Informality and the Career Costs of Children in Developing Countries

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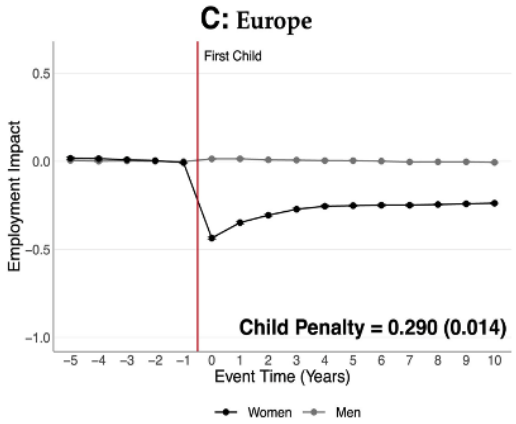
FGV EESP 2025

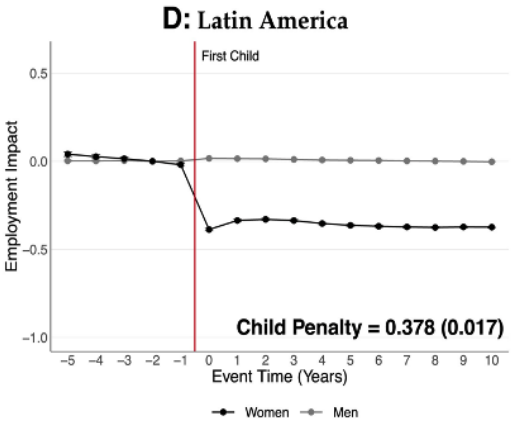
Motivation

- Well-established results on career costs of children **for women**
- “child penalty” or “motherhood penalty”

Motivation

From Kleven et al. (2023) (more)





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  - Lower earnings
  - Greater instability (turnover and variance of earnings)
  - Lack of protection (social security benefits)

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- Informal sector (informal employees & self-employed individuals) is often characterized by:
  - Lower earnings
  - Greater instability (turnover and variance of earnings)
  - Lack of protection (social security benefits)

- ... but it may also bring:
  - More flexibility/lower costs (working hours, working place, commuting time)

Motivation

- Flexibility may be desirable by some groups (e.g. those with child-care responsibilities)
  - Women are more likely to work informally after the birth of the first child [Chile] (Berniell et al. 2021)
  - Drop in female labor supply over summer [US] (Price and Wasserman 2023)
  - Larger child-penalty for urban places [US] (Kleven 2023)

$\rightarrow$ Flexibility?

This Paper

- **Questions**
  1. What are the career costs of children for women in the presence of a **rigid labor market** and **high informality**?
  2. Are there traps for women in highly flexible low-earnings occupations?
  3. How are these career costs shaped by public policy? Childcare, more flexible labor regulations

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- **What we do**

  A. Combine high-quality admin data to estimate the child penalties for mothers and fathers in Brazil
  B. Develop a partial equilibrium life-cycle model, where women decide on fertility and labor supply (participation and sector of employment)
  C. Estimate the model and analyze counterfactual exercises

Contributions

- Career costs of children
  - Bertrand, Goldin and Katz (2010), Goldin (2014), Angelov, Johansson and Lindahl (2016), Kleven, Landais and Søgaard (2019), Berniell, Berniell, De la Mata, Edo and Marchionni (2021), Kleven, Landais and Søgaard (2021), Kleven (2023), Kleven, Landais and Leite-Mariante (2023)
  - Keane and Wolpin (2010), Blundell, Costa Dias, Meghir and Shaw (2016), Adda, Dustmann and Stevens (2017), Costa Dias, Joyce and Parodi (2020), Ilieva (2022), Xiao (2023)

  $\Rightarrow$ Estimates using rich admin data in a rigid labor market and high informality

  $\Rightarrow$ Granular estimates

  $\Rightarrow$ Model to account for different channels suggested in the literature (e.g. flexibility)

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- Labor Supply and Informality

  Meghir, Narita and Robin (2015), Lopez Garcia (2015), Narita (2020), Bobba, Flabbi, Levy and Tejada (2021), Bobba, Flabbi and Levy (2022), Herreño and Ocampo (2021), Conti, Ginja and Narita (2022), Moreno (2022), Finamor (2025)

  $\Rightarrow$ Fertility and Labor Supply Decisions

  $\Rightarrow$ Sector-specific returns to experience

Talk

1. Data
2. Event-study
3. Empirical Facts
4. Model
5. Estimation
6. Results
7. Counterfactuals
8. Agenda

Data

Data - Family Link

1. **Tax Authority's Registry:** universe of adult population (name, gender, dob, mother's full name, addresses)
   - ChildID—Mother's name

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4. **School Census:** Administrative records of all students (2008–2017). Children's name, dob, parents' full name
   - Child Name—Parents' names

Data - Family Link

- Identifying children-parents following these principles:
    a. Using ID-ID pairs whenever available
    b. Matching on unique names
    c. Matching on names and same addresses
- Separately for mothers and fathers

Data

5. **RAIS** — Matched employer-employee with the universe of formal labor contracts (monthly level) [2002–2019]

6. **PNADC** — Quarterly household survey [2012–2019], employment information (with informality status)

7. **Decennial Census** [2010] labor market information for 25% of the population

Event-Study Analysis

Methodology

- Panel: individual-level employment information with family links for 2002–2019

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  - **Treated**: parents who had their first child in 2012 and 2013
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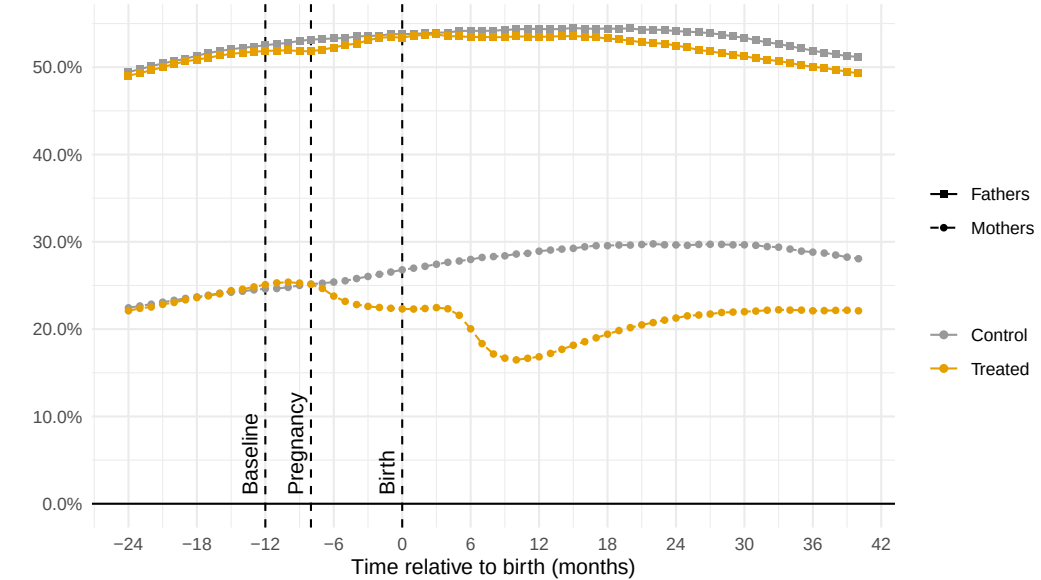
  - **Potential controls**: all parents who had their first child 4 years later than the treated (2016 or 2017)
  - Matching variables: gender, birth cohort, municipality, education, RAIS/CadUnico status

$$Y_{it} = \alpha + \gamma Treat_i + \sum_{\tau=-P}^{T} \gamma_t (Treat_i \times Time_t) + \eta_t + \varepsilon_{it}$$

Career costs of children (raw data) - Prob formal employment



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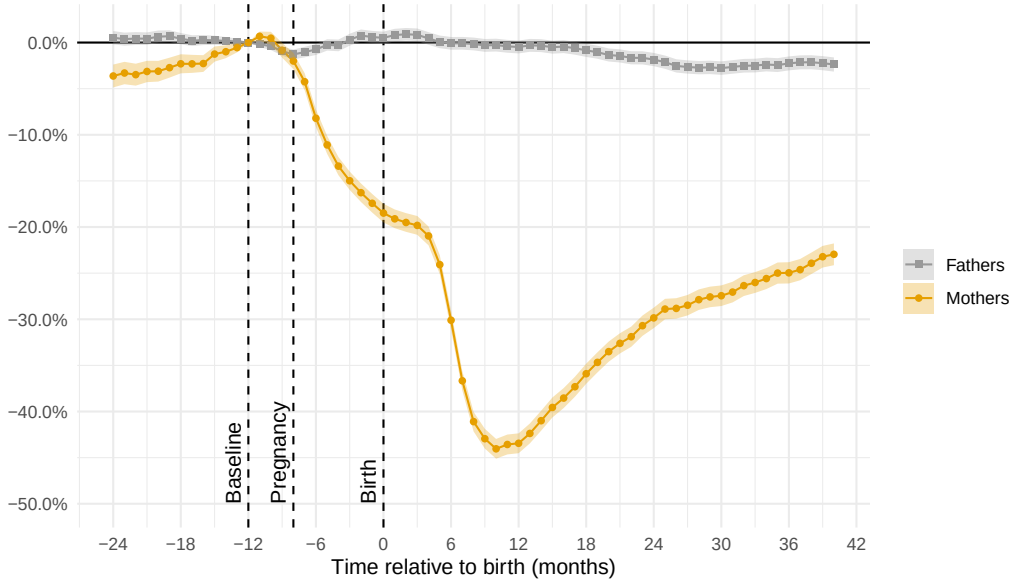

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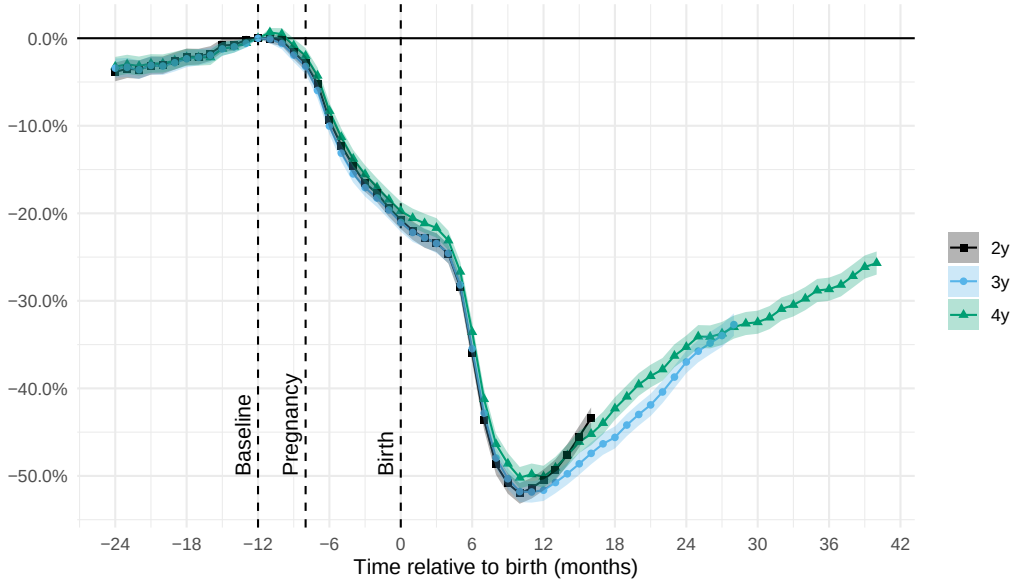

