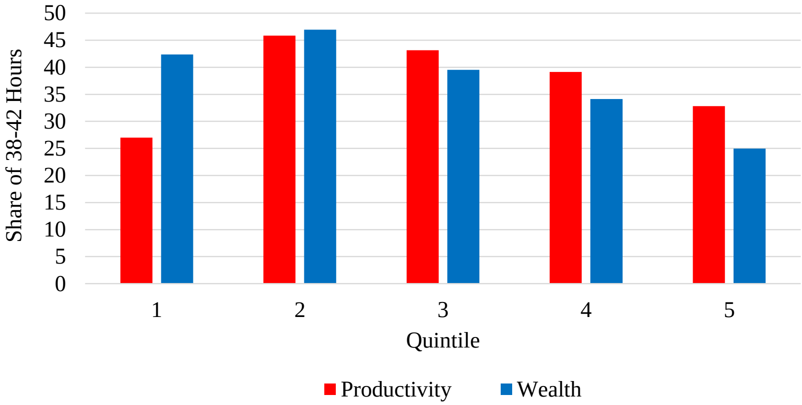
# Usual Weekly Hours



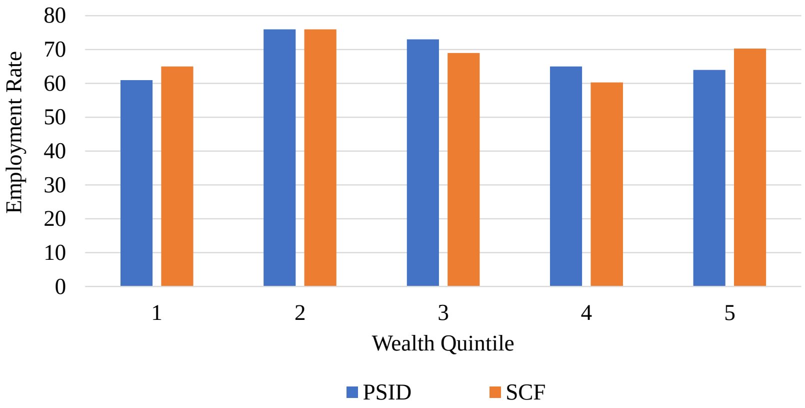
# Annual Hours



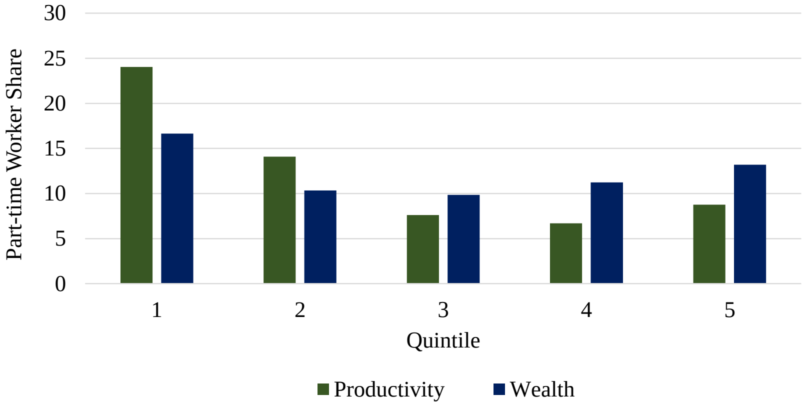
# The Spike Distribution



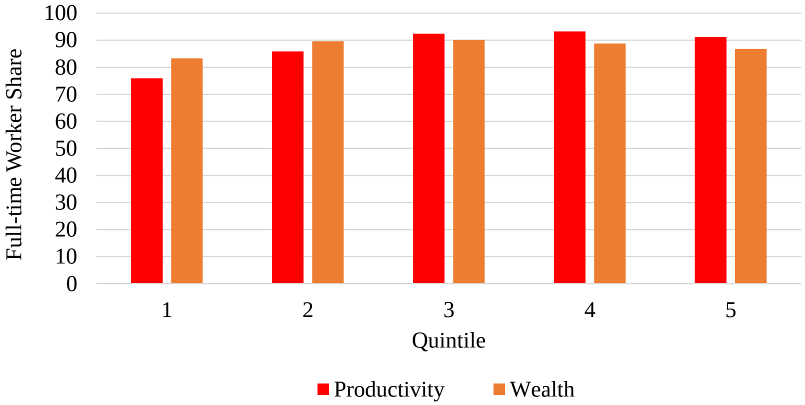
# Employment Distribution



# Part-time Worker Distribution



# Full-time Worker Distribution



# Transition between Employment Status

| | | $t+1$ | | |
|---|---|---|---|---|
| | | Not Work | Part Time | Full Time |
| | Not Work | 81.2 | 14.4 | 4.4 |
| $t$ | Part Time | 18.4 | 51.0 | 30.5 |
| | Full Time | 2.6 | 7.7 | 89.7 |

