The Macro Implications of Gender and Marriage

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Facts

- Women and married people make up a large fraction of
  - Labor market participants
  - Total hours worked
  - Total earnings
- Wages, labor market participation, hours worked, and savings differ
  - By gender
  - By marital status
Facts

- Women and married people make up a large fraction of
  - Labor market participants
  - Total hours worked
  - Total earnings
- Wages, labor market participation, hours worked, and savings differ
  - By gender
  - By marital status
- Yet, most papers, unless studying female labor supply
  - Ignore women and marriage
  - Only use data on men
Questions, matching the aggregates in life cycle models

- Can we match
  - Labor participation
  - Hours worked
  - Labor income
  - Net worth
- By ignoring gender and marriage in both models and data and only considering men?
Questions, matching the aggregates in life cycle models

- Can we match
  - Labor participation
  - Hours worked
  - Labor income
  - Net worth
- By ignoring gender and marriage in both models and data and only considering men?
- Other calibration strategies or relatively simple models of marriage that can do better?
Questions, elasticity implications in life cycle models

• Implications for elasticities of hours and participation for
  • Different calibrations
  • Different versions of the models?
Study implications of four life-cycle models

- Economy 1: “No marriage, only men”
  - Model: single decision maker (labor supply and savings)
  - Calibration: data on men only
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- Economy 1: “No marriage, only men”
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- Economies 2 and 3: “No marriage, men and women together”
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- Economy 4: “Married and singles”
  - Model: married and singles. Everyone chooses labor. Spouses also save and consume jointly
  - Calibration: data for married and single men and women
Key results on matching the aggregates

- Economy 1 cannot match participation, and hours, earnings.
- Economy 2 and 3 better match labor income but still miss participation, and hours.
- Economy 4 matches observed data well.
- ⇒ Modeling gender and marriage: important to understand aggregates and thus the economy at a point in time!
Key results on the implied elasticities

- Economy 1 $\Rightarrow$ lowest elasticities
- Economy 2 and 3 $\Rightarrow$ higher elasticities
- Economy 4 $\Rightarrow$ very heterogenous elasticities by gender and marital status
- $\Rightarrow$ Modeling gender and marriage: important to understand elasticities and thus the models’ dynamics!
Data and Methodology

- **Data**
  - PSID: Earnings, wages, hours, participation, marital status, gender, and wealth
  - HRS: Survival

- **Methodology**
  - Pick the 1941-1945 birth cohort and follow it over their life cycle
  - Take its initial conditions and exogenous processes from data (data inputs)
  - Study the evolution of its endogenous variables and match them to data (data outputs)
Women and married people as a fraction of workers, hours, or earnings

<table>
<thead>
<tr>
<th>Age Group</th>
<th>25</th>
<th>35</th>
<th>45</th>
<th>55</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fract. women among workers</td>
<td>0.37</td>
<td>0.40</td>
<td>0.46</td>
<td>0.46</td>
<td>0.44</td>
</tr>
<tr>
<td>Fract. hours worked by women</td>
<td>0.28</td>
<td>0.31</td>
<td>0.39</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>Fract. earnings by women</td>
<td>0.24</td>
<td>0.22</td>
<td>0.30</td>
<td>0.27</td>
<td>0.27</td>
</tr>
<tr>
<td>Fract. married among workers</td>
<td>0.86</td>
<td>0.85</td>
<td>0.84</td>
<td>0.82</td>
<td>0.78</td>
</tr>
<tr>
<td>Fract. hours worked by married</td>
<td>0.86</td>
<td>0.86</td>
<td>0.84</td>
<td>0.83</td>
<td>0.80</td>
</tr>
<tr>
<td>Fract. earnings by married</td>
<td>0.88</td>
<td>0.87</td>
<td>0.86</td>
<td>0.87</td>
<td>0.85</td>
</tr>
</tbody>
</table>

• The aggregates are comprised of large fraction of women and married people.
Single and married men and women over the life cycle

Labor Participation

Mean hours

Average Labor Income

Average Household Asset

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Gender and Marriage
Key model features for the more general model

- Lifecycle model
- Partial equilibrium, cohort level analysis
- Period length: one year
Key model features for the more general model

- Lifecycle model
- Partial equilibrium, cohort level analysis
- Period length: one year
- Working stage \((t_0\) to \(t_r\))
  - Alive for sure
  - Face shocks to their labor productivity
  - Either are married or single
  - Singles and people in couples can choose to work and hours
  - Fixed cost of working
- Retirement stage \((t_r\) to \(T\))
  - Exogenous probability of death. Thus, married people might lose their spouse.
Household preferences