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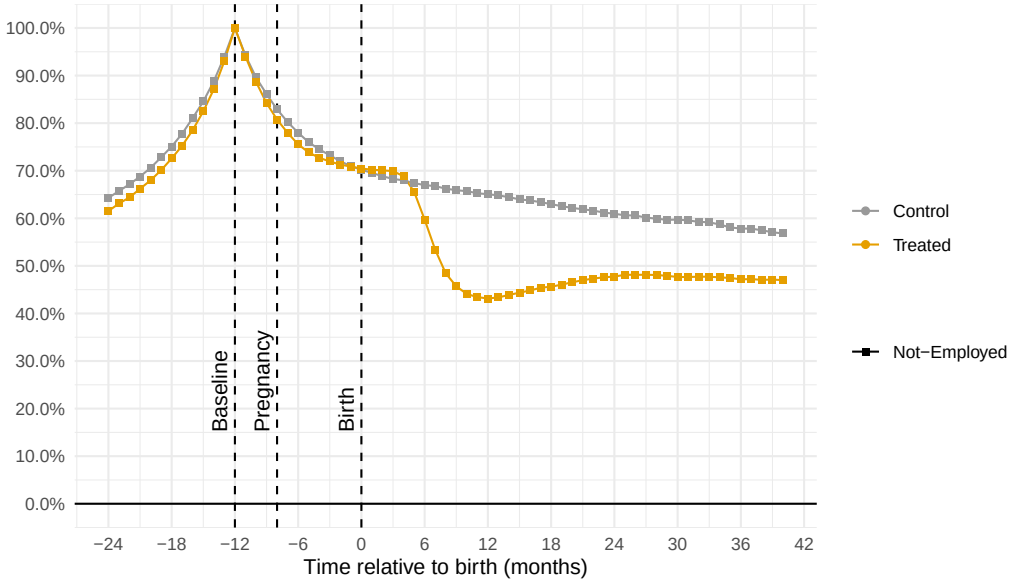

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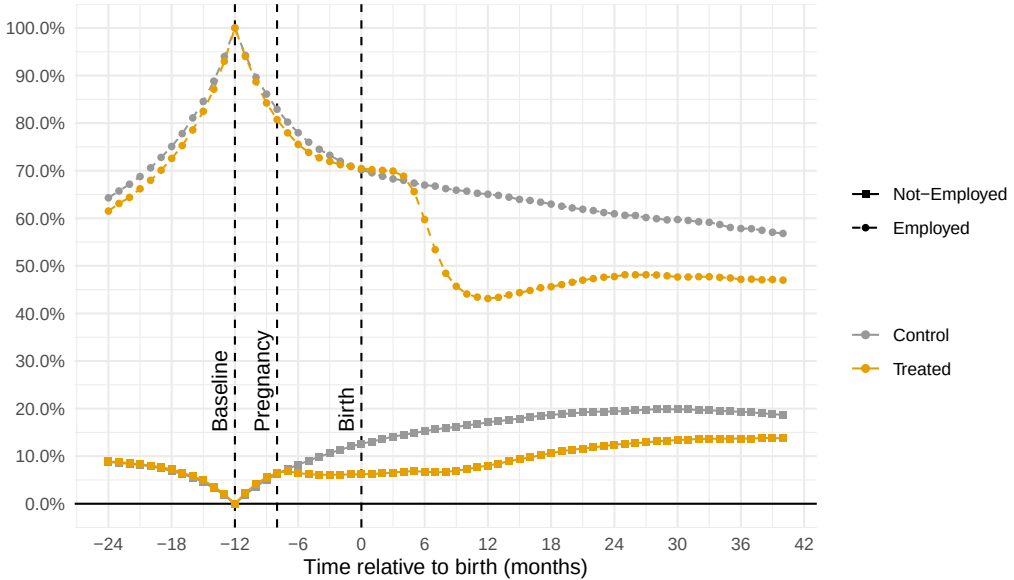
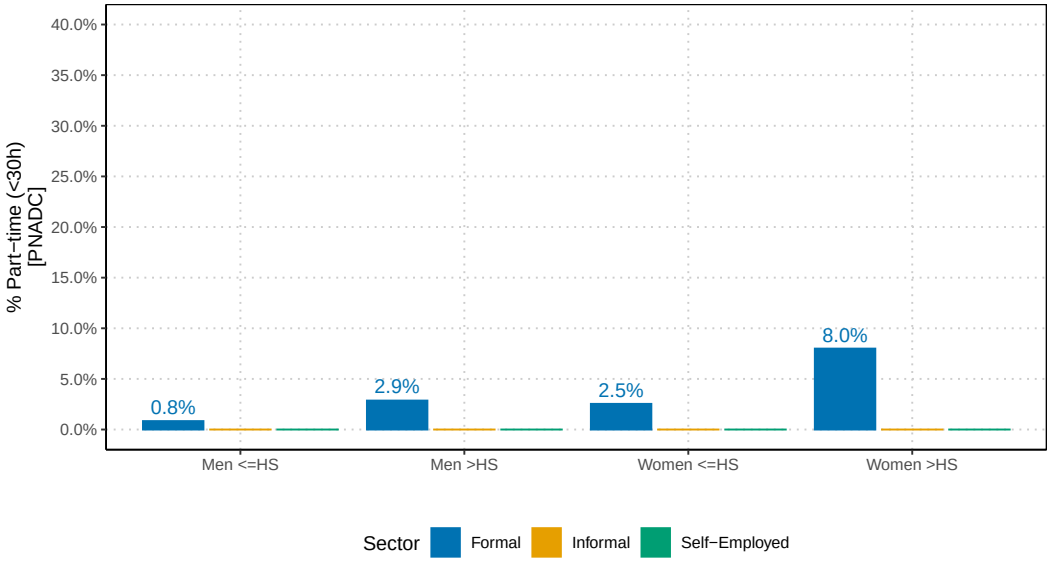


Empirical Facts

Lack of part-time contracts

Educ Trends Occupations



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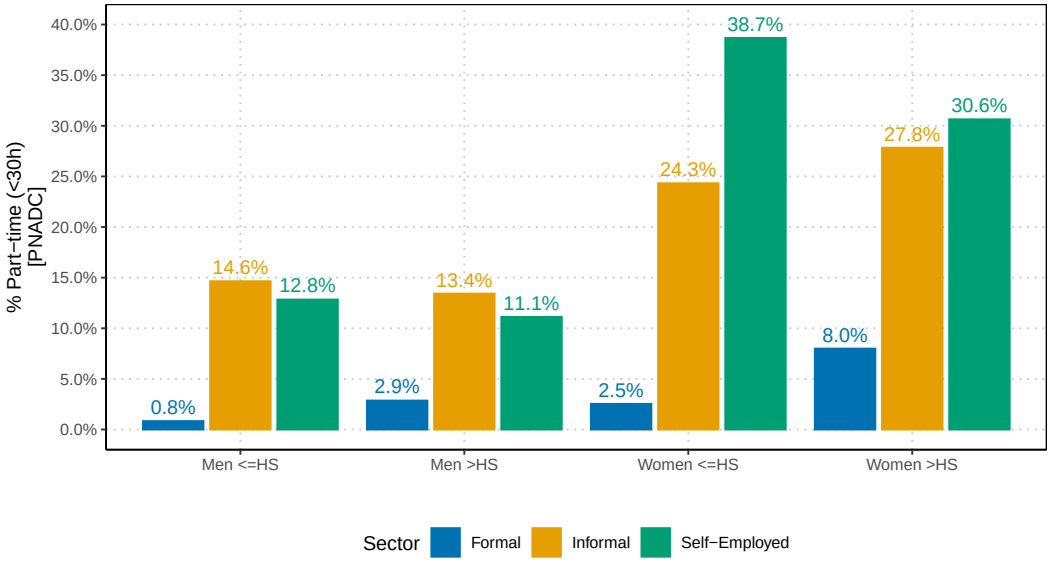
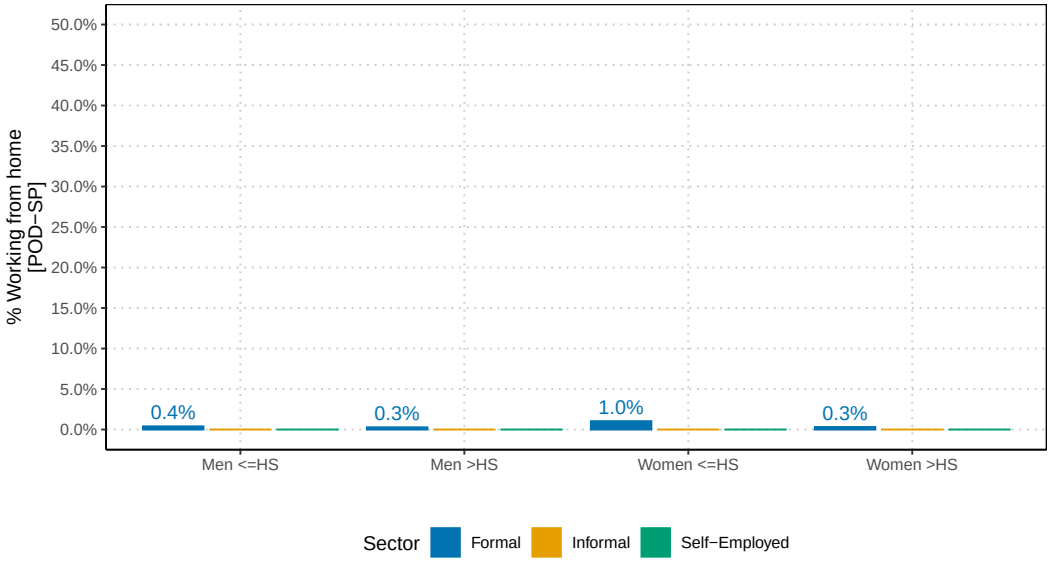


