You are the father!
Effects of Costa Rica's Responsible Paternity Law on families

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Research question:

How does child-related paternity laws affect women's labor outcomes?

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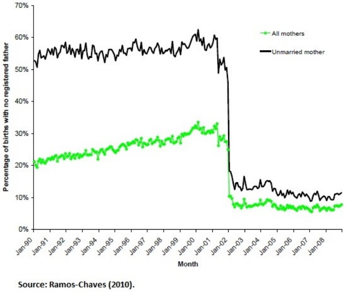

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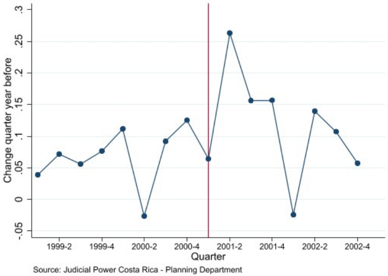

Figure: % change in child support demands

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  2. Intra-household: woman receives a larger share of household income in a couple.

Literature

Overview

Costa Rican context

Abortion is not legal in Costa Rica.

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- Paternity law:
  - Non-married mothers automatically declare father of their newborn child.
  - Children with a recognized father can demand child support.
- Ramos (2010):
  - 5 — 10% fall in birth rate and total fertility rates.
  - Drop in marriages: link with unplanned pregnancies.

Data

Costa Rican Multi-Purpose Household Survey: repeated cross-sections, 1997 to 2009.

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- Men at most 40 y.o.

Households Men Women

Empirical evidence: Differences in Differences

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Fuzzy Diff-in-Diff (de Chaisemartin & D'Haultfœuille, 2018)

Fuzzy Difference in Differences: Estimation

“Treatment group switchers”: treatment group units going from non-treated to treated.

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LATE estimator for labor outcomes:

$$\Delta = E(Y(1) - Y(0) | S, T = 1)$$

Assumptions | Wald TiC | Wald CiC

Fuzzy Difference in Differences: Results

	Labor participation		Weekly paid hours	
	Women	Men	Women	Men
LATE	0.03	-0.08**	-5.57*	-4.49**
	(0.045)	(0.037)	(2.935)	(2.040)
Controls	Yes	Yes	No	No
N	31,430	30,995	10,367	21,690

Bootstrap S.E. 150 times. Controls include individual and household demographics and geographical variables.
*:10% significance, **: 5% significance, ***: 1% significance.

Follow Choo & Seitz (2013) two-stage model:

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$$\max_{h_m, C_m, h_f, C_f} \lambda(\cdot)U^m(1 - h_m, C_m)(1 - \lambda(\cdot))U^f(h_f, C_f)$$
$$\text{s.t. budget constraint}$$

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   - **Second Welfare Theorem**: assuming Pareto-efficient outcomes.

$$\implies \text{decentralized with } \textit{sharing functions}:$$
$$\Psi^m_{couple}(\cdot) \ \& \ \Psi^f_{couple}(\cdot)$$

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$$\uparrow \Psi^{f}_{couple}(\cdot) \implies \text{ income effect.}$$

1st stage: multinomial logit of marital status

Table: Average Marginal Effects - Child after 2002

	All sample	Men	Women
Single	0.02***	-0.16***	0.08***
	(0.005)	(0.011)	(0.005)
Cohabitated	0.05***	0.11***	0.03***
	(0.006)	(0.007)	(0.006)
Married	-0.06***	0.05***	-0.10***
	(0.007)	(0.009)	(0.007)
Controls	Yes	Yes	Yes
N	59,337	29,477	29,860

S.E. clustered at the household year level.
Controls include individual and household demographics and geographical variables.
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Female labor supply:

$$\begin{aligned} h_{f,T} &= \kappa_f + \underset{(34.577)}{63.371} \log w_f + \underset{(0.053)}{1.179} \; y^f \\ h_{f,C} &= \kappa_f + \underset{(177.247)}{172.157} \log w_f + \underset{(0.0559)}{1.826} \; y^f \end{aligned} \tag{1}$$

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Male labor participation:

$$\begin{aligned} w^r_{m,T} &= \kappa_m - \underset{(0.033)}{0.086} \log w_f - \underset{(1.787)}{4.641}\ y \\ w^r_{m,C} &= \kappa_m - \underset{(0.024)}{0.027} \log w_f - \underset{(1.260)}{2.536}\ y \end{aligned} \tag{2}$$

