Household Labor Supply and Child-Related Transfers

Thomas H. Jørgensen

2024

Plan for today

- Dynamic labor supply of **couples** + children
  Guner, Kaygusuz and Ventura (2020): "Child-Related Transfers, Household Labor Supply and Welfare"
  Related paper: Wang (2022, R&R, ReStud)

Plan for today

- Dynamic labor supply of **couples** + children
  Guner, Kaygusuz and Ventura (2020): "Child-Related Transfers, Household Labor Supply and Welfare"
  Related paper: Wang (2022, R&R, ReStud)

- **Reading guide:**
  1. What are the main *research questions*?
  2. What is the *(empirical) motivation*?
  3. What are the central *mechanisms in the model*?
  4. What is the *simplest model* in which we could capture these?

Plan for today

- Dynamic labor supply of **couples** + children
  Guner, Kaygusuz and Ventura (2020): "Child-Related Transfers, Household Labor Supply and Welfare"
  Related paper: Wang (2022, R&R, ReStud)

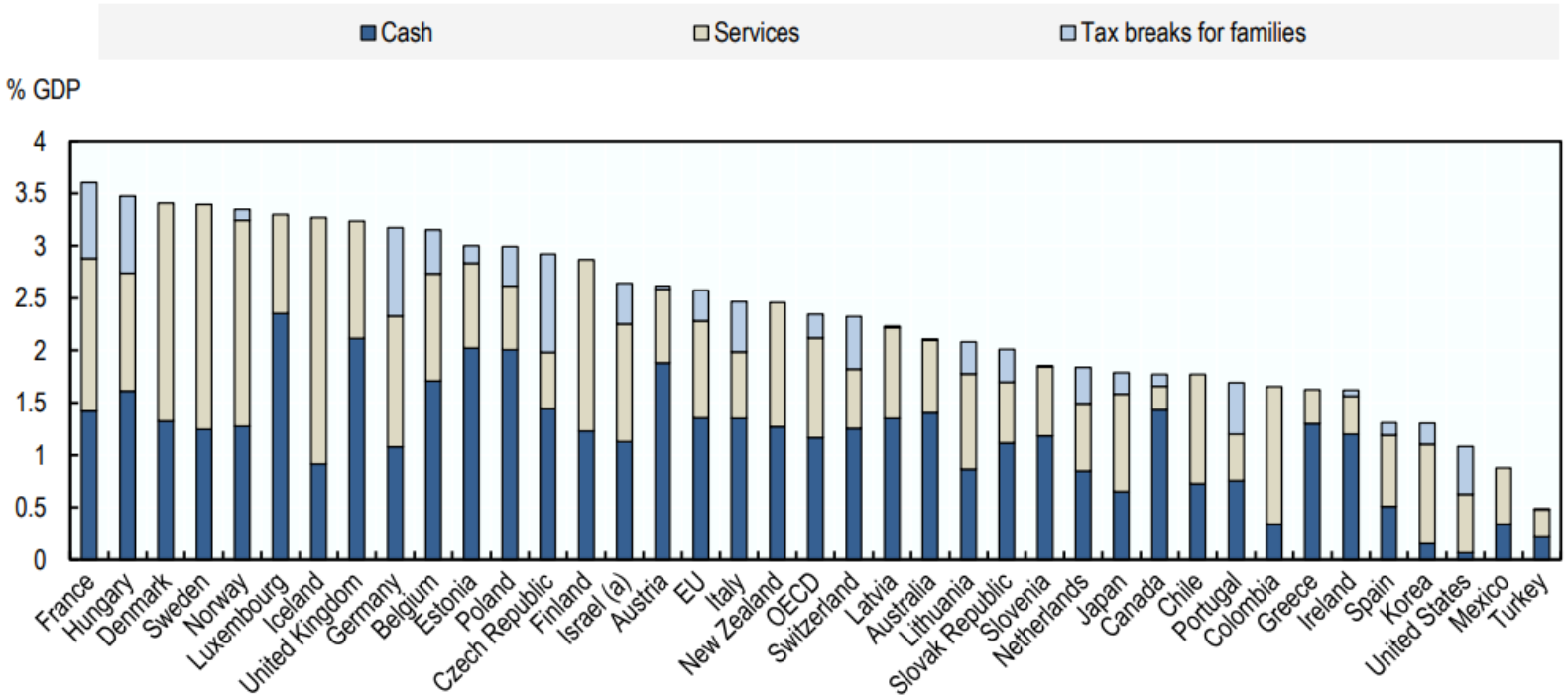
- **Reading guide:**
  1. What are the main *research questions*?
     - How do different child-related transfers affect labor supply?
     - Could alternative combinations increase welfare?
  2. What is the *(empirical) motivation*?
  3. What are the central *mechanisms in the model*?
  4. What is the *simplest model* in which we could capture these?