Working place



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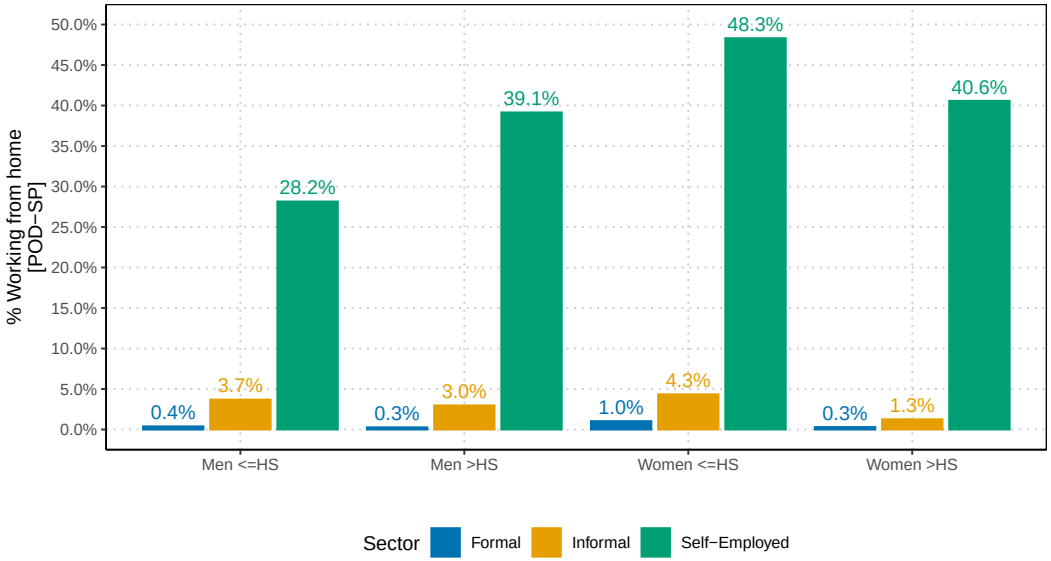
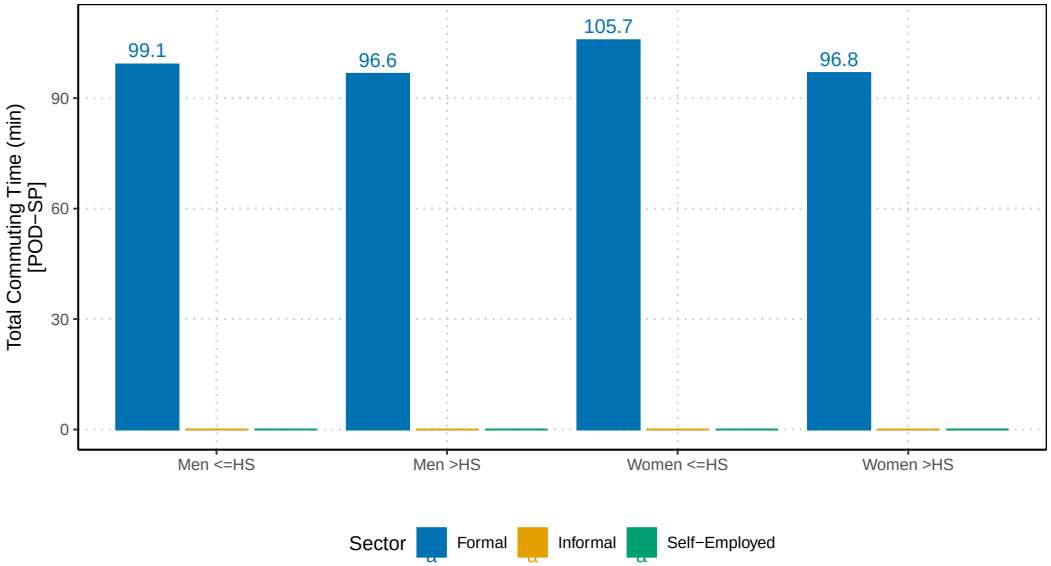


Commuting time (conditional on any)



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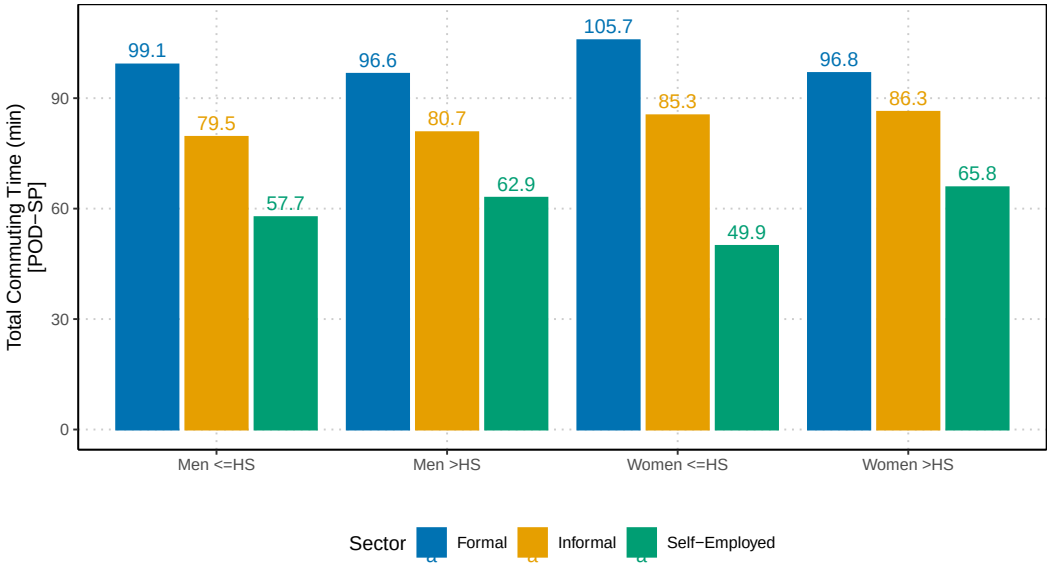

Model

Model — Main Ingredients

- Life-cycle model where women decide in every period:
  - Fertility (trying to conceive)
  - Labor Market: participation, sector of employment, full x part-time

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  - Fertility (trying to conceive)
  - Labor Market: participation, sector of employment, full x part-time
- Taking into account:
  - Family demographics (single x married, number of children, age, age youngest kid)
  - Rich labor market structure with frictions
  - Career costs

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  - Rich characterization of the labor market:

    3 sectors of employment (formal, informal, self-employment) + Unemployment + Out LF

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- Model abstracts from:
  - Endogenous marriage market
  - Savings/Borrowing

Timing

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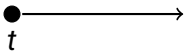
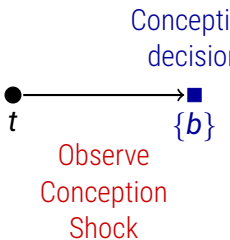


Observe
Conception
Shock

Timing



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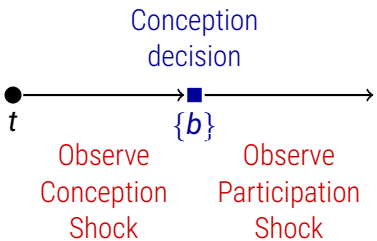
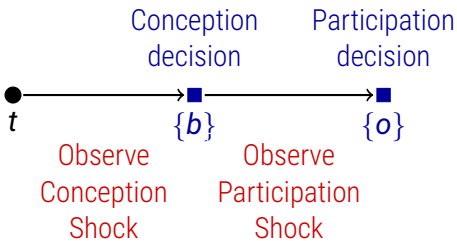
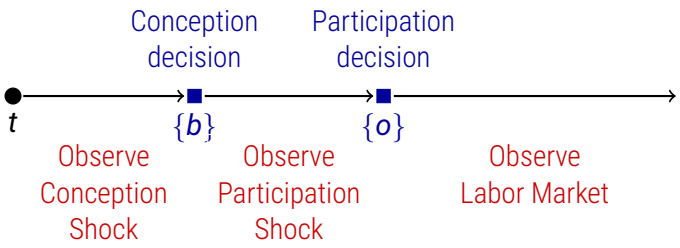

Conception
decision
t
{b}
Observe
Conception
Shock
Observe
Participation
Shock

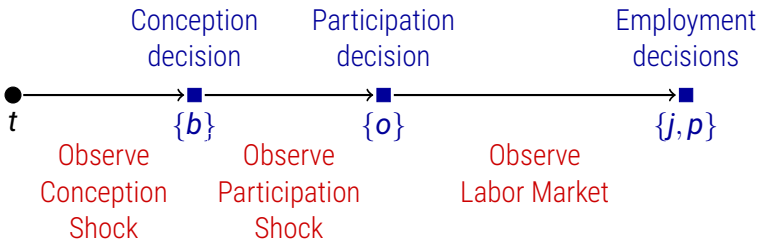
Timing


Conception decision
Participation decision
t
{b}
{o}
Observe Conception Shock
Observe Participation Shock

Timing


Conception decision
Participation decision
t
{b}
{o}
Observe Conception Shock
Observe Participation Shock
Observe Labor Market

Timing


Conception decision
Participation decision
Employment decisions
t
{b}
{o}
{j,p}
Observe Conception Shock
Observe Participation Shock
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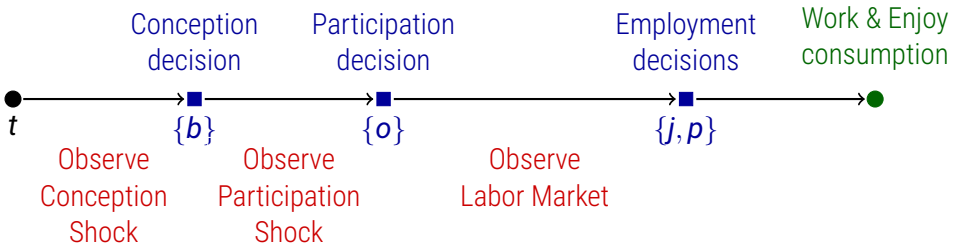
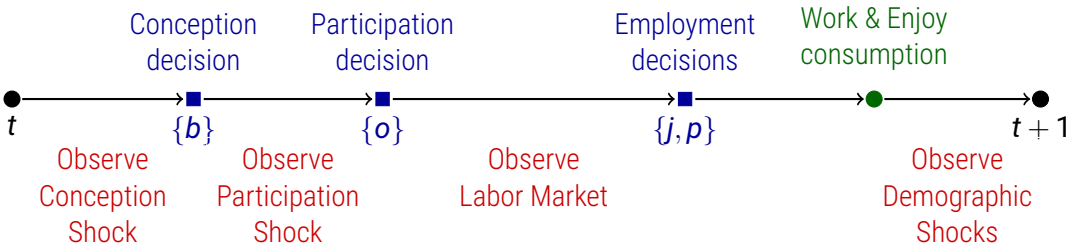
Timing

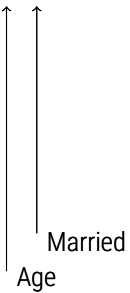

Conception decision
Participation decision
Employment decisions
Work & Enjoy consumption
t
{b}
{o}
{j,p}
Observe Conception Shock
Observe Participation Shock
Observe Labor Market

Timing


Conception decision
Participation decision
Employment decisions
Work & Enjoy consumption
t
$\{b\}$
$\{o\}$
$\{j,p\}$
$t+1$
Observe Conception Shock
Observe Participation Shock
Observe Labor Market
Observe Demographic Shocks