# Business Cycle Moments for PT and FT

| | | | | |
|---|---|---|---|---|
| | | $H$ | $E$ | $h$ |
| Total | $\rho(Y, x)$ | 0.89 | 0.83 | 0.79 |
| | $\sigma(x)/\sigma(Y)$ | 0.96 | 0.64 | 0.41 |
| | | $H_F$ | $S_F$ | $h_F$ |
| Full Time | $\rho(Y, x)$ | 0.90 | 0.79 | 0.66 |
| | $\sigma(x)/\sigma(Y)$ | 1.20 | 0.42 | 0.33 |
| | | $H_P$ | $S_P$ | $h_P$ |
| Part Time | $\rho(Y, x)$ | -0.57 | -0.79 | -0.21 |
| | $\sigma(x)/\sigma(Y)$ | 0.93 | 1.24 | 0.40 |

# Counterfactual Analysis

| | $\sigma(x)/\sigma(Y)$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $H$ | $h$ | $H_F$ | $S_F$ | $h_F$ | $H_P$ | $S_P$ | $h_P$ |
| *Actual* | 0.96 | 0.41 | 1.20 | 0.42 | 0.33 | 0.93 | 1.24 | 0.40 |
| *No* $h_P$ | **0.96** | **0.41** | 1.20 | 0.42 | 0.33 | 0.84 | 1.24 | **0.00** |
| *No* $h_F$ | **0.79** | **0.19** | 1.00 | 0.42 | **0.00** | 0.93 | 1.24 | 0.40 |
| *No TR.* | **0.80** | **0.28** | 0.84 | **0.00** | 0.33 | 0.70 | **0.00** | 0.40 |

- Transition between PT and FT work is important *(Daniel and Lale, 2019)*.
- New finding: *the full-time workers' intensive margin plays a crucial role in accounting for the total intensive dynamics.*

# Model

# Heterogeneity

- Two types of heterogeneity: heterogeneous labor productivity ($x$) and time-discount factor ($\beta$).

1. Labor productivity
   - Households face idiosyncratic labor productivity shocks, $x$, which follows AR(1) process in logs:
   $$\log x' = \rho_x \log x + \varepsilon_x, \quad \varepsilon_x \overset{iid}{\sim} \mathcal{N}(0, {\sigma_x}^2).$$
2. Time-discount factor
   - $\beta$ can take on two values, i.e., $\beta \in \mathbf{S}_\beta = \{\beta_L, \beta_H\}$, where $0 < \beta_L < \beta_H < 1$.
     - Follow a discrete-time two-state Markov chain with transition matrix, $\mathbf{Q}^\beta$.

- Incomplete asset market: Households cannot issue any assets contingent on their future idiosyncratic risks.

# Household

- A household maximizes her expected lifetime utility consumption, $c_t$, and hours of work, $h_t$ :

$$\max_{\{c_t, a_{t+1}, h_t\}_{t=0}^{\infty}} \mathbb{E}_0 \left[ \sum_{t=0}^{\infty} B_t \left( \log c_t - \chi \frac{h_t^{1+1/\gamma}}{1+1/\gamma} \right) + \xi \right] \; s.t.$$

$$c_t + a_{t+1} = w_t x_t h_t + (1 + r_t) a_t,$$

$$a_{t+1} \geq \underline{a}.$$

- $\gamma > 0$: curvature parameter for labor supply, and $B_t = \prod_{k=0}^{t} \beta_k$,and $\xi$ is a (dis)utility term for employment status.

# Extensive Margin of Labor Supply

- Extensive margin of labor supply: employment ($h > 0$) and nonemployment ($h = 0$).
- Non-employed workers enjoy home production, $\xi$, which depends on asset.
  - $\xi(a)\,(\geq 0)$, depends on the level of asset such that:

$$\xi(a) = \phi_1\left[1 + \max\{a, 0\}\right]^{-\phi_2}$$

- Non-employed worker's value function:

$$V^N(\theta, \Theta) = \max_{c, a'}\left\{\log c + \xi + \beta \mathbb{E}\left[V(\theta', \Theta')\right]\right\} \; s.t.$$

$$c + a' = (1 + r)a,$$

$$\mu' = \mathbb{T}(\Theta)$$

where $\mathbb{T}$ is a transition operator for $\mu$.