Empirical Motivation: I

- Large differences in governmental spending on child-related policies
  https://www.oecd.org/els/soc/PF1_1_Public_spending_on_family_benefits.pdf

Chart PF1.1.A. Public spending on family benefits

Public expenditure on family benefits by type of expenditure, in per cent of GDP, 2017 and latest available



Note: Public spending accounted for here concerns public support that is exclusively for families (e.g. child payments and allowances, parental leave benefits and childcare support), only. Spending in other social policy areas such as health and housing support also assists families, but not exclusively, and is not included here. Coverage of spending on family and community services in the OECD Social Expenditure data may be limited as such services are often provided and/or co-financed by local governments. The latter may receive general block grants to finance their activities, and reporting requirements may not be sufficient for central statistical agencies to have a detailed view of the nature of local spending. In Nordic countries (where local government is heavily involved in service

Empirical Motivation: II

- **Childcare subsidies can increase labor supply of mothers**
  See e.g. Lefebvre and Merrigan (2008) for RF evidence
  $\rightarrow$ Such policies should be analyzed!

Empirical Motivation: II

- **Childcare subsidies can increase labor supply of mothers**
  See e.g. Lefebvre and Merrigan (2008) for RF evidence
  → Such policies should be analyzed!

- **Many ways** to subsidize families, however
  - Conditional on work ("Unconditional"/"Conditional")
    (incentivize work)
  - Means-tested on income ("Universal"/"Means-tested")
    (re-distribution but dis-incentivize work a bit)
  - Conditional on childcare usage ("Transfer"/"Subsidy")
    (incentivize work through co-payment)

  → Need a **unified framework** (model) to evaluate them!

Taxonomy (my modifications)