Structural equations

Household sharing function when both work:

$$\begin{aligned} \Psi_T &= \kappa_1 + \underset{(0.416)}{1.001}\ w_m - \underset{(29.222)}{53.746} \log w_f + \underset{(0.021)}{0.996}\ y \\ \Psi_C &= \kappa_1 + \underset{(0.926)}{1.021}\ w_m - \underset{(97.0176)}{94.299} \log w_f + \underset{(0.015)}{1.008}\ y \end{aligned} \tag{3}$$

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Household sharing function when male does not work:

$$\begin{aligned}F(\Psi)_T &= \kappa_0 + \underset{(0.040)}{0.905}\left(\underset{(0.416)}{1.001}\ w_m - \underset{(29.222)}{53.746} \log w_f + \underset{(0.021)}{0.996}\ y\right) \\ F(\Psi)_C &= \kappa_0 + \underset{(0.026)}{0.972}\left(\underset{(0.926)}{1.021}\ w_m - \underset{(97.0176)}{94.299} \log w_f + \underset{(0.015)}{1.008}\ y\right)\end{aligned} \tag{4}$$

Conclusions and next steps

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Next steps

- Robustness check for structural estimation:
  - Endogenize two estimations: inverse Mill's ratio for matching selection.
  - Effect for women with different outside option: more education, older, more personal non-labor income.

Thanks for your attention!

Comments? Questions?

Contact: jalfonso.munoza@tse-fr.eu

Literature Back

Two main literatures:

1. Paternity laws:
   - Ekberg et al. (2013), Reynoso (2018), Goussé and Leturq (2018), Chiappori et al. (2017)

   Empirical analysis of a natural experiment related to children's rights.

2. Collective Household Models:
   - Survey by Chiappori & Mazzoto (2017)

   Empirical evidence on of households' decision-making and formation.

- Application: Fuzzy Differences-in-Differences (de Chaisemartin & D'Haultfœuille,2018)

Data: Households' summary stats Back

Variable	Obs	Mean	Std. Dev.	Min	Max
Marital status					
Single	33,618	0.235		0	1
Cohabited	33,618	0.293		0	1
Married	33,618	0.472		0	1
Nb members in HH	33,618	3.609	1.311	1	6
Children					
None	33,618	0.190		0	1
One	33,618	0.265		0	1
Two	33,618	0.310		0	1
Three or more	33,618	0.234		0	1
Child pre 2002	33,618	0.638		0	1
Child post 2002	33,618	0.359		0	1
Outside CV, rural are	33,618	0.447		0	1
Outside CV, urban are	33,618	0.227		0	1
CV, rural zone	33,618	0.149		0	1
CV, urban zone	33,618	0.177		0	1
Total household income	33,618	285.617	182.070	0	1,098.226

Variable	Obs	Mean	Std. Dev.	Min	Max
Single	33,618	0.112		0	1
Age	29,477	33.099	6.900	19	49
Years schooling	29,477	7.267	3.483	0	19
Diploma					
None	29,477	0.032		0	1
School	29,477	0.567		0	1
High School	29,477	0.306		0	1
College	29,477	0.095		0	1
Employed	29,477	0.705		0	1
Labor hours	20,791	52.832	10.288	4	98

Data: Women's summary stats Back

Variable	Obs	Mean	Std. Dev.	Min	Max
Single	33,618	0.123		0	1
Age	29,860	28.286	5.065	19	40
Years schooling	29,860	7.377	3.324	0	19
Diploma					
None	29,860	0.019		0	1
School	29,860	0.563		0	1
High School	29,860	0.327		0	1
College	29,860	0.090		0	1
Employed	29,860	0.333		0	1
Labor hours	9,936	38.507	17.840	1	97

Fuzzy Difference in Differences Back

$D_{gt} \sim D|G = g, T = t$

1. **Fuzzy setting**:

$$E(D_{11}) > E(D_{10}) \text{ and } E(D_{11}) - E(D_{10}) > E(D_{01}) > E(D_{00})$$

2. **Stable percentage of treated units in the control group**:

$$P(D_{01} = d) = P(D_{00} = d) \in (0, 1)$$

3. **Treatment participation equation**: $D = \mathbf{1}\{V \geq v_{GT}\}$, $V \perp\!\!\!\perp T|G$

1 and 3 $\implies$ switch treatment in one direction: non-treated to treated.

"Treatment group switchers": $S = \{D(0) < D(1), G = 1\}$

Wald TC:

$$W_{TC} = \frac{E(Y_{11}) - E(Y_{10} + \delta_{D_{10}})}{E(D_{11}) - E(D_{10})}$$

where $\delta_d = E(Y_{d01}) - E(Y_{d00})$ accounts for the effect of time on the outcome in the treatment group.