State space and notation

$$\Omega = (t, m \qquad)$$



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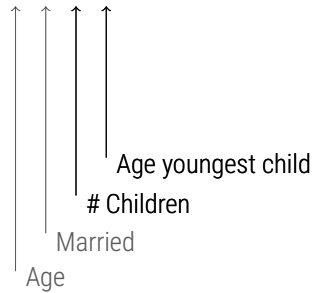
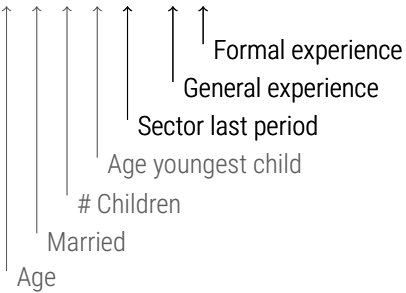


State space and notation

$$\Omega = (t, m, n, a, j^{-}, e^{g}, e^{f})$$



Instantaneous utility more

$$U(\Omega) = \underbrace{\frac{(c^{\nu}\ell^{1-\nu})^{1-\gamma}}{1-\gamma}}_{\text{Consumption and Leisure}} + \overbrace{\kappa(n)}^{\text{\# of kids}} +$$

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Leisure

- If out of the labor force (or in maternity leave)

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- If working in $j \in \{F, I, S\}$

  $$\ell = 1 - \underbrace{h_p}_{\text{Hours working}} - \overbrace{\chi_j}^{\text{Fixed cost}} - \underbrace{g(a, j, m)}_{\text{Childcare}}$$

Experience and Earnings

- Formal (e^f) and general (e^g) experience

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- Potential earnings (Y^*) depend on experience and sector:

$$Y_j^* = \begin{cases} \mu^F + \overbrace{h^f(e^f)}^{\text{Returns to formal exp}} + \underbrace{h^g(e^g)}_{\text{Returns to gen exp}} & \text{, if } j = F \end{cases}$$

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- Gross earnings depends hours of work and earnings shocks

$$Y_j^{\text{Gross}} = \underbrace{(Y_j^* + \varepsilon^j)}_{\text{Hourly earnings}} \overbrace{h_p}^{\text{Hours}}$$

Maternity Leave

- If a woman gives birth while being **previously** employed in the formal sector, then:

1. She cannot be fired
2. She will remain in the formal sector without working for one period
3. She will enjoy formal earnings

Estimation

Estimation

- We first parametrize our problem (more)

- 2-step estimation:
  - Set or estimate some parameters outside the model more
  - SMM for the remaining parameters (preference and technology parameters)

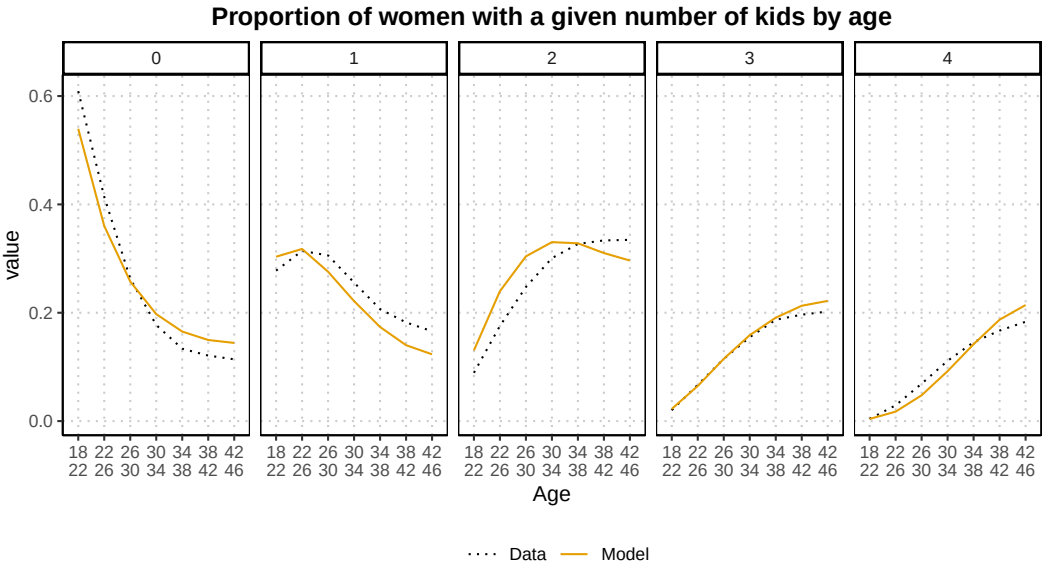
Parameters — 2nd stage

Selected moments exploring: (more)

- Reduced-form estimates
- Short-panel transitions
- Employment patterns by age, marital status, and age of youngest child
- Earnings
- Number of children

Results

Model Fit (targeted moments)



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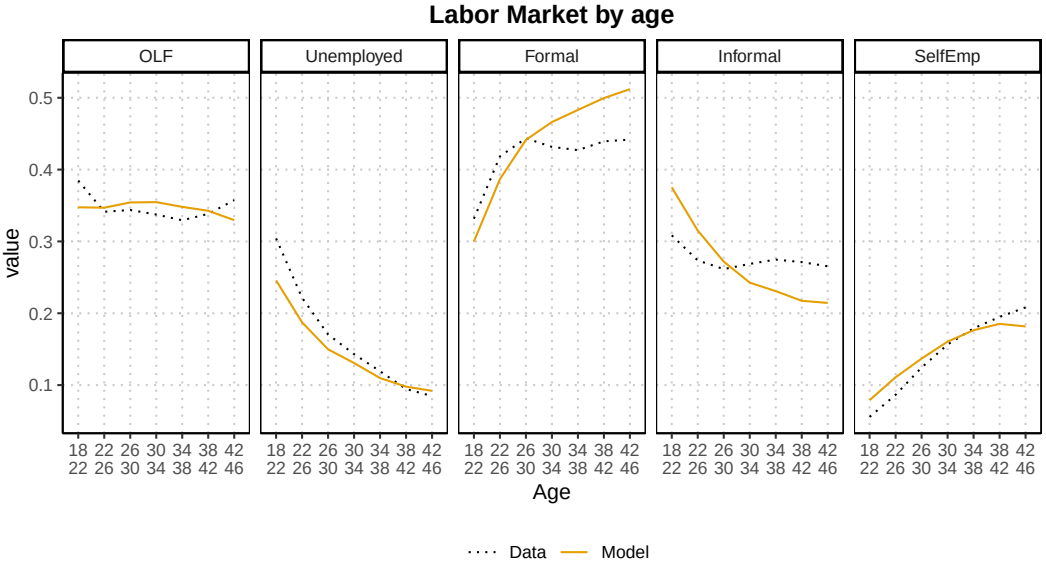

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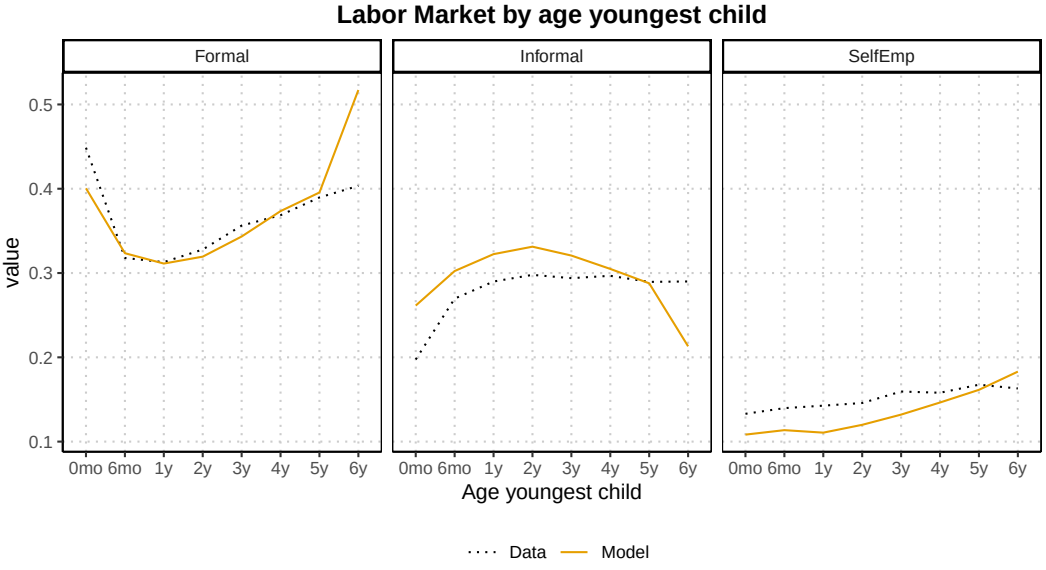

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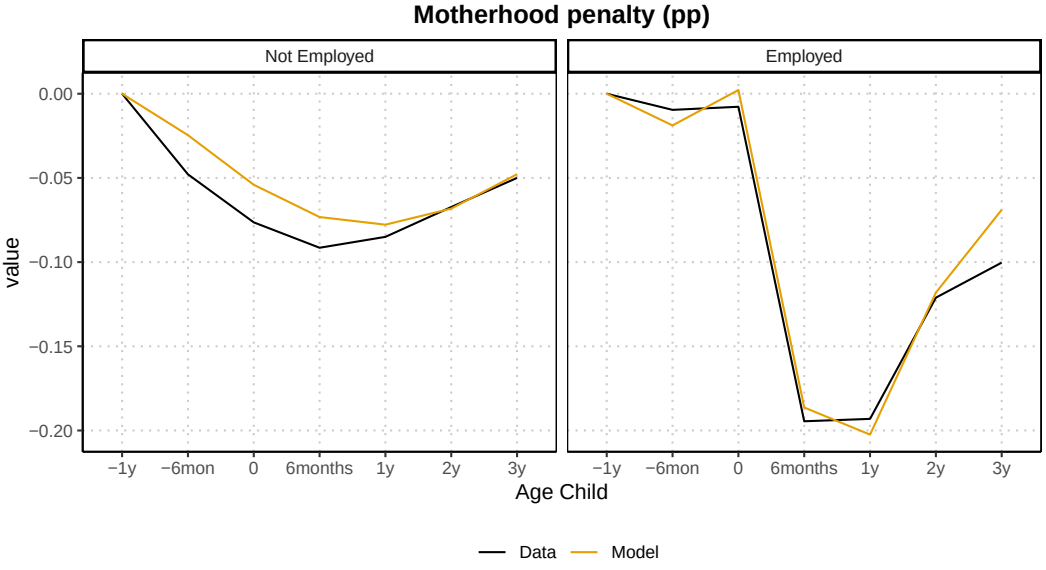


Leisure

- Fixed-cost of working:
  Formal: 3.4h, Informal: 2.0h, Self-employment: 1.2h

Leisure

- Fixed-cost of working:

  Formal: 3.4h, Informal: 2.0h, Self-employment: 1.2h

- Childcare costs:
  - 40.4h/week for children aged 0-6months
  - 16.3h/week for children aged 2y