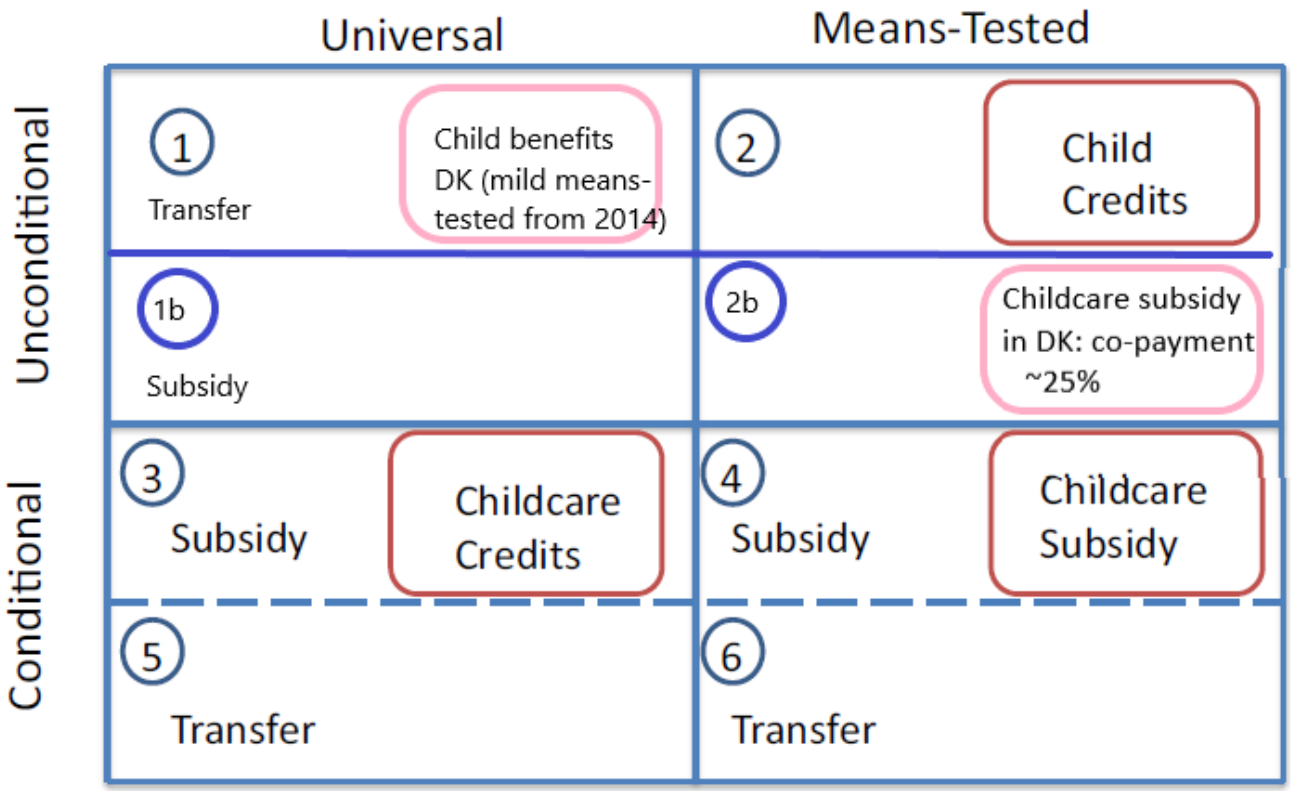


FIGURE 1

Taxonomy of child-related transfers.

- Guner, Kaygusuz and Ventura (2020) do not entertain 1b and 2b.

US Background

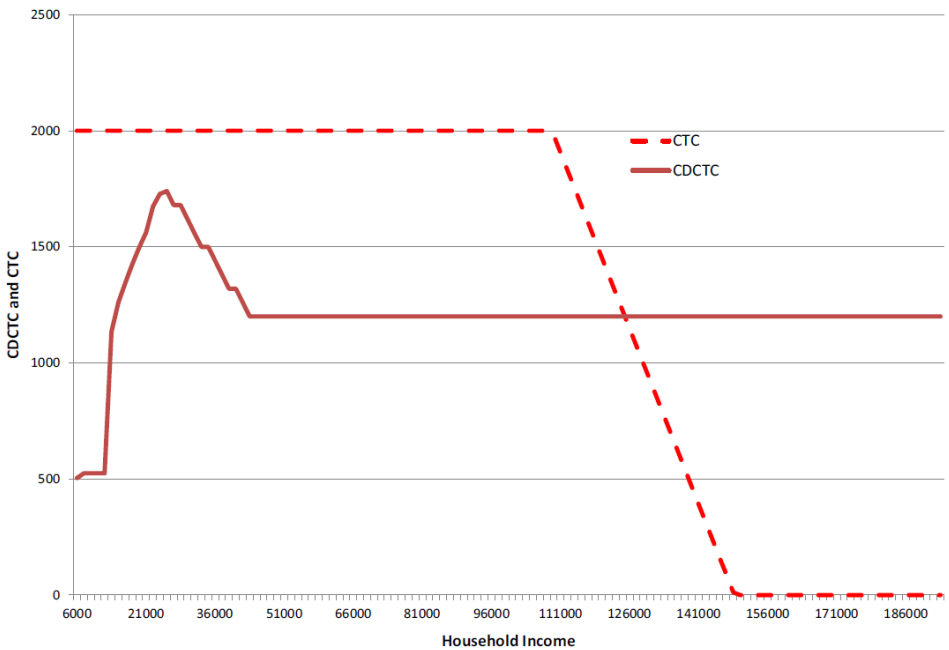
- **Childcare subsidies (4):** Child Care Development Fund (CCDF)
  ∼75% childcare subsidy to low-income employed households
  (useful for working people with childcare expenses)