Under assumptions 1-3 and:

4. Conditional common trends: $\forall d \in S(D)$ and all $t \in \{0, ..., \bar{t}\}$,

$$E\{Y(d)|G, T = 1, D(0) = d\} - E\{Y(d)|G, T = 0, D(0) = d\}$$

does not depend on G.

$$\implies W_{TC} = \Delta$$

Fuzzy Difference in Differences: Estimators Back

Wald CIC:

$$W_{CIC} = \frac{E(Y_{11}) - E(Q_{D_{10}}(Y_{10}))}{E(D_{11}) - E(D_{10})}$$

where $Q_{d(y)}(y) = F^{-1}_{Y_{d01}} \circ F_{Y_{d00}}(y)$ is the quantile-quantile transformation of Y.
Under assumptions 1-3 and:

5. Monotonicity and time-invariance of unobservables

6. Data restrictions:

- Outcome has common support in each subgroup.
- Outcome continuous with positive density in each subgroup.

$$\implies W_{CIC} = \Delta$$

Collective matching household model Back

Following Choo & Seitz (2013) two stage model:

1. Household formation decision: single, cohabited or married.
    - Knowledge of wages and assets.
    - Determination of the household's bargaining function.
2. Intrahousehold allocation:
    - Labor decisions: supply for women and participation for men.

I present the model recursively.

Preferences Back

Let:

- $k \in \{s, c, u\}$ be household type: single, cohabitated, married.
- C_i be private consumption for individual $i = m, f$
- h_i labor supply.

The utility of i is

$$U_k^i(1 - h_i, C_i) + \Gamma_{i,k} + \epsilon_{i,k}, \ \ i = m, f; \quad k = s, c, u$$

where $\Gamma_{i,k}$ captures invariant gains of i in household of type k (Choo & Siow, 2006).

Second stage: Intrahousehold allocation Back

Single households: For single individuals, the maximization problem is ordinary:

$$\max_{h_i, C_i} \; U_s^i(1 - h_i, C_i) + \Gamma_{i,s} + \epsilon_{i,s}, \;\; i = m, f \tag{5}$$

s.t.

$$C_i = w_i h_i + y_s$$

where

- w_i is the wage
- y_s is non-labor income when single. It includes monetary child support: received by the mother and paid by the father.

Second stage: Intrahousehold allocation Back

Cohabited households: For cohabited households the maximization problem follows Blundell, Chiappori, Magnac and Meghir (BCMM, 2007):

$$\max_{h_m, C_m, h_f, C_f} \quad U^m(1-h_m, C_m) + \Gamma_{m,k} + \epsilon_{m,k}, \quad k = c, u \tag{6}$$

s.t.

$$U^f_k(1-h_f, C_f) + \Gamma_{f,k} + \epsilon_{f,k} \geq U^f_s(1-h_f, C_f) + \Gamma_{f,s} + \epsilon_{f,s} \;, \quad k = c, u$$
$$U^m_k(1-h_m, C_m) + \Gamma_{m,k} + \epsilon_{m,k} \geq U^m_s(1-h_m, C_m) + \Gamma_{m,s} + \epsilon_{m,s} \;, \quad k = c, u$$
$$C_m + C_f = w_m h_m + w_f h_f + y_k \;, \quad k = c, u$$
$$h_m \in \{0, 1\}, \; 0 \leq h_f \leq 1$$

Second Welfare Theorem: assuming Pareto-efficient outcomes.

$\implies$ decentralized with *sharing functions*:

$$\Psi^m_k(\cdot) \;\&\; \Psi^f_k(\cdot)$$

Decentralized model Back

Solution: depends on the man's labor participation.

- If man participates: the woman solves

$$\max_{h_f, C_f} \; U_k^f(1 - h_f, C_f), \quad k = c, u \tag{7}$$

$$s.t. \begin{cases} C_f = w_f h_f + \Psi_k^f(w_f, w_m, y_k) & \text{(7a)} \\ 0 \leq h_f \leq 1 & \text{(7b)} \end{cases}$$

Her labor supply function is:

$$H^f[w_f, \Psi_f(w_f, w_m, y)] = h^f(w_f, w_m, y)$$

- If man does not participate:

$$H^f[w_f, F(\Psi_f(w_f, w_m, y))] = h^f(w_f, w_m, y)$$

First stage: Household formation Back

For each household type, i obtains an indirect utility function:

$$V_{i,s}(\epsilon_{i,s}) = Q_{i,s}[w_i^*, y_s] + \Gamma_{i,s} + \epsilon_{i,s}$$
$$V_{i,c}(\epsilon_{i,c}) = Q_{i,c}[\Psi_c^i(w_f^*, w_m^*, y_c)] + \Gamma_{i,c} + \epsilon_{i,c}$$
$$V_{i,u}(\epsilon_{i,u}) = Q_{i,u}[\Psi_u^i(w_f^*, w_m^*, y_u)] + \Gamma_{i,u} + \epsilon_{i,u}$$