# Intensive Margin of Labor Supply

- ***A social norm on hours*** endogenously generate part- and full-time workers
- Upon employment,
  - a household can make a decision for part- and full-time work
  - should pay cost in utility terms, i.e., $\underline{\xi} < 0$, when their hours deviate from *the social norm hours*, $\overline{h}$:

$$\xi = -\boldsymbol{\kappa} \left| h - \overline{h} \right|$$

# Intensive Margin of Labor Supply

- Part-time worker's value function:

$$V^P(\theta, \Theta) = \max_{c,h,a'} \left\{ \log c - \chi \frac{h^{1+1/\gamma}}{1+1/\gamma} + \xi + \beta \mathbb{E}\left[ V(\theta', \Theta') \right] \right\}$$

$$s.t.\ c + a' = wxh + (1+r)a,$$

$$\text{and } h \in (0,\ \overline{h})$$

- Full-time worker's value function:

$$V^F(\theta, \Theta) = \max_{c,h,a'} \left\{ \log c - \chi \frac{h^{1+1/\gamma}}{1+1/\gamma} + \xi + \beta \mathbb{E}\left[ V(\theta', \Theta') \right] \right\}$$

$$s.t.\ c + a' = wxh + (1+r)a,$$

$$\text{and } h \in [\overline{h}, 1]$$

# Labor Supply Decision

- The employment decision, $h(\theta, \Theta)$, for a household is:

$$V(\theta, \Theta) = \max_{h \in [0,1]} \left\{ V^P(\theta, \Theta), V^F(\theta, \Theta), V^N(\theta, \Theta) \right\}.$$

# Representative Firm

- The representative firm demands labor and capital in order to maximize current profits:

$$\Pi = \max_{K,L} \left\{ ZL^{\alpha} K^{1-\alpha} - wL - (r+\delta)K \right\}.$$

where $Z$ is aggregate productivity, and $\delta$ is the depreciation rate of capital. $Z$ follows a AR(1) process:

$$Z' = (1-\rho_A) + \rho_A Z + \varepsilon_A \qquad \text{with} \qquad \varepsilon_A \overset{iid}{\sim} \mathcal{N}(0, {\sigma_A}^2),$$

- Optimality conditions for the firm are standard: marginal products are equalized to the cost of each factor.

# Result I

*Steady-state Results*

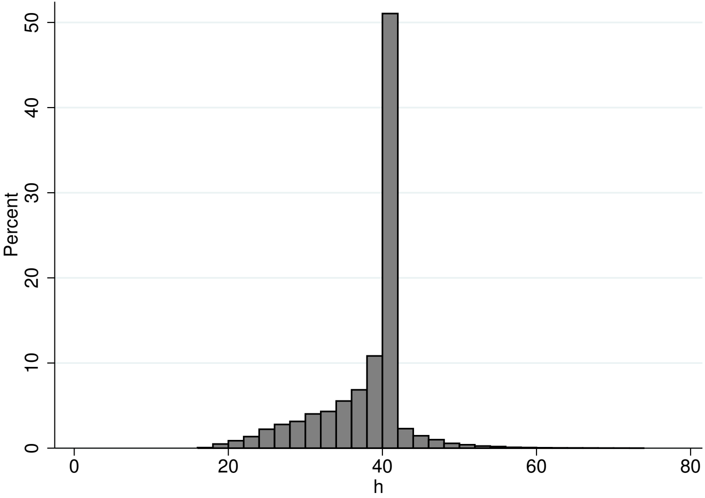
# Wealth and Income Distributions

| | Quintile | | | | | Gini |
|---|---|---|---|---|---|---|
| | 1st | 2nd | 3rd | 4th | 5th | |
| | | | WEALTH DISTRIBUTION | | | |
| *Data* | | | | | | |
| SCF 1992 | -0.39 | 1.74 | 5.72 | 13.43 | 79.49 | 0.78 |
| PSID 1994 | -1.22 | 0.88 | 4.98 | 14.68 | 80.68 | 0.79 |
| ***Model*** | -0.16 | 0.36 | 4.14 | 16.31 | 79.35 | 0.78 |
| | | | INCOME DISTRIBUTION | | | |
| *Data* | | | | | | |
| SCF 1992 | 2.18 | 6.63 | 11.80 | 19.47 | 59.91 | 0.57 |
| PSID 1994 | -0.27 | 5.06 | 13.94 | 24.80 | 56.48 | 0.57 |
| ***Model*** | 0.26 | 3.81 | 11.79 | 23.75 | 60.38 | 0.58 |