US Background

- **Childcare subsidies (4):** Child Care Development Fund (CCDF)
  ∼75% childcare subsidy to low-income employed households
  (useful for working people with childcare expenses)
- **Childcare Credits (3):** Child and Dependent Care Tax Credit (CDCTC)
  ∼$1,200-$2,100 (dep. on income) tax deduction of childcare expenses.
  (useful for working people with childcare expenses)

US Background

- **Childcare subsidies (4):** Child Care Development Fund (CCDF)
  ∼75% childcare subsidy to low-income employed households
  (useful for working people with childcare expenses)
- **Childcare Credits (3):** Child and Dependent Care Tax Credit (CDCTC)
  ∼$1,200-$2,100 (dep. on income) tax deduction of childcare expenses.
  (useful for working people with childcare expenses)
- **Child Credits (2):** Child Tax Credit (CTC) + Additional CTC (ACTC)
  ∼$1,000 per child but is a tax-credit (reason for ACTC).



Outline

Model Overview

- **"Macro" model**
  General equilibrium (w and r)
  Overlapping generations (OLG)
  Period is 5 years, j is period

Model Overview

- **"Macro" model**
  General equilibrium (w and r)
  Overlapping generations (OLG)
  Period is 5 years, j is period
- **Family characteristics:**
  Born as either single or married (fixed throughout)
  Children can arrive "early" or "late" ($k(x, z)$)

Model Overview

- **"Macro" model**
  General equilibrium (w and r)
  Overlapping generations (OLG)
  Period is 5 years, j is period
- **Family characteristics:**
  Born as either single or married (fixed throughout)
  Children can arrive "early" or "late" ($k(x, z)$)
- **Choices:**
  Labor supply (w. human capital accumulation of women)
  Consumption/saving

Model Overview

- **"Macro" model**
  General equilibrium (w and r)
  Overlapping generations (OLG)
  Period is 5 years, j is period
- **Family characteristics:**
  Born as either single or married (fixed throughout)
  Children can arrive "early" or "late" ($k(x, z)$)
- **Choices:**
  Labor supply (w. human capital accumulation of women)
  Consumption/saving
- **Childcare:**
  If a woman works, the household has to pay childcare costs.
  Access to informal childcare ($g = 1$) reduces cost

Model Overview

- **Types:** x, z is educational type of men and women
- **Income:**

$$\text{men}: w\varpi_m(z,j)\varepsilon_z l_m$$

$$\text{women}: wh\varepsilon_x l_f$$

$$\log h' = \log h + \alpha_j^x \chi(l_f) - \delta_x(1-\chi(l_f))$$

Model Overview

- **Types:** x, z is educational type of men and women
- **Income:**

$$\text{men}: w\varpi_m(z,j)\varepsilon_z l_m$$

$$\text{women}: wh\varepsilon_x l_f$$

$$\log h' = \log h + \alpha_j^x \chi(l_f) - \delta_x(1-\chi(l_f))$$

- **Childcare costs:** Number of children (couple) is $k(z,x)$
  If women work, they incur costs of

$$D = wk(z,x)d(s,x,z,g)$$

  where s is age of child, g is informal childcare availability.

Model Overview

- **Types:** x, z is educational type of men and women
- **Income:**

$$\text{men}: w\varpi_m(z,j)\varepsilon_z l_m$$

$$\text{women}: wh\varepsilon_x l_f$$

$$\log h' = \log h + \alpha_j^x \chi(l_f) - \delta_x(1-\chi(l_f))$$

- **Childcare costs:** Number of children (couple) is $k(z,x)$
  If women work, they incur costs of

$$D = wk(z,x)d(s,x,z,g)$$

  where s is age of child, g is informal childcare availability.
- **Childcare subsidies:** Parents pay $(1-\theta)$ of childcare costs if working:

$$(1-\theta)D\chi(l_f)$$

  if household income less that $\hat{I}$ (determined endo. to match take-up).