The optimal choice is:

$$V_i^* = \max[V_{i,s}, V_{i,c}, V_{i,u}]$$

And the probability for each type k is:

$$\pi_{i,k} = \frac{\exp(V_{i,k})}{\sum_{l \in s,c,u} \exp(V_{i,l})}$$

2nd stage: collective household model Back

Identification

Observed:

- Wages: w_f and w_m
- Female labor supply $h^f(w_f, w_m, y)$
- Male participation decision $\gamma^m(w_f, w_m, y) \in \{0, 1\}$
- Non-labor income y

Need to recover:

- Sharing rule $\Psi(w_f, w_m, y)$
- Structural female labor supply $H^f(w_f, \Psi_f(\cdot))$

BCMM (2007) **proposition 2**: Recover $\Psi(\cdot)$ and $H^f(\cdot)$

Proposition 2: With a male participation function $\gamma(w_f, y)$, the following restrictions recover the sharing rule and preferences

Restrictions:

$$-\Psi_{w_m} + A\Psi_y = A - 1$$

$$-\Psi_{w_m} + B\Psi_y = \frac{B}{F'}$$

$$(\Psi_y + \gamma_y \Psi_{w_m}) = \frac{\gamma_y}{1 - F'}$$

$$\Psi_{w_m} = \frac{\gamma_{w_f}}{\gamma_y}\Psi_y$$

$$A(w_f, w_m, y) = \frac{1-\Psi_{w_m}}{1-\Psi_y} = \frac{h^f_{w_m}}{h^f_y}$$

$$B(w_f, w_m, y) = \frac{F'(\Psi_{w_m})}{1-F'(\Psi_y)} = \frac{h^f_{w_m}}{h^f_y}$$

System of PDE: $\Psi_{w_f}, \Psi_{w_m}, \Psi_y, F' \implies$ recover $\Psi(\cdot)$ and $H^f(\cdot)$

Estimation model Back

Two estimations:

1. Man's participation equation: probit.
2. Woman's labor supply: truncated regression, separately for those whose men works or not.

Two problems:

1. Unobserved wages for non-working spouses
   $\longrightarrow$ imputation with exogenous variables.
2. No data for Responsible Paternity Law.
   - 2 groups: households with child born after 2002 vs no child born after 2002.
   - Estimate the model in each group and compare the structural parameters.

Estimation model Back

3 equations:

- Female labor hours if male participates

$$h_{i,t}^{f} = A_{0,t}^{f} + A_m w_{i,t}^{m} + A_f \ln w_{i,t}^{f} + A_y y_{i,t} + \mathbf{A} \cdot \mathbf{X}' + u_{1,i,t}$$

- Female labor hours if male does not participate

$$h_{i,t}^{f} = a_{0,t}^{f} + a_m w_{i,t}^{m} + a_f \ln w_{i,t}^{f} + a_y y_{i,t} + \mathbf{a} \cdot \mathbf{X}' + u_{0,i,t}$$

- Male labor participation

$$p_{i,t}^{m} = b_{p,t}^{m} + b_m^{m} w_{i,t}^{m} + b_f^{m} \ln w_{i,t}^{f} + b_y^{m} y_{i,t} + \mathbf{b} \cdot \mathbf{X}' + u_{p,i,t}^{m}$$

Restricted estimation results Back

	Female weekly hours				Male Participation	
	Male works		Male out of work			
	T	**C**	**T**	**C**	**T**	**C**
Imputed Wage man	-0.002	-0.039	-1.292	-1.917	0.008	0.007
	(0.491)	(1.690)	(3.885)	(11.594)	(0.0002)	(0.0002)
Imputed Wage woman	0.369	0.376	-5.621	-4.385	0.019	0.031
	(3.240)	(4.895)	(18.006)	(29.383)	(0.012)	(0.009)
Non labor income	0.004	-0.014	-0.107	-0.065	0.0002	0.001
	(0.024)	(0.027)	(0.340)	(0.330)	(0.0002)	(0.0002)
Year Effect	Yes		Yes		Yes	
Control variables	Yes		Yes		Yes	
N	6,712	7,693	2,736	3,058	9,448	10,751

The S.E. have been computed using the bootstrap with 1000 repetitions and allowing for the fact that male and female wages as well as other income are predicted.