  - 70% smaller if working informally
  - 65% smaller if married

Arrival Rates

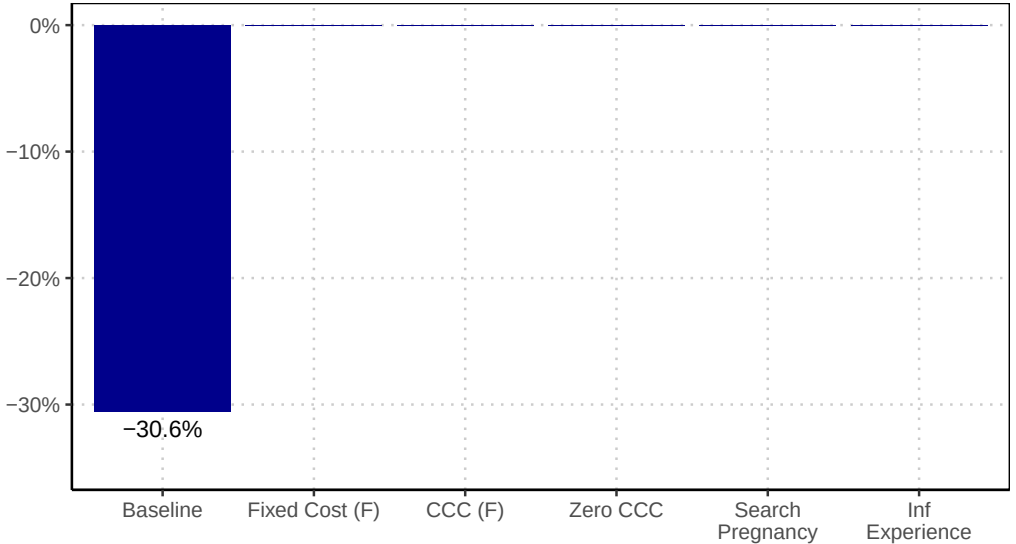
- Arrival rates depend on experience and sector (and whether pregnant)
- Arrival rate for formal jobs is $\sim$80% smaller if you do not have experience (compared to 5 years of experience)
- Arrival rate is $\sim$15% smaller if you are pregnant

Counterfactuals

Counterfactuals

1. ↓ fixed cost of working in F
2. ↓ childcare cost when working in F
3. ↓ childcare cost
4. ↓ “search-penalty” when pregnant
5. ↑ returns of informal experience
6. ↑ increase of PT offers in F

Counterfactuals — Career costs (with young child)



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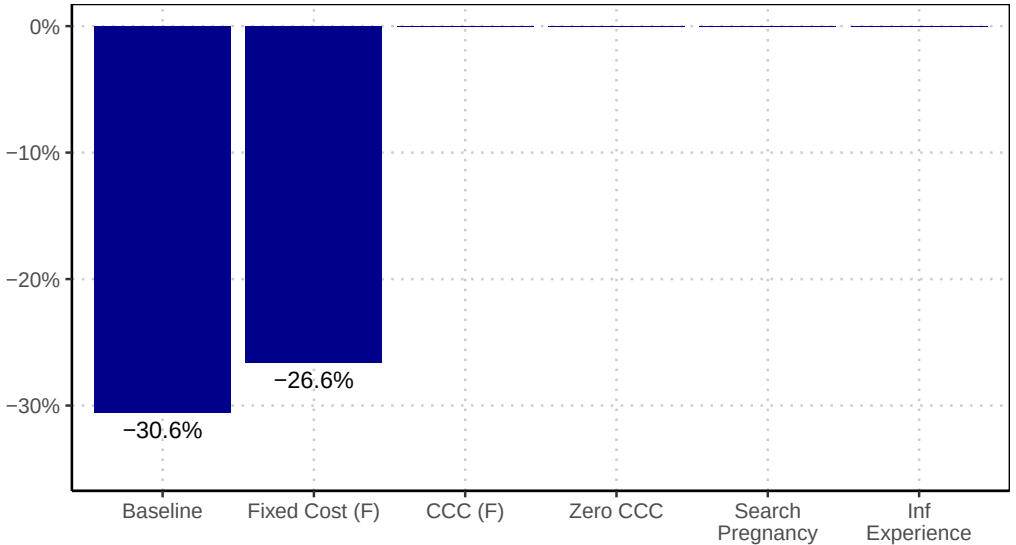

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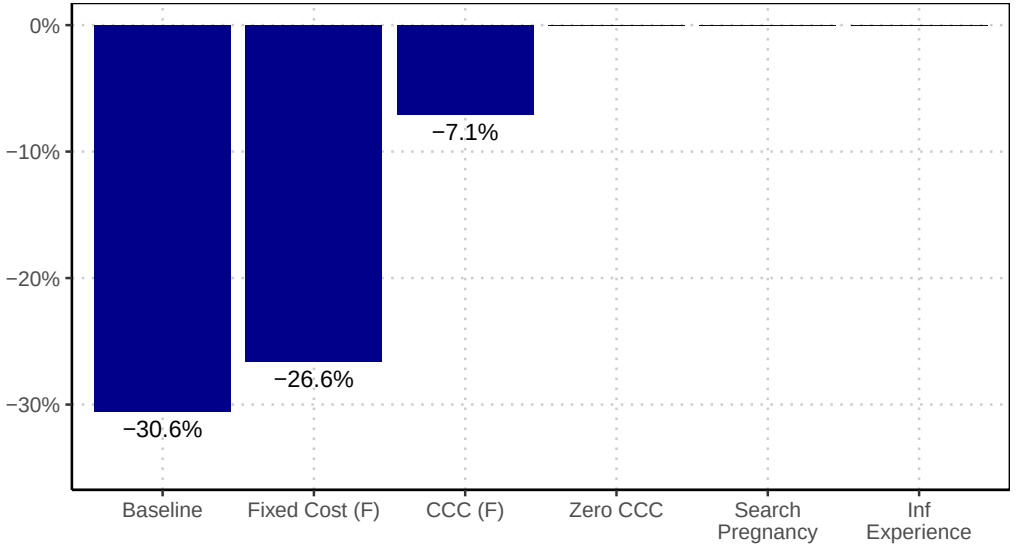

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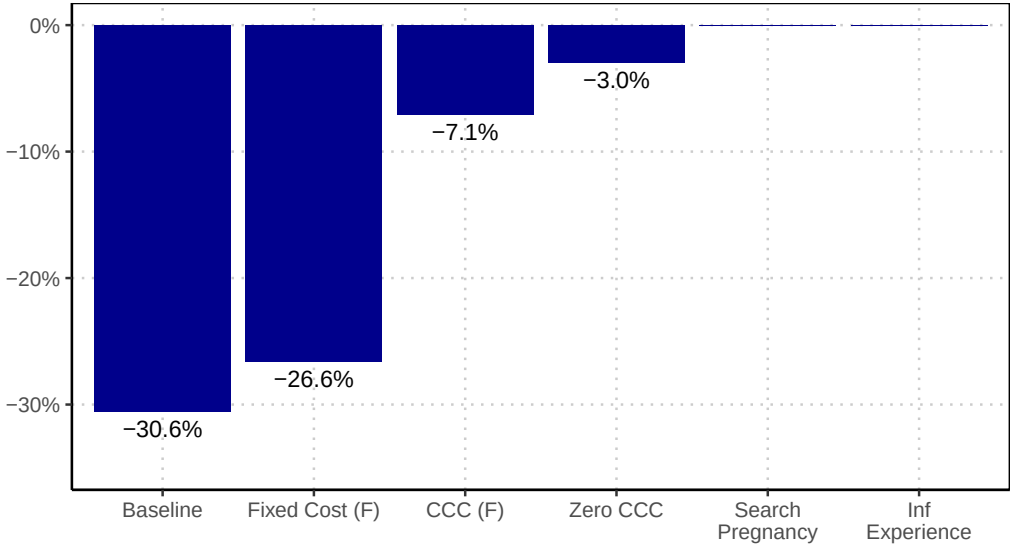

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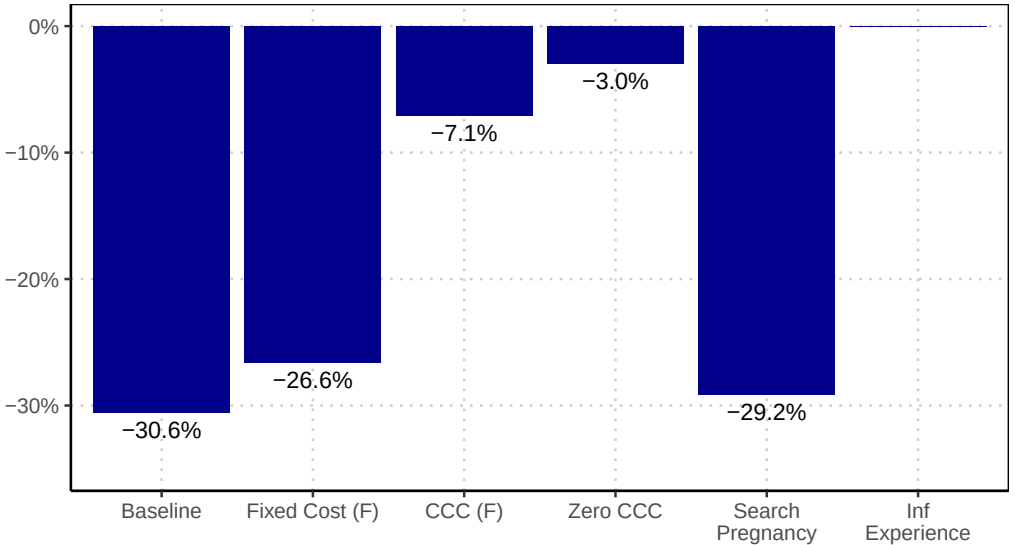