# Key Moments

| Moment | Data | Model |
|---|---|---|
| *Targeted* | | |
| Employment rate | 0.70 | 0.70 |
| Share of usual hours at $\overline{h}$ | 0.52 | 0.52 |
| Gini coefficient for earnings | 0.63 | 0.63 |
| Gini coefficient for wealth | 0.78 | 0.78 |
| *Untargeted* | | |
| Gini coefficient for income | 0.57 | 0.58 |
| CV of at usual hours | 0.25 | 0.20 |
| CV of at annual hours | 0.35 | 0.31 |
| Share of FT workers | 0.78 | 0.78 |
| Share of annual hours at $\overline{h}$ | 0.40 | 0.45 |

# Usual Hours Distribution



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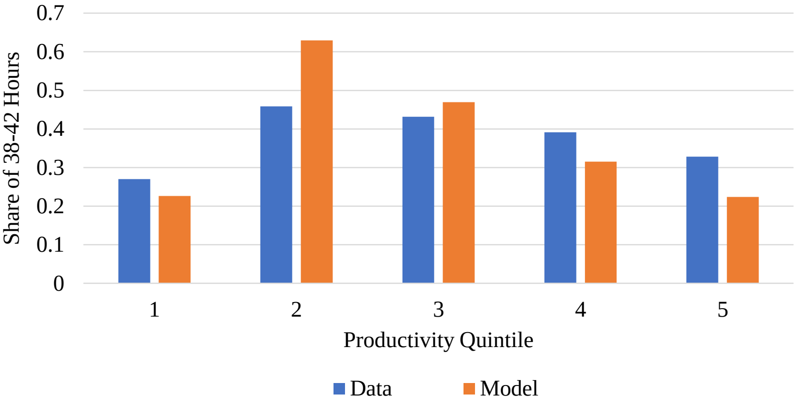

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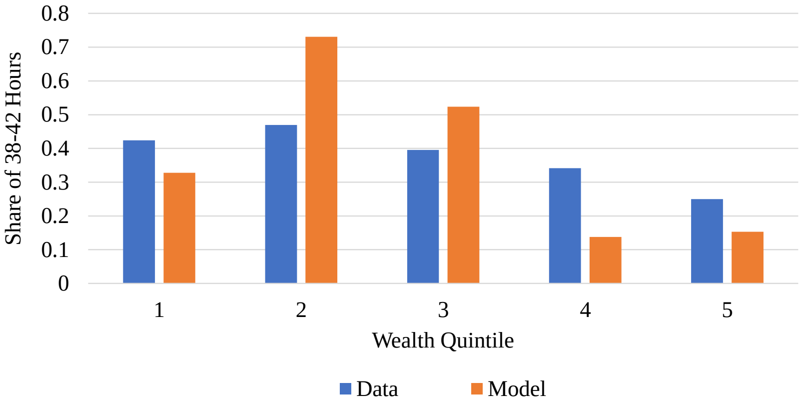
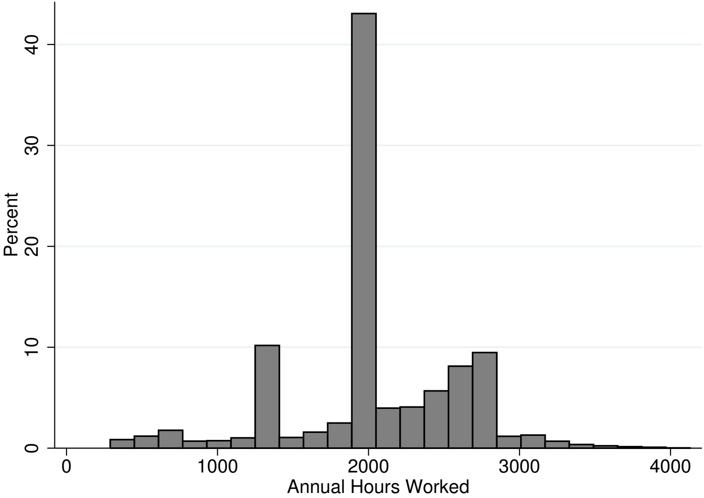
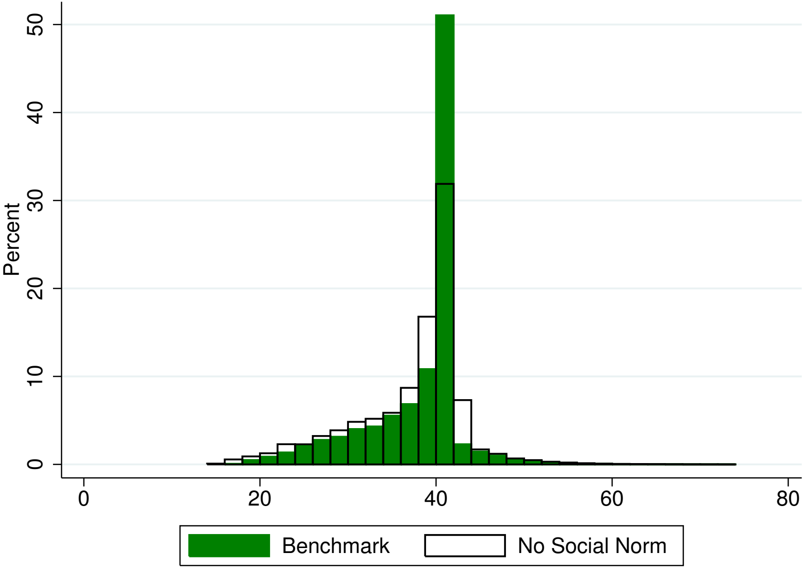


