

# Single Mothers and the Welfare State

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- Becoming a single mothers is a risk associated with huge financial consequences in the US
- An increasingly large fraction of mothers raise their children without a father: 30 percent of all mothers in 2015
- Child care costs are substantial in the US with \$9,589 (\$28,354) in center care (at home); Further, even full-time working mothers spend up to 20hrs/week caring for their young children
- High poverty rates among single mothers: 77(55) percent of all single mothers with 3+(2) children live in poverty

- ① Why are so many single mothers living in poverty?
- ② How can the current welfare system be improved for single mothers and what are its labor supply effects?
- ③ Who would be in favor of such a reform?

- Life-cycle model of couples featuring marital transitions, the 'risk' to become a mother, and a detailed modeling of the US welfare state
- Calibrate model to 1965-69 cohort in U.S.
- Counterfactuals: Increase child care support (here: 100% reimbursement of child care costs)

- ① Stylized Facts
- ② The Model
- ③ Calibrated Economy
- ④ Policy Analysis
- ⑤ Conclusions

# Stylized Facts

⇒ 15.7% of all mothers are single in 1965-69 sample

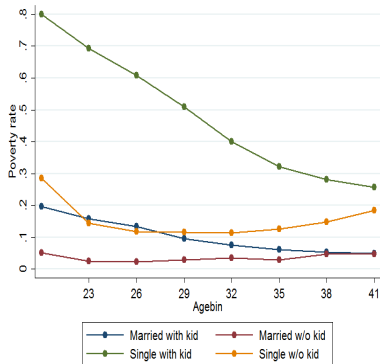
Fraction of Single Mothers over Nr. of Kids (in %)			
Nr.Children	1	2	3+
Dropout	4.9	6.2	7.5
High school	27.8	24.8	15.4
College	6.7	5.0	1.7
Total	39.45	35.99	24.6

	Married	Divorced	Single
No children	0.04	0.19	0.15
One child	0.05	0.25	0.41
Two children	0.06	0.30	0.55
Three+ children	0.14	0.52	0.77

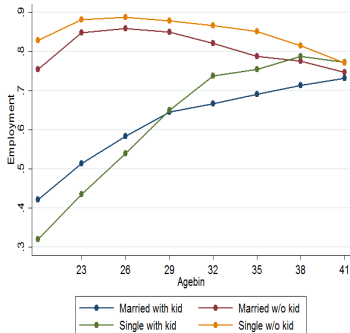
*Note:* Poverty according to the official poverty line. Cohort born 1965-69. CPS data.

► Poverty Rates cond. on education





(a) Poverty



(b) Employment

# The Model

- Life cycle model of singles and couples between ages 23 and at most 83; Model period is 3 years
- Heterogeneity
  - ▶ Marital status: single, married, divorced, widowed
  - ▶ Children: No. and age of (young) children
  - ▶ Education (own and spousal): college, high school, dropout
  - ▶ Assets
  - ▶ Income states and female human capital

## Choices

- Consumption-savings decision every period
- Female labor supply: full-time, part-time or not at all  
Working accumulates human capital
- Exogenous retirement at age 65; Men always work full-time

## Uncertainties

- Marital transitions
- Childbirth
- Survival
- Labor income

Period utility function married couple

$$U(\hat{c}_t, L_t) = \chi \left[ \ln \left( \frac{\hat{c}_t}{eq(n)} \right) - \Phi_{v,e} \frac{(L_{1,t} + \zeta(n, k))^\gamma}{\gamma} \right] \\ + (1 - \chi) \left[ \ln \left( \frac{\hat{c}_t}{eq(n)} \right) - \Phi_{v,e} \frac{L_{2,t}^\gamma}{\gamma} \right]$$

- $\hat{c}_t$  hh consumption, equivalence scaled  $eq(n)$
- $L_{g,t}$  Labor supply (in time units)
- $\Phi_{v,e}$  Disutility of work, 2 types ( $v = 1, 2$ ) dep. on education  $e$
- $\zeta(n, k)$  Time costs dep. on no. ( $n$ ) and age ( $k$ ) of children

s.t. budget constraint (here: married household)

$$\begin{aligned} (1 + \tau_c)\hat{c}_t + a_{t+1}^s &= (1 - \tau_y^s) \cdot (Ra_t^m + \mathbf{1}_{L_{1,t}}y_{1,t} + y_{2,t}) \\ &\quad - \tau_{ss}(\hat{y}_{1,t} + \hat{y}_{2,t}) \\ &\quad + 2T - (1 - \nu_{\bar{y}})w_{n,k}\mathbf{1}_{L_{1,t}}. \end{aligned}$$