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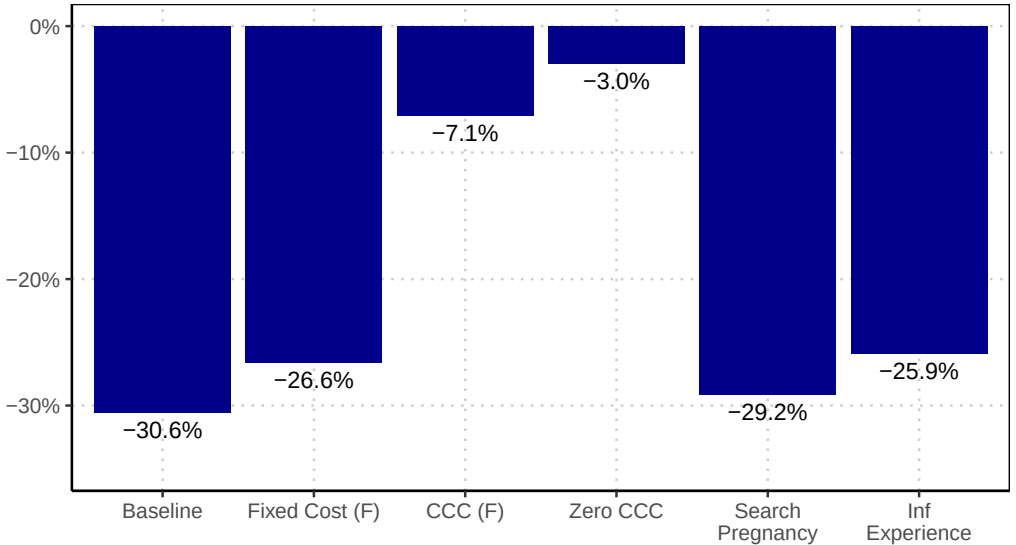
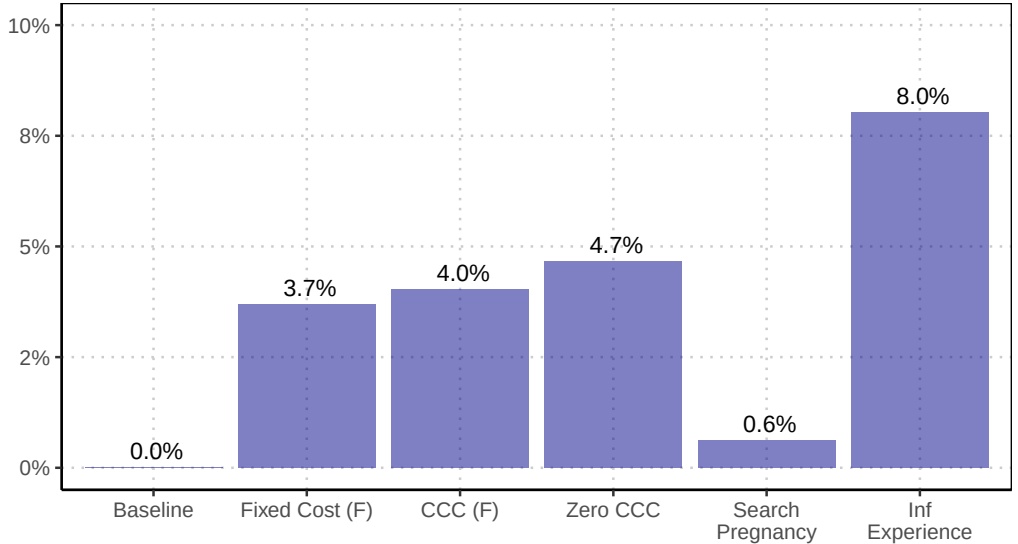


Counterfactuals — Career costs (long-term)



Conclusion

Agenda

- **Subset of these co-authors:**
  - The determinants of the career costs (empirically)
  - Embedded the decision in a family model

- **Joint with Cormac O'Dea (Yale University) and Hannah Zillessen (KU Leuven)**
  - Timing of fertility decisions and risk-aversion

Thank you

Lucas Finamor
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Appendix

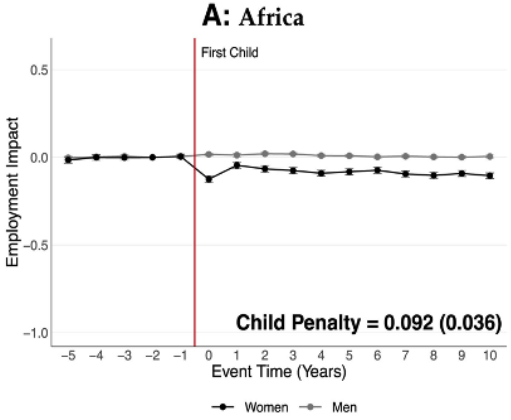
Presentation

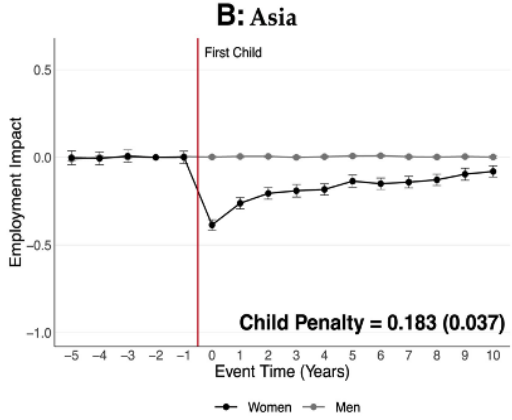
- Introduction
- Institutional setting and data
- Empirical Facts
- Child penalties
- Model
- Estimation
- Results
- Counterfactuals
- Conclusions

- Appendix

Motivation (back)

From Kleven et al. (2023)





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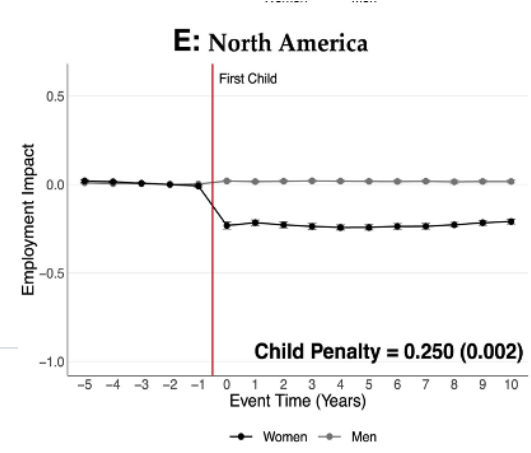
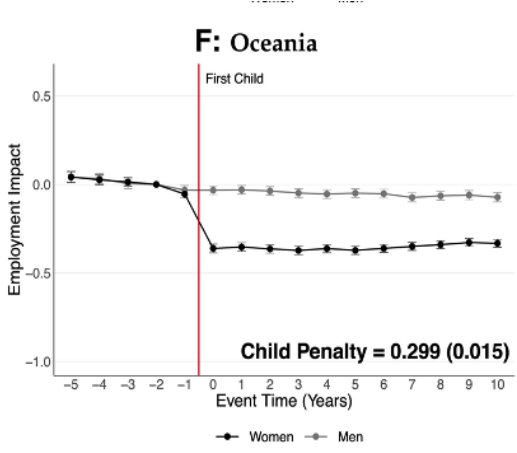
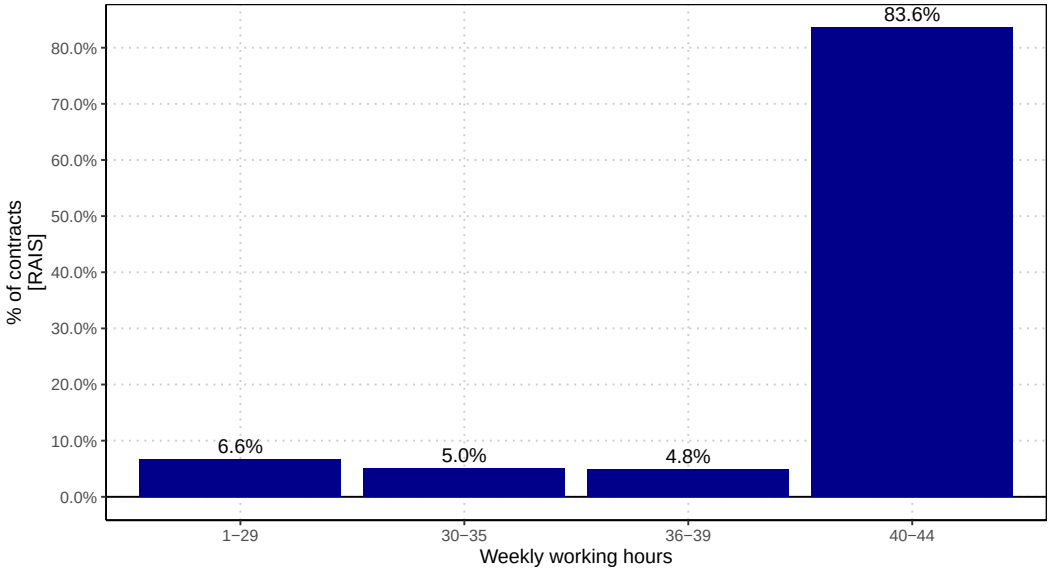




Lack of part-time contracts

Educ Trends Occupations



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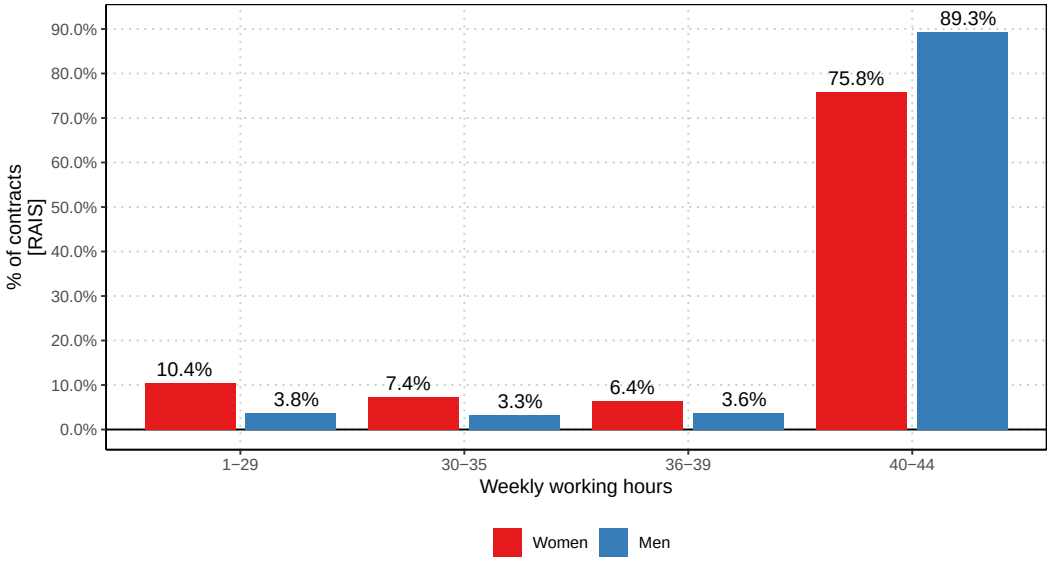