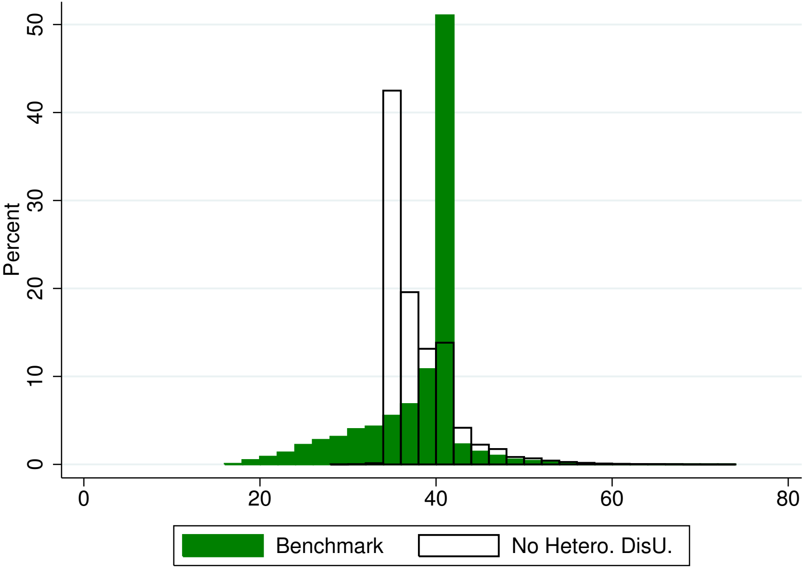
# Annual Hours Distribution



# Role of the Social Norm



# Role of Hetero. Home Production



# Transition Between PT and FT

**Data**

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|---|---|---|---|---|
| | | Not Work | Part Time | Full Time |
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| | Part Time | 18.4 | 51.0 | 30.5 |
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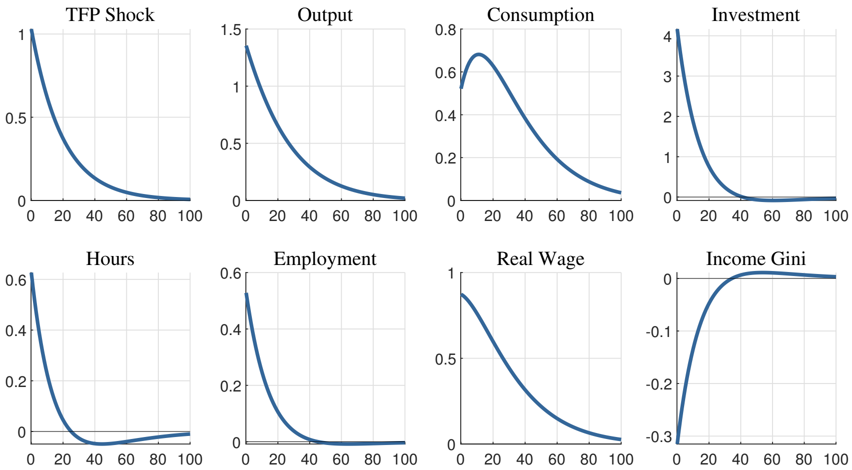
**Model**