Model Overview: Preferences

- **Individual** preferences [my notation]

$$U(c, l, k_y) = \log c - \phi(l + k_y\eta)^{1+\frac{1}{\gamma}}$$

where $k_y = 1$ if there is a young child present

Model Overview: Preferences

- **Individual** preferences [my notation]

$$U(c, l, k_y) = \log c - \phi(l + k_y\eta)^{1+\frac{1}{\gamma}}$$

  where $k_y = 1$ if there is a young child present

- **Household** utility is sum

$$U(c, l_f, l_m, k_y, q) = U(c, l_f, k_y) + U(c, l_m, 0) - q\chi(l_f)$$

  where q is a (random) household-specific cost of "joint work" (but should it then be $q\chi(l_f)\chi(l_m)$?)

- **Imposes** that women are less likely to work when children.

Bellman Equation, Working Couple.

3.7.2. The problem of married households. Like singles, married couples decide how much to consume, how much to save, and how much to work. They also decide whether the female member of the household should work. Their problem is given by

$$V^M(a,h,\mathbf{s}^M,j)=\max_{a',\,l_f,\,l_m}\{[U_f^M(c,l_f,q,k_y)+U_m^M(c,l_m,l_f,q)]+\beta V^M(a',h',\mathbf{s}^M,j+1)\},$$

subject to

(i) *With kids:* *if* $b=\{1,2\}$, $j\in\{b,b+1,b+2\}$, *then* the household has $k(x,z)$ children and

$$c+a'=\begin{cases} a(1+r(1-\tau_k))+w(\varpi_m(z,j)\varepsilon_z l_m+h\varepsilon_x l_f)(1-\tau_p) \\ -T^M(I,k(x,z))+TR^M(I,D(1-\theta),k(x,z)) \\ -D(1-\theta)\chi(l_f),\ \text{if } I\leq\widehat{I} \\ \\ a(1+r(1-\tau_k))+w(\varpi_m(z,j)\varepsilon_z l_m+h\varepsilon_x l_f)(1-\tau_p) \\ -T^M(I,k(x,z))+TR^M(I,D,k(x,z)) \\ -D\chi(l_f),\ \text{otherwise} \end{cases},$$

where $I=w\varpi_m(z,j)\varepsilon_z l_m+wh\varepsilon_x l_f+ra$ and $D=wd(j+1-b,x,z,g)k(x,z)$. Furthermore, if $b=j$, then $k_y=1$.

- $\mathbf{s}^M=(x,z,\varepsilon_x,\varepsilon_z,q,b,g)$. $b\in\{1,2\}$, where 2 is child-bearing
- TR: transfers

Outline

Simulation Results, Guner, Kaygusuz and Ventura (2020)

Q1: **What happens if we change current system** (spread on three types) by using all expenditures in one single type only?

Simulation Results, Guner, Kaygusuz and Ventura (2020)

Q1: **What happens if we change current system** (spread on three types) by using all expenditures in one single type only?

A1.1: Conditional yet universal transfers (5) maximizes **labor supply** both extensive and intensive margin incentivized (Table 3, col 3)

Simulation Results, Guner, Kaygusuz and Ventura (2020)

Q1: **What happens if we change current system** (spread on three types) by using all expenditures in one single type only?

- A1.1: Conditional yet universal transfers (5) maximizes **labor supply**
  both extensive and intensive margin incentivized (Table 3, col 3)
- A1.2: Unconditional yet means-tested transfers (2) maximizes **welfare**
  can provide large subsidies to high-value group (Table 3, col 5)

Simulation Results, Guner, Kaygusuz and Ventura (2020)

Q1: **What happens if we change current system** (spread on three types) by using all expenditures in one single type only?