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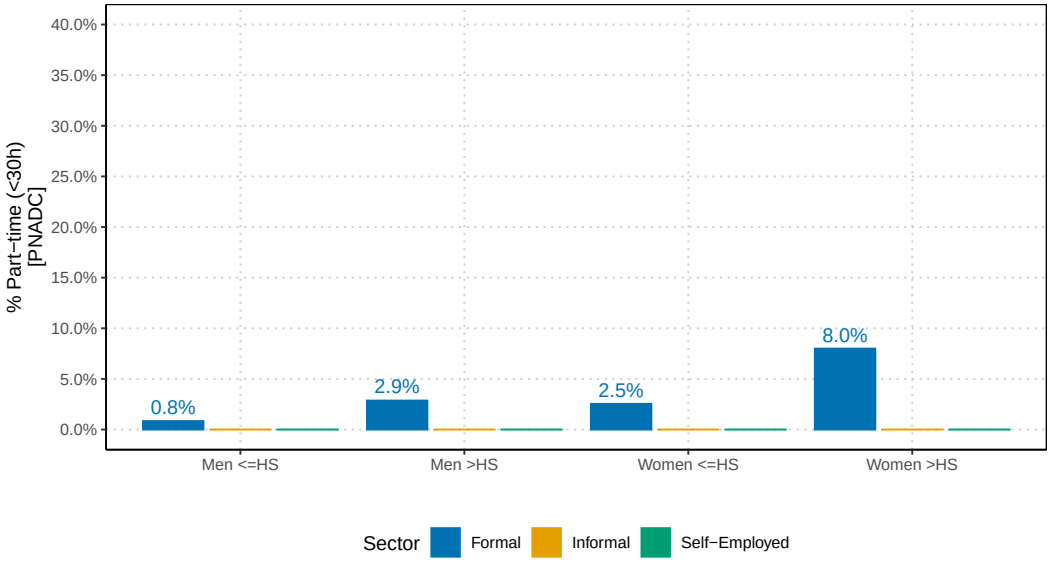

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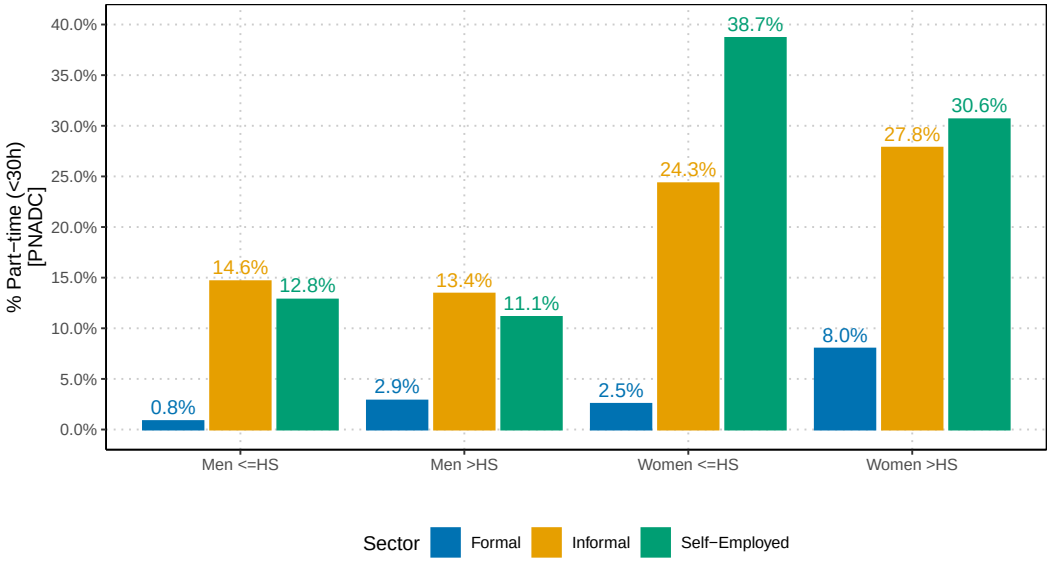

Lack of part-time contracts (back)

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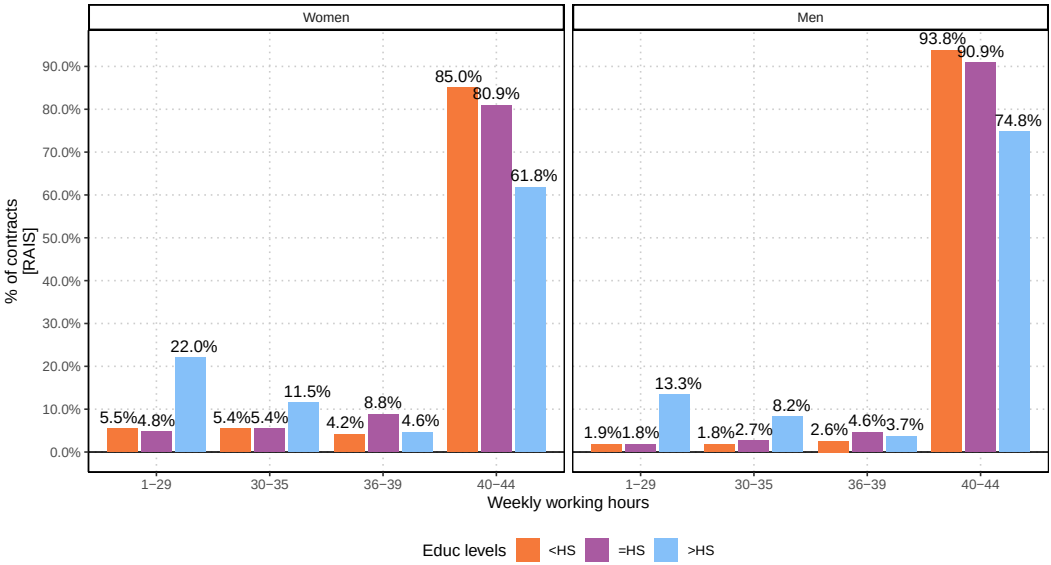


Lack of part-time contracts (back)

Outcome: Part-time ($<$ **30** hours)

Model:	(1)	(2)	(3)	(4)
Constant	0.0696***	0.0414***	0.0183***	
	(0.0016)	(0.0012)	(0.0015)	
Women		0.0655***	0.0442***	0.0142***
		(0.0039)	(0.0031)	(0.0028)
Educ $=$ HS			-0.0038*	-0.0128***
			(0.0020)	(0.0020)
Educ $>$ HS			0.1419***	0.0078*
			(0.0053)	(0.0047)
OCC FE	-	-	-	Yes

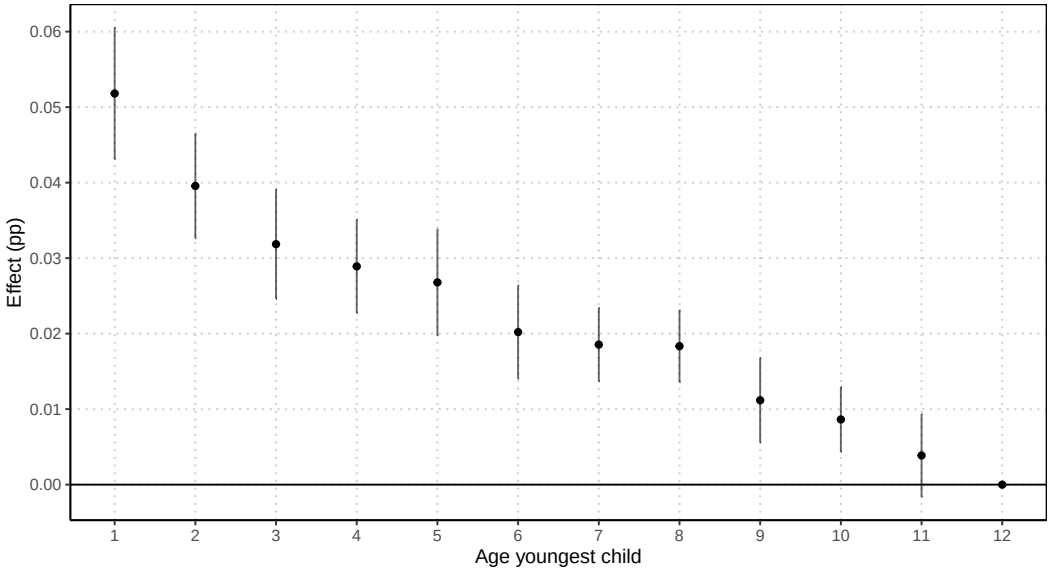
Institutional Setting

- Formal sector:
  - minimum wage, severance payment, forced savings
  - social security contributions (unemployment insurance, health and parental leaves, disability insurance, pension contributions)
- Safety net:
  - Conditional Cash Transfer, Minimum Pension Guarantees

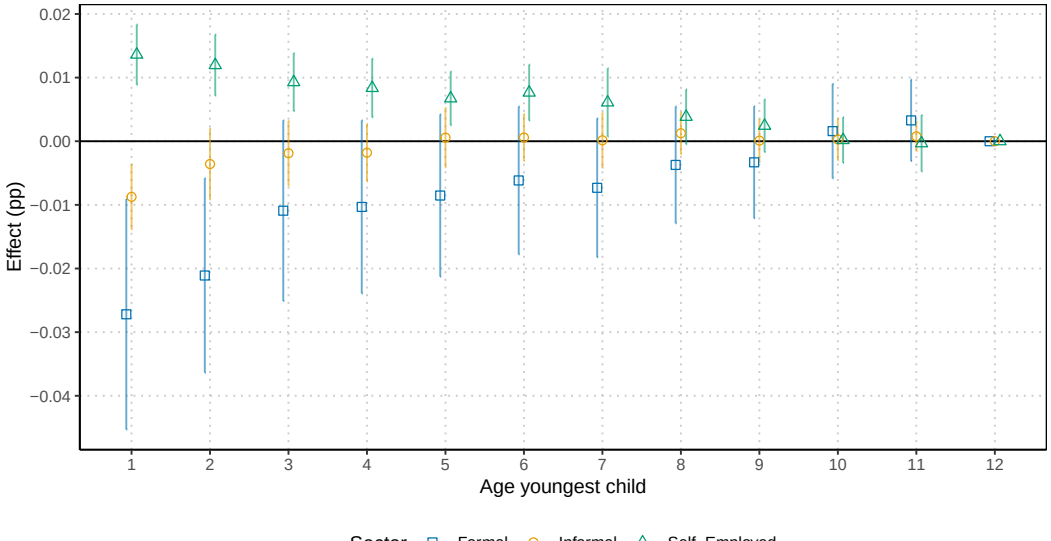
Institutional Setting

- Formal sector:
  - minimum wage, severance payment, forced savings
  - social security contributions (unemployment insurance, health and parental leaves, disability insurance, pension contributions)
- Safety net:
  - Conditional Cash Transfer, Minimum Pension Guarantees
- Pregnancy/Children:
  - Pregnant women cannot be fired from the formal sector
  - Leave: 120 days for mothers and 5 days for fathers in the formal sector
  - Around 23% of children aged 0–3 attended childcare [Census 2010]
    15% public and 8% private