- $(1 - \nu_{\bar{y}})w_{n,k}$  childcare costs
- $\hat{y}_{g,t} = \min\{\mathbf{1}_{L_{g,t}}y_{g,t}, y_{max}\}$
- $a_{t+1}^s$  depends on marital status  $s$ :  $a_{t+1}^m = 2a_{t+1}^{u,d}$  and  $a_{t+1}^d = 0.5a_{t+1}^m$

$\Rightarrow$  Recursive Optimization: Max. Value function, current utility and all discounted possible future value functions, s.t. budget constraint.

- Children
  - ▶ Birthrate differ by ages (between 23-38), marital status, and education (SIPP); Track no (0,1,2,3+) and age (0 to 12 years)
  - ▶ Child care costs for institutionalized care (SIPP)
  - ▶ Total hrs spent on childcare for full-time working female (ATUS)
- Marital transition probabilities  
Differ by education, gender and age (SIPP and CPS) [▶ details](#)
- Survival rates  
Logit estimation by gender and education (HRS) [▶ details](#)

Labor income for women depends on human capital,  $h$

$$y_{1,t,e} = (1 - \zeta_e) \cdot \{ \gamma_e + \alpha_e \cdot h_{t,e} + \bar{\alpha}_e \cdot h_{t,e}^2 \} + w_{t,e}$$

⇒  $h_{t+1} = h_t + (1 - (1 - \iota)\mathbf{1}_{L_t=0.5}) \cdot \mathbf{1}_{L_t=1} - \delta h_t \cdot (1 - \mathbf{1}_{L_t=1})$   
 $\iota$  captures part-time penalty (Blundell et al. 2015)

⇒ PSID data, males' coefficients  $\gamma_{t,e}$ ,  $\alpha_e$ ,  $\bar{\alpha}_e$  used for females

⇒ Exogenous gender wage gap,  $\zeta_{t,e}$ , education-specific

⇒ Idiosyncratic component,  $w_{t,e}$  standard estimation  
 (Storesletten et al. (2004))



Follow Guner, Kaygusuz and Ventura (2017)

① Childcare Support

- ▶ Childcare subsidy program (CCDF)
- ▶ Tax credits for children (CTC) and childcare expenditures (CD-CTC)

② Earned Income Tax Credit (EITC)

③ Means-tested welfare payments: estimate effective transfer function using SSSI, TANF, SNAP, WIC, and housing assistance

④ Social Security: Own benefits based on progressive pay-out schedule and Auxiliary benefit system

⑤ Taxes: progressive income-, flat payroll- and consumption taxes

## Calibrated parameters to match data moments

## ① Employment

*Targets*

- ▶ Employment of females over age and education
- ▶ Part-time employment of females over age and education

*Parameters*

- ▶  $\Phi_e^v$ : two types  $v$  of female disutility from working depending on education
- ▶  $\alpha_e$ : fraction of high-disutility types,  $v$