- A1.1: Conditional yet universal transfers (5) maximizes **labor supply**
  both extensive and intensive margin incentivized (Table 3, col 3)
- A1.2: Unconditional yet means-tested transfers (2) maximizes **welfare**
  can provide large subsidies to high-value group (Table 3, col 5)

- **keeps** government budget fixed (I think).
  Meant to illustrate the incentives

Simulation Results, Guner, Kaygusuz and Ventura (2020)

Q1: **What happens if we change current system** (spread on three types) by using all expenditures in one single type only?

- A1.1: Conditional yet universal transfers (5) maximizes **labor supply**
  both extensive and intensive margin incentivized (Table 3, col 3)
- A1.2: Unconditional yet means-tested transfers (2) maximizes **welfare**
  can provide large subsidies to high-value group (Table 3, col 5)

- **keeps** government budget fixed (I think).
  Meant to illustrate the incentives

- **Implies that the current system is not optimal** (if fixed budget)
  Could still be optimal to have a mix (not analyzed)
  What about the 1b and 2b alternatives? Co-payments encourage work.

Counterfactual Reforms

Q2: **What happens if we** expand the current system by alternative reforms?

Budget neutral: For each reform, a flat-rate marginal tax rate is found to keep government budget fixed at baseline.

Counterfactual Reforms

Q2: **What happens if we** expand the current system by alternative reforms?

Budget neutral: For each reform, a flat-rate marginal tax rate is found to keep government budget fixed at baseline.

1. **Universal subsidies:**
   Remove means-testing in 75% childcare subsidy (CCDF and 1.2% tax)
   [by setting income threshold $\hat{I} = \infty$]
2. **Child credit expansion:**
   Increase CTC from \$1,000 to \$1,800 per child, unchanged income threshold (and 1.2% tax)
3. **Childcare credit expansion:**
   Increase the CDCTC by factor ~2
   (non-usable tax credit payed out and 1.2% tax)
4. **New child credit:**
   Increase CTC from \$1,000 to \$2,000 per child, increased income threshold (and 1.35% tax)

Counterfactual Reforms, Labor Supply

TABLE 4
Expansion of child-related transfers (% changes relative to benchmark)

	Universal subsidies (75%)	Child credit expansion	Childcare credit expansion	New child credit
Participation of married females	10.2	−2.4	10.6	−2.6
Total hours	1.8	−1.4	1.5	−1.5
Total hours (married females)	8.6	−3.1	8.6	−3.3
Hours per worker (all females)	−1.1	−1.1	−1.6	−1.3
Hours per worker (married females)	−1.8	−0.7	−2.2	−0.9
Hours per worker (single females)	0.2	−1.5	−0.3	−1.9
Hours per worker (all males)	−1.5	−0.7	−1.7	−0.7
Human capital (married females)	2.8	−0.8	2.5	−0.8
Output	0.5	−1.7	0.7	−1.5
Tax rate (%)	1.2	1.2	1.2	1.35
Participation of married females:				
By education				
<HS	25.4	−6.4	32.0	−7.2
HS	13.3	−4.4	16.9	−4.8
SC	9.1	−2.5	10.4	−2.8
COL	9.4	−1.2	7.0	−1.3
COL+	5.2	−0.7	2.8	−0.3
By child bearing status				
Early	14.9	−4.0	17.0	−4.4
Late	8.2	−1.5	6.9	−1.4

Counterfactual Reforms, Labor Supply

TABLE 4
Expansion of child-related transfers (% changes relative to benchmark)