| | | $t$+1 | | |
|---|---|---|---|---|
| | | Not Work | Part Time | Full Time |
| $t$ | Not Work | 73.7 | 21.3 | 4.9 |
| | Part Time | 14.5 | 31.2 | 54.3 |
| | Full Time | 1.0 | 15.7 | 83.2 |

# Result II

*Business Cycles*

# Aggregate IRFs



# Key Business Cycle Moments (qauarterly)

| Relative std. | $C$ | $I$ | $H$ | $E$ | $H/E$ | $Gini$ |
|---|---|---|---|---|---|---|
| Data | 0.55 | 3.11 | 0.79 | 0.63 | 0.19 | 0.55 |
| Model | 0.42 | 3.20 | 0.65 | 0.57 | 0.10 | 0.24 |

| Corr. with $Y$ | $C$ | $I$ | $H$ | $E$ | $H/E$ | $Gini$ |
|---|---|---|---|---|---|---|
| Data | 0.77 | 0.92 | 0.88 | 0.81 | 0.48 | -0.50 |
| Model | 0.91 | 0.97 | 0.83 | 0.82 | 0.75 | -0.81 |

# PT-FT Work Dynamics

| | Data | | | Model | | |
|---|---|---|---|---|---|---|
| | $H$ | $E$ | $h$ | $H$ | $E$ | $h$ |
| $\rho(Y,x)$ | 0.89 | 0.83 | 0.79 | 0.77 | 0.45 | 0.79 |
| $\sigma(x)/\sigma(Y)$ | 0.96 | 0.64 | 0.41 | 0.40 | 0.30 | 0.18 |
| | $H_F$ | $S_F$ | $h_F$ | $H_F$ | $S_F$ | $h_F$ |
| $\rho(Y,x)$ | 0.90 | 0.79 | 0.66 | 0.72 | 0.30 | 0.75 |
| $\sigma(x)/\sigma(Y)$ | 1.20 | 0.42 | 0.33 | 0.57 | 0.42 | 0.16 |
| | $H_P$ | $S_P$ | $h_P$ | $H_P$ | $S_P$ | $h_P$ |
| $\rho(Y,x)$ | -0.57 | -0.79 | -0.21 | -0.13 | -0.30 | 0.37 |
| $\sigma(x)/\sigma(Y)$ | 0.93 | 1.24 | 0.40 | 1.63 | 1.56 | 0.21 |

# Counterfactual Analysis

| | $\sigma(x)/\sigma(Y)$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $H$ | $h$ | $H_F$ | $S_F$ | $h_F$ | $H_P$ | $S_P$ | $h_P$ |
| *Actual* | 0.40 | 0.18 | 0.57 | 0.42 | 0.16 | 1.63 | 1.56 | 0.21 |
| *No* $h_P$ | **0.39** | **0.16** | 0.57 | 0.42 | 0.16 | 1.61 | 1.56 | **0.00** |
| *No* $h_F$ | **0.31** | **0.09** | 0.50 | 0.42 | **0.00** | 1.63 | 1.56 | 0.21 |
| *No TR.* | **0.39** | **0.15** | 0.40 | **0.00** | 0.16 | 0.40 | **0.00** | 0.21 |

# Role of the Social Norm

| | Percent Change in $\sigma(h)/\sigma(Y)$ | | |
|---|---|---|---|
| | Data | Benchmark | No Social Norm |
| *No* $h_P$ | 0% | -11% | -20% |
| *No* $h_F$ | -53% | -50% | -43% |
| *No TR.* | -31% | -17% | -9% |

# Solving Hours-productivity Puzzle

| | $Corr(H, Y/H)$ |
|---|---|
| Data | 0.23 |
| Benchmark | 0.46 |
| No Social Norm | 0.51 |
| Homo. Home Production | 0.83 |

# Conclusion

- This paper studies the role of the social norm in shaping cross-sectional distribution of hours and its business-cycle implications.
- To this end, I develop a heterogeneous-agent model with a social norm on hours worked.
- I find that the social norm can replicate silent features of the hours distribution and hours dynamics over the business cycle found in the data.