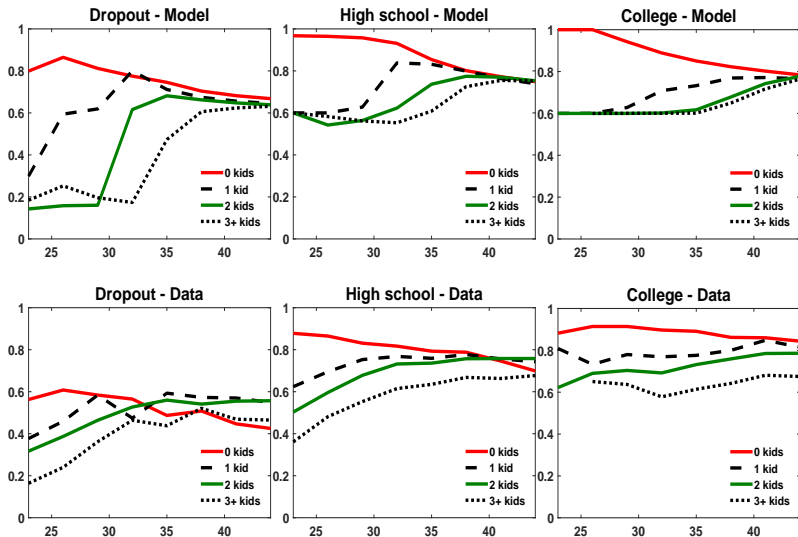
## ② Assets

- ▶ Calibrate  $\rho = 0.03$  to match asset-to-income ratio of 2.6 in economy

# Calibrated Economy

	Total Employment		Part Time	
	Model	Data	Model	Data
Dropout	0.59	0.47	0.11	0.15
High school	0.75	0.73	0.20	0.19
College	0.79	0.79	0.19	0.19
Total	0.75	0.72	0.19	0.19

*Note:* CPS data, cohort 1965-69. Target: Average female employment, age 23-46.



	Never Married		Married	
	Model	Data	Model	Data
Dropout-0Kid	0.40	0.55	0.16	0.28
Dropout-1Kid	0.81	0.73	0.29	0.29
Dropout-2Kids	0.93	0.84	0.43	0.43
Dropout-3Kids	0.97	0.92	0.51	0.62
Highschool-0Kid	0.40	0.16	0.03	0.07
Highschool-1Kid	0.58	0.39	0.07	0.09
Highschool-2Kids	0.81	0.61	0.08	0.12
Highschool-3Kids	0.89	0.82	0.09	0.25
College-0Kid	0.05	0.06	0.0	0.03
College1Kid	0.35	0.11	0.01	0.03
College2Kids	0.39	0.29	0.02	0.03
College3Kids	0.40	0.34	0.02	0.08

	Never Married		Married	
	Model	Data	Model	Data
Dropout-0Kid	0.40	0.55	0.16	0.28
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College-0Kid	0.05	0.06	0.0	0.03
College1Kid	0.35	0.11	0.01	0.03
College2Kids	0.39	0.29	0.02	0.03
College3Kids	0.40	0.34	0.02	0.08



# Introduce 100% Childcare Subsidy

	Baseline	Reform
Dropout	0.59	0.65
High school	0.75	0.76
College	0.79	0.79
Total	0.75	0.76

*Note:* CPS data, cohort 1965-69. Target: Average female employment, age 23-46.

	Never Married		Married	
	Baseline	Reform	Baseline	Reform
Dropout-0Kid	0.40	0.50	0.16	0.26
Dropout-1Kid	0.81	0.54	0.29	0.31
Dropout-2Kids	0.93	0.74	0.43	0.32
Dropout-3Kids	0.97	0.82	0.51	0.33
Highschool-0Kid	0.40	0.40	0.03	0.05
Highschool-1Kid	0.58	0.40	0.07	0.15
Highschool-2Kid	0.81	0.48	0.08	0.17
Highschool-3Kid	0.89	0.48	0.09	0.17
College-0Kid	0.05	0.07	0.00	0.00
College-1Kid	0.35	0.36	0.01	0.04
College-2Kid	0.39	0.39	0.02	0.05
College-3Kid	0.40	0.40	0.02	0.05

	Never Married		Married	
	Baseline	Reform	Baseline	Reform
Dropout-0Kid	0.40	<b>0.50</b>	0.16	<b>0.26</b>
Dropout-1Kid	0.81	<b>0.54</b>	0.29	<b>0.31</b>
Dropout-2Kids	0.93	<b>0.74</b>	0.43	<b>0.32</b>
Dropout-3Kids	0.97	<b>0.82</b>	0.51	<b>0.33</b>
Highschool-0Kid	0.40	0.40	0.03	<b>0.05</b>
Highschool-1Kid	0.58	<b>0.40</b>	0.07	<b>0.15</b>
Highschool-2Kid	0.81	<b>0.48</b>	0.08	<b>0.17</b>
Highschool-3Kid	0.89	<b>0.48</b>	0.09	<b>0.17</b>
College-0Kid	0.05	<b>0.07</b>	0.00	0.00
College-1Kid	0.35	<b>0.36</b>	0.01	<b>0.04</b>
College-2Kid	0.39	0.39	0.02	<b>0.05</b>
College-3Kid	0.40	0.40	0.02	<b>0.05</b>