- Discount factor: $\beta$.
- Singles:
  \[ v(c_t, l_t) = \frac{(c_t^{1-\omega})^{1-\gamma} - 1}{1 - \gamma} \]
- Couples:
  \[ w(c_t, l^1_t, l^2_t) = \frac{((\frac{c_t}{2})^{1-\omega})^{1-\gamma} - 1}{1 - \gamma} + \frac{((\frac{c_t}{2})^{1-\omega})^{1-\gamma} - 1}{1 - \gamma} \]
- Labor participation cost (time cost): $\phi^{i,j}_t$.
- $j = \text{marital status, } i = \text{gender.}$
Wage processes for men and women

- Deterministic age-efficiency profile: $e^{i,j}_t$.
- Shocks: AR(1) process
  \[
  \ln \epsilon^{i}_{t+1} = \rho^{i}_\epsilon \ln \epsilon^{i}_t + \upsilon^{i}_t, \quad \upsilon^{i}_t \sim N(0, \sigma^2_{\upsilon}).
  \]
- Total productivity: $e^{i,j}_t \epsilon^{i}_t$
Recursive problem for working-age singles

\[ W_{t}^{s,i}(a_{t}^{i}, \epsilon_{t}^{i}) = \max_{c_{t}, a_{t+1}^{i}, n_{t}} \left[ v(c_{t}, 1 - n_{t} - \phi_{t}^{i,1} I_{n_{t}}) + \beta E_{t} W_{t+1}^{s,i}(a_{t+1}^{i}, \epsilon_{t+1}^{i}) \right] \]

\[ Y_{t} = e_{t}^{i,j} \epsilon_{t}^{i} n_{t} \] \hspace{1cm} (1)

\[ c_{t} + a_{t+1}^{i} = (1 + r)a_{t}^{i} + (1 - \tau_{SS})Y_{t} \] \hspace{1cm} (2)

\[ a_{t} \geq 0, \quad n_{t} \geq 0, \quad \forall t \] \hspace{1cm} (3)
Recursive problem for working-age couples

\[ W^c_t(a_t, \epsilon^1_t, \epsilon^2_t) = \max_{c_t, a_{t+1}, n^1_t, n^2_t} \left[ w(c_t, 1 - n^1_t - \phi^1_t l^1_{n^1_t}, 1 - n^2_t - \phi^2_t l^2_{n^2_t}) \right. \]

\[ \left. + \beta E_t W^c_{t+1}(a_{t+1}, \epsilon^1_{t+1}, \epsilon^2_{t+1}) \right] \]  

(4)

\[ Y^i_t = e^i_t \epsilon^i_t n^i_t \quad i = 1, 2 \]  

(5)

\[ c_t + a_{t+1} = (1 + r)a_t + (1 - \tau_{SS})(Y^1_t + Y^2_t) \]  

(6)

\[ a_t \geq 0, \quad n^1_t, n^2_t \geq 0, \quad \forall t \]  

(7)
Economy 1: The singles economy, calibrated parameters

- Model: single decision maker
- Calibration: data on men only

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta$</td>
<td>Discount factor</td>
</tr>
<tr>
<td>$\omega$</td>
<td>Consumption weight</td>
</tr>
<tr>
<td>$\phi_{i=1,j}$</td>
<td>Labor participation cost</td>
</tr>
<tr>
<td>$Y_{r=1,s}$</td>
<td>Social Security benefit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moments</th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS budget deficit</td>
<td>0.000</td>
<td>0.002</td>
</tr>
<tr>
<td>Average assets, men at 50</td>
<td>148710</td>
<td>149017</td>
</tr>
<tr>
<td>Average hours, men at 50</td>
<td>2129</td>
<td>2120</td>
</tr>
<tr>
<td>Participation, men at 50</td>
<td>0.939</td>
<td>0.964</td>
</tr>
</tbody>
</table>

**Table:** Parameters in the singles economy
The singles economy, profiles fit

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Gender and Marriage
Aggregating up the profiles by gender and marital status
Economy 2, a no marriage economy calibrated to men and women together, calibrated parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta$</td>
<td>Discount factor 0.958</td>
</tr>
<tr>
<td>$\omega$</td>
<td>Consumption weight 0.471</td>
</tr>
<tr>
<td>$\phi_{i=j}$</td>
<td>Labor participation cost 0.302</td>
</tr>
<tr>
<td>$Y_{r=1,s}$</td>
<td>Social Security benefit $5006</td>
</tr>
<tr>
<td>SS budget deficit</td>
<td>0.000 $-0.001</td>
</tr>
<tr>
<td>Average assets, individuals at 50</td>
<td>147134 147530</td>
</tr>
<tr>
<td>Average hours, individuals at 50</td>
<td>1768 1758</td>
</tr>
<tr>
<td>Participation, individuals at 50</td>
<td>0.859 0.872</td>
</tr>
</tbody>
</table>