	Universal subsidies (75%)	Child credit expansion	Childcare credit expansion	New child credit
Participation of married females	10.2	−2.4	10.6	−2.6
Total hours	1.8	−1.4	1.5	−1.5
Total hours (married females)	8.6	−3.1	8.6	−3.3
Hours per worker (all females)	−1.1	−1.1	−1.6	−1.3
Hours per worker (married females)	−1.8	−0.7	−2.2	−0.9
Hours per worker (single females)	0.2	−1.5	−0.3	−1.9
Hours per worker (all males)	−1.5	−0.7	−1.7	−0.7
Human capital (married females)	2.8	−0.8	2.5	−0.8
Output	0.5	−1.7	0.7	−1.5
Tax rate (%)	1.2	1.2	1.2	1.35
Participation of married females:				
By education				
<HS	25.4	−6.4	32.0	−7.2
HS	13.3	−4.4	16.9	−4.8
SC	9.1	−2.5	10.4	−2.8
COL	9.4	−1.2	7.0	−1.3
COL+	5.2	−0.7	2.8	−0.3
By child bearing status				
Early	14.9	−4.0	17.0	−4.4
Late	8.2	−1.5	6.9	−1.4

Counterfactual Reforms, Welfare

TABLE 5
Expansion of child-related transfers: welfare effects (newborns, %)

	Childcare subsidy (75%)	Child credit	Childcare credit	New child credit
Single F				
No children	−1.41	−1.40	−1.46	−1.62
Early	4.25	5.99	10.06	6.71
Late	3.40	3.58	7.40	4.25
Informal care	4.15	5.44	9.62	6.03
No informal care	3.69	5.23	8.84	6.15
<HS	1.85	8.43	6.95	9.55
HS	2.54	4.93	6.66	5.62
SC	2.41	2.39	6.40	2.65
COL	1.08	0.33	2.43	0.37
COL+	0.56	−0.54	1.19	−0.56
Married				
No children	−3.16	−3.14	−3.29	−3.61
Early	2.90	3.59	5.80	4.76
Late	0.50	0.85	1.51	1.41
Informal care	2.02	2.09	3.84	3.96
No informal care	1.18	2.95	3.74	2.93
All newborns	0.84	1.28	2.51	1.73
(%) winners	48.0	54.3	50.9	57.7
All newborns (weighted welfare)	0.04	0.04	0.14	∼0

Non-mothers always lose

Counterfactual Reforms, Welfare

TABLE 5
Expansion of child-related transfers: welfare effects (newborns, %)

	Childcare subsidy (75%)	Child credit	Childcare credit	New child credit
Single F				
No children	−1.41	−1.40	−1.46	−1.62
Early	4.25	5.99	10.06	6.71
Late	3.40	3.58	7.40	4.25
Informal care	4.15	5.44	9.62	6.03
No informal care	3.69	5.23	8.84	6.15
<HS	1.85	8.43	6.95	9.55
HS	2.54	4.93	6.66	5.62
SC	2.41	2.39	6.40	2.65
COL	1.08	0.33	2.43	0.37
COL+	0.56	−0.54	1.19	−0.56
Married				
No children	−3.16	−3.14	−3.29	−3.61
Early	2.90	3.59	5.80	4.76
Late	0.50	0.85	1.51	1.41
Informal care	2.02	2.09	3.84	3.96
No informal care	1.18	2.95	3.74	2.93
All newborns	0.84	1.28	2.51	1.73
(%) winners	48.0	54.3	50.9	57.7
All newborns (weighted welfare)	0.04	0.04	0.14	∼0

but majority of voters and the government might prefer it

Outline

Our simple model

- **Dual-earner model from last time**
- **Modification:**
  A child can arrive with probability

$$p(n_t) = \begin{cases} p_n & \text{if } n_t = 0 \\ 0 & \text{if } n_t = 1 \end{cases}$$

- **Taxes and transfers:**
  Taxes on household level
  Childcare costs if both work
  Child credits
- **Reform** of interest:
  Child-related transfers