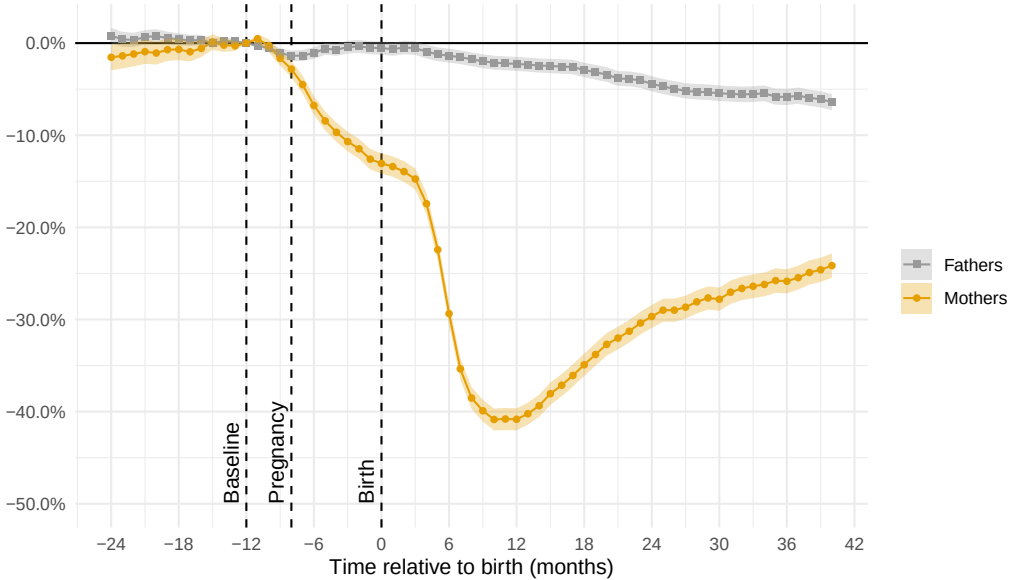
Working Part-time by age of youngest child



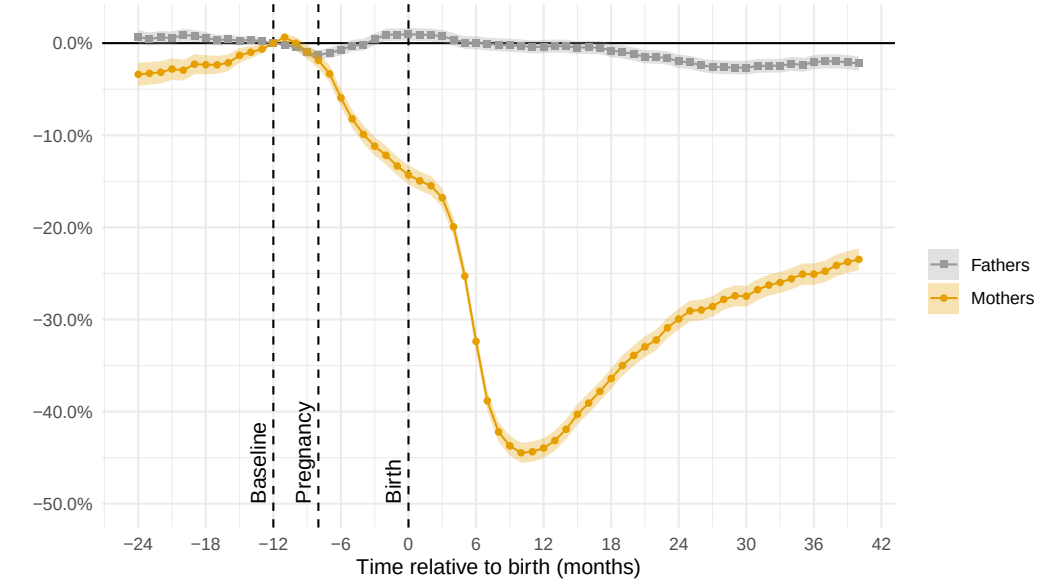
Sector of work by age of youngest child



Career costs of children - Months employment



Career costs of children - Formal Earnings



Notation

- State space: $\Omega = (t, m, n, a, j^{-}, e_g, e_f, t_p)$
- Decisions: $X = (b, j, p)$
- Shocks: $\zeta = (\zeta_o, \zeta_b, \zeta_w^j, \zeta_\lambda^{jj'}, \zeta_d)$

State space

	Variable	Notation
Demographics	Age	t
	Married	m
	Number of children	n
	Age of youngest child	a
Previous LM status	Participation	o^-
	Sector	j^-
Experience levels	Non-formal	e^g
	Formal	e^f

$$\Omega = (t, m, n, a, o^-, j^-, e^g, e^f)$$

Shocks

Area	Shock	Notation
Preference Shocks	For Participation	ζ_o
	For Conception	ζ_b
Labor Market Shocks	Arrival from sector j to j'	$\zeta_\lambda^{j,j'}$
	Productivity for sector j	ζ_w^j
Demographic shocks	Marriage	$\zeta_{d,m}$
	Conception success	$\zeta_{d,b}$

Utilities Formally written (back)

$$U(\Omega, X, \zeta) = u_{c\ell}(c, \ell; \Omega) + u_n(n) + u_{j,j^-}(j, j^-) + \zeta_o 1\{j = O\} + \zeta_b b\pi_p$$

$$u_n(n) = \kappa_1 n + \kappa_2 n^2$$

$$u_{j,j^-}(j, j^-) = -\chi_{j,j} \mathbb{1}[j \neq j^-]$$

Equations back

$$u_{c\ell}(c, \ell; \Omega) = \frac{(c^{\nu} \ell^{1-\nu})^{1-\gamma}}{1-\gamma}$$

$$c = Y(j, p, e_g, e_f, \zeta_w) + Y^m \mathbb{1}[m = 1]$$

$$\ell = 1 - h_{j,p} - \left(\chi_0 \left(1 + \chi_I 1[j = I] + \chi_S 1[j = S] \right) + g(a, j, m) \right) \mathbb{1}[j \in F, I, S]$$

$$g(a, j, m) = \theta_0 \left(1 + \theta_I \mathbb{1}[j = I] + \theta_S \mathbb{1}[j = S] \right) \left(1 - \theta_m m \right) g(a)$$

$$g(a, j) = \begin{cases} \phi_1, & \text{if } a = 0 \\ \frac{\bar{A}}{\bar{A} + \phi_2 a}, & \text{if } a > 0. \end{cases}$$

Timing 1

1. Woman starts her period at $\Omega = (t, m, n, a, j^-, e_g, e_f, t_p)$ and she observes the conception shock ζ_b.
   - If $\zeta_b \geq \bar{\zeta}_{b\Omega}$, she tries to get pregnant $b = 1$.

2. Woman, then observes the participation shock ζ_p.
   - If $\zeta_p \geq \bar{\zeta}_{p\Omega,b}$, she decides to be out of the labor market $o = 1$ (and $j = 0$)

3. If the woman enters the labor market. We first check whether she receives a separation shock (only if $j^- \in [F, I, S]$).

$$j_{aux} = \begin{cases} U & \text{if } j^- \in [F, I, S] \text{ and fired} \\ j^- & \text{otherwise} \end{cases}$$

Timing 2

4. Given j_{aux}, individuals may or not receive offers from F, I, S, observe the wage for F and I and decide in which sector she want to be and how much to work.

5. If she decided to be in S, she then learn the earnings.

   - Note that for transitions we compare j_{-} (and not j_{aux}) with j

6. Towards the end of the period the demographic shocks are realized, whether she will start next period married or single (given current m) and whether she will have a baby born (if $b = 1$).

Parametrization (back)

- Preference Shock ζ_o (for being out of the labor force)

$$\zeta_o \sim N(0, \sigma_o)$$

- Preference Shock ζ_b (for conception)

$$\zeta_b \sim N(\mu_{b,m}, \sigma_b)$$

- Probability of conceiving by age t: $Pr(\nu_{it} > \bar{\nu}_t)$

$$\nu_{it} \sim U[0,1] \quad \text{and} \quad \bar{\nu}_t = \sqrt{\frac{\nu_0}{\nu_1 - t}}$$

Parametrization (2) (back)

- Probability of marrying by age t: $Pr(\gamma_{it} > \bar{\gamma}_t^0)$

$$\gamma_{it} \sim U[0,1] \quad \text{and} \quad \bar{\gamma}_t^0 = [1 + \exp(\varphi_0 + \varphi_1 t + \varphi_2 t^2)]^{-1}$$

- Probability of divorcing by age t: $Pr(\gamma_{it} > \bar{\gamma}_t^1)$

$$\gamma_{it} \sim U[0,1] \quad \text{and} \quad \bar{\gamma}_t^1 = \varphi_3$$

- Child penalty (actual)

$$g(a_{it}) = \pi_0 \mathbb{1}[a_{it} = 0] + \frac{6 - a_{it}}{6 + \pi_1 a_{it}} \quad \text{, if } a_{it} \in [0,6]$$

Parametrization (3) (back)

- Returns to experience

$$h^k(e) = \alpha_1^k e + \alpha_2^k e^2$$

- Earnings shocks

$$\varepsilon^j \sim N(0, \sigma_{\varepsilon_j})$$

Parameters – 1st stage (back)

Discount rate	β	1	Set from the literature
Coefficient of risk aversion	γ	1	Set from the literature
Types	$Prob(t_p = 1), Prob(t_p = 2)$	2	PNAD
Exogenous destruction	δ^F	1	RAIS
Earnings intercept	μ_F, μ_I, μ_S	3	PNAD
Variance of income shocks	$\sigma_F, \sigma_I, \sigma_S$	3	PNAD
Prob Conceiving	$\nu_0 = 5, \nu_1 = 55$	2	Set from literature
Prob Marrying/Divorcing	$\varphi_0, \varphi_1, \varphi_2, \varphi_3$	4	Estimated separately
Part-time earnings	ω_0	1	Set to prop of hours part-time
Part-time penalty (experience)	ω_3	1	Set to 0.50
Formal wage	$\tau_0 = 1.306, \tau_1 = 0$	2	Haanwinckel and Soares (2021)

Parameters and Identification (2nd stage) (back)

Consumption-weight	ν	1	Prop PT
Participation shock	σ_o	1	Proportion out the labor force
Conception shock	$\mu_b, \sigma_{b,m}$	3	Fertility patterns by marital status
Kids utility	κ_1	1	Number of kids
Childcare	$g(a), \theta, \theta_I, \theta_S, \theta_m$	5	LM by age of kid and event studies
Fixed cost of working	χ_0, χ_I, χ_S	3	% working part-time by sector
Switching cost	$\xi_{j,j}$	1	Prop staying same sector
Arrival rates	$\lambda_{j,j'}$	7	Transitions
Arrival PT options	$\lambda_{F,PT}, \lambda_{I,PT}$	2	Transitions & %PT

Parameters and Identification (2nd stage) (back)

Destruction rates	δ_I, δ_S	2	Transitions
Returns to experience	r_F, r_I, r_S	3	Income
Adj to search	$\omega_F, \omega_S, \omega_b$	3	Life-cycle LM
Husband income	Y	1	Prop OLF/PT by marital status

Formal earnings in Haanwinckel and Soares (2021)

- $W = a \times w + b$
- In a they include:
  - 13 wage, Vacation, Severance Payment INSS, IRPF, FGTS (50%), FGTS firing penalty, Insurance,...
- b includes abono salarial & UI
- Their estimates for unskilled workers
  - $a = 1.306$
  - $b = (0.05 + \delta 4)\bar{w}$