**Table:** Parameters used in the singles economy
Economy 2, profiles fit, thus the aggregates
Economy 4: The marriage economy, parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta$</td>
<td>Discount factor 0.959</td>
</tr>
<tr>
<td>$\omega$</td>
<td>Consumption weight 0.499</td>
</tr>
<tr>
<td>$\phi_{i=1,j}$</td>
<td>Men participation cost 0.318</td>
</tr>
<tr>
<td>$\phi_{i=2,j=1}$</td>
<td>Single women part. cost 0.385</td>
</tr>
<tr>
<td>$\phi_{i=2,j=2}$</td>
<td>Married women part. cost  See next</td>
</tr>
<tr>
<td>$\gamma_{i=1,s}$</td>
<td>Single men SS benefit $6,764$</td>
</tr>
</tbody>
</table>

Table: Parameters used in the marriage economy.
Figure: Calibrated lifecycle labor participation cost in time
The marriage economy, model fit

<table>
<thead>
<tr>
<th>Moments</th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS budget deficit</td>
<td>0.000</td>
<td>0.009</td>
</tr>
<tr>
<td>Avg. assets, single men at 50</td>
<td>133821</td>
<td>157842</td>
</tr>
<tr>
<td>Avg. assets, single women at 50</td>
<td>83156</td>
<td>85419</td>
</tr>
<tr>
<td>Avg. assets, couples at 50</td>
<td>291433</td>
<td>214084</td>
</tr>
<tr>
<td>Avg. hours, single men at 50</td>
<td>1869</td>
<td>1825</td>
</tr>
<tr>
<td>Avg. hours, single women at 50</td>
<td>1703</td>
<td>1675</td>
</tr>
<tr>
<td>Avg. hours, married men at 50</td>
<td>2165</td>
<td>2053</td>
</tr>
<tr>
<td>Avg. hours, married women at 50</td>
<td>1337</td>
<td>1563</td>
</tr>
<tr>
<td>Part., single men at 50</td>
<td>0.831</td>
<td>0.883</td>
</tr>
<tr>
<td>Part., single women at 50</td>
<td>0.875</td>
<td>0.889</td>
</tr>
<tr>
<td>Part., married women at 30</td>
<td>0.542</td>
<td>0.611</td>
</tr>
<tr>
<td>Part., married women at 40</td>
<td>0.740</td>
<td>0.716</td>
</tr>
<tr>
<td>Part., married women at 50</td>
<td>0.754</td>
<td>0.681</td>
</tr>
<tr>
<td>Part., married women at 60</td>
<td>0.551</td>
<td>0.488</td>
</tr>
</tbody>
</table>
The marriage economy, profiles fit
The marriage economy, profiles fit
Aggregating up the profiles by gender and marital status

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**Age**

- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65

**Labor participation**

- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1

**Average Labor Income**

- 10
- 4
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4

**Average Working Hours**

- 500
- 1000
- 1500
- 2000
- 2500

**Average Asset**

- 10
- 5
- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4

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Gender and Marriage

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Aggregating up the profiles, what have we learned?

- The economy with only men, calibrated using men
  - Overestimates participation by 10 percentage points
  - Overestimates average hours by about 500 hours
  - Overestimates average earnings by age
- Adding women in the calibration helps in fitting the aggregates.
- The marriage economy does a much better job of fitting aggregate behavior by age
Compensated elasticities by age (singles economies)

<table>
<thead>
<tr>
<th>Age</th>
<th>Participation in economy</th>
<th>Hours in economy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>40</td>
<td>0.06</td>
<td>0.89</td>
</tr>
<tr>
<td>50</td>
<td>0.24</td>
<td>1.29</td>
</tr>
<tr>
<td>60</td>
<td>0.36</td>
<td>1.32</td>
</tr>
</tbody>
</table>

- Elasticity increases by age.
- Economy 1 has the lowest elasticity.
### Compensated elasticity by age (marriage economy)

<table>
<thead>
<tr>
<th>Age</th>
<th>Participation</th>
<th></th>
<th></th>
<th></th>
<th>Hours</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single</td>
<td>Married</td>
<td>All</td>
<td>Single</td>
<td>Married</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>W</td>
<td>All</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>0.02</td>
<td>0.23</td>
<td>0.07</td>
<td>1.02</td>
<td>0.39</td>
<td>0.11</td>
<td>0.75</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>0.34</td>
<td>0.54</td>
<td>0.22</td>
<td>1.85</td>
<td>0.86</td>
<td>0.67</td>
<td>0.99</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>0.99</td>
<td>1.50</td>
<td>0.49</td>
<td>1.76</td>
<td>1.06</td>
<td>1.40</td>
<td>1.96</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>0.83</td>
<td>3.42</td>
<td>0.91</td>
<td>1.59</td>
<td>1.30</td>
<td>1.68</td>
<td>3.57</td>
</tr>
</tbody>
</table>

- Large heterogeneity
- Larger elasticity for women
Conclusions

• Substantial differences by gender and marital status in
  • Labor market outcomes
  • Savings

• Women and marriage matter for
  • The aggregates
  • Labor supply elasticities

• Modeling marriage and gender is important!