Our simple model: **Recursive formulation**

$$V_t(n_t, K_{1,t}, K_{2,t}) = \max_{h_{1,t}, h_{2,t}} U(c_t, h_{1,t}, h_{2,t}, n_t) + \beta \mathbb{E}_t[V_{t+1}(n_{t+1}, K_{1,t+1}, K_{2,t+1})]$$

$$c_t = Y_t - T(Y_t + \mathcal{C}) + \mathcal{C}$$

$$Y_t = \sum_{j=1}^{2} w_{j,t} h_{j,t}$$

$$n_{t+1} = \begin{cases} 1 & \text{with prob. } p(n_t) \\ 0 & \text{with prob. } 1 - p(n_t) \end{cases}$$

$$\log w_{j,t} = \alpha_{j,0} + \alpha_{j,1} K_{j,t},\ j \in \{1, 2\}$$

$$K_{j,t+1} = (1 - \delta) K_{j,t} + h_{j,t},\ j \in \{1, 2\}$$

- **Child-related transfers**

$$\mathcal{C}(n_t, h_{1,t}, h_{2,t}, w_{1,t}, w_{2,t}) = \mathcal{C}_1(n_t) + \mathcal{C}_2(n_t, Y_t) + [\mathcal{C}_3(n_t) + \mathcal{C}_4(n_t, Y_t)] \cdot \mathbf{1}(h_{1,t} \cdot h_{2,t} > 0)$$

Our simple model

- **We assume that if both work, they have to buy childcare.**
  Means that conditional transfers are always a subsidy (cannot do 5 or 6).

Our simple model

- **We assume that if both work, they have to buy childcare.**
  Means that conditional transfers are always a subsidy (cannot do 5 or 6).
- **Preferences** are sum of individual

$$U(c_t, h_{1,t}, h_{2,t}) = 2\frac{(c_t/2)^{1+\eta}}{1+\eta} - \rho_1(n_t)\frac{h_{1,t}^{1+\gamma}}{1+\gamma} - \rho_2(n_t)\frac{h_{2,t}^{1+\gamma}}{1+\gamma}$$

with

$$\rho_j(n_t) = \rho_{0,j} + \rho_{1,j} n_t$$

Our simple model

- **We assume that if both work, they have to buy childcare.**
  Means that conditional transfers are always a subsidy (cannot do 5 or 6).
- **Preferences** are sum of individual

$$U(c_t, h_{1,t}, h_{2,t}) = 2\frac{(c_t/2)^{1+\eta}}{1+\eta} - \rho_1(n_t)\frac{h_{1,t}^{1+\gamma}}{1+\gamma} - \rho_2(n_t)\frac{h_{2,t}^{1+\gamma}}{1+\gamma}$$

  with

$$\rho_j(n_t) = \rho_{0,j} + \rho_{1,j} n_t$$

- **Expected value** is

$$\begin{aligned}\mathbb{E}_t[V_{t+1}(n_{t+1}, K_{1,t+1}, K_{2,t+1})] = p(n_t) V_{t+1}(n_t + 1, K_{1,t+1}, K_{2,t+1}) \\ + (1 - p(n_t)) V_{t+1}(n_t, K_{1,t+1}, K_{2,t+1})\end{aligned}$$

Next Time

- **Next time:**
  Models of Household Behavior.

- **Literature:**
  Chiappori and Mazzocco (2017): "Static and Intertemporal Household Decisions"
  + my guide
    - **Read** before lecture
    - **Reading guide:**
      Section 1: Introduction + overview. Read.
      Section 2: Static models. Read. Read details fast.
      Section 3: Dynamic models. Get the idea of limited commitment. Do not get stuck.
      Section 4: Tests. We won't cover this, you can skip.
      Section 5: Policies. Short, might be worth a read.

References I

Chiappori, P.-A. and M. Mazzocco (2017): "Static and Intertemporal Household Decisions," *Journal of Economic Literature*, 55(3), 985–1045.

Guner, N., R. Kaygusuz and G. Ventura (2020): "Child-Related Transfers, Household Labor Supply and Welfare," *Review of Economic Studies*, 87(5), 2290–2321.

Lefebvre, P. and P. Merrigan (2008): "Child-Care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada," *Journal of Labor Economics*, 26(3), 519–548.

Wang, H. (2022): "Fertility and Family Leave Policies in Germany: Optimal Policy Design in a Dynamic Framework," Working paper.