- Young females face a substantial risk to end up in poverty if they become single mothers
- The current welfare measures are insufficient to prevent these high poverty rates  $\Rightarrow$  Next: analyze more closely
- Extending child care subsidies already goes a long way in reducing poverty  $\Rightarrow$  Next: analyze welfare

# Poverty and Nr. of Children

	<b>Married</b>	<b>Divorced</b>	<b>Single</b>
Dropout - No kid	0.15	0.57	0.51
Dropout - 1 kid	0.20	0.57	0.71
Dropout - 2 kid	0.26	0.61	0.78
Dropout - 3+ kid	0.39	0.77	0.89
High school - No kid	0.04	0.19	0.19
High school - 1 kid	0.05	0.25	0.38
High school - 2 kid	0.06	0.30	0.49
High school - 3+ kid	0.12	0.48	0.70
College - No kid	0.02	0.05	0.05
College - 1 kid	0.01	0.07	0.09
College - 2 kid	0.02	0.10	0.15
College - 3+ kid	0.03	0.15	0.23

# Marital Transition Probabilities - Data

- Survey of Income and Program Participation (SIPP), wave 2008, marital history variable, 5,722 observations for 1950-54 cohort  
⇒ remarriage and divorce probabilities
- Current Population Survey (CPS), synthetic-panel using 1976-2015 waves  
⇒ Marriage probabilities and initials

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# Survival Probabilities - Data

- Survival rate:  $\psi_{t,g,e}$  depends on age, gender, and education
- Not possible to use life-tables
- Estimate Logit Model using Health- and Retirement Study (HRS), waves 1992-2010

$$\text{Logit}(\textit{death}) = \alpha + \beta_1 \textit{age} + \beta_2 \textit{edu} + \beta_3 \textit{sex} \\ + \beta_4 \textit{age} \times \textit{edu} + \beta_5 \textit{age} \times \textit{sex}$$



# Deterministic Income - Estimation

- Male SRC household heads aged 26-60 in PSID, waves 1969-2013
- Variable: household head's wages and salaries, CPI adjusted
- Eliminate outliers: drop top and bottom 1% of income distribution and all working less than 1,000 hours per year

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# Idiosyncratic Income - Estimation

- Time-invariant wage specification

$$\begin{aligned}w_{i,t,e} &= z_{i,t,e} + \eta_{i,t,e} \\z_{i,t,e} &= \rho z_{i,t-1,e} + \varepsilon_{i,t,e}\end{aligned}$$

with  $\eta_e \sim \mathcal{N}(0, \sigma_{\eta_e})$  and  $\varepsilon_e \sim \mathcal{N}(0, \sigma_{\varepsilon_e})$ .

- The parameter  $\rho$ ,  $\sigma_{\eta}^2$ , and  $\sigma_{\varepsilon}^2$  are estimated via GMM following Storesletten et al. (2004).
- Persistent income component of spouses,  $z_{i,t,e}$  and  $z_{i,t,e}^s$  are correlated, where  $\varepsilon$  is assumed to be jointly normal distributed with

$$\Sigma_{\varepsilon} = \begin{bmatrix} \sigma_{\varepsilon_e} & \sigma_{\varepsilon_e, \varepsilon_e^s} \\ \sigma_{\varepsilon_e^s, \varepsilon_e} & \sigma_{\varepsilon_e^s} \end{bmatrix} \quad (1)$$

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Tax Parameters		
$\tau_c$	Consumption tax	7.5%
$\tau_{ss}$	Payroll tax	15.3%
$y_{max}$	Earnings cap for payroll tax in 2010	\$106,800
$\alpha_s$	Coefficient in $\tau_y^s$ (married/single)	0.105/0.085
$\beta_s$	Coefficient in $\tau_y^s$ (married/single)	0.034/0.0058
$\bar{y}$	Average earnings in 2010	\$53,063
	Government Consumption Ratio	24%

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# Calibrated 1st Stage Parameters

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Exogenous Parameters		
$1/(\gamma - 1)$	Frisch-Elasticity	0.7
$\rho$	Discount rate (yearly)	0.01
$\chi$	Pareto-Weight	0.5
$eq$	Consumption equivalence scaling	1/1.5
$\iota$	Return of experience from part-time	0.1
$r$	Interest rate (yearly)	0.045

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