Are Cash Transfers Effective at Empowering Mothers?

A Structural Evaluation of Mexico's *Oportunidades*

Andrea María Flores
FGV EPGE

Overview

1. Research Question and Motivation
2. Model
3. Data and Reduced-Form Policy Evidence
4. Identification and Estimation
5. Results
6. Counterfactual Exercises
7. Concluding Remarks

Gender-Targeted Policies and Women's Empowerment

- Numerous policies aimed at promoting economic development target their benefits to household members that are deemed as disadvantaged.
  - → Typically women: nexus between women's empowerment and investments in children (Duflo (2003, 2012)).

Mexico's *Progresa/Oportunidades*: expanded to urban areas in 2002

- Bimonthly cash transfers
- Gender-based targeting strategy
- Conditionalities in the form of children's school attendance

Gender-Targeted Policies and Women's Empowerment

- Numerous policies aimed at promoting economic development target their benefits to household members that are deemed as disadvantaged.
  - → Typically women: nexus between women's empowerment and investments in children (Duflo (2003, 2012)).
- To what extent are these gender-targeted policies effective at promoting women's empowerment?
  - Remains an open question – challenges measuring empowerment

Mexico's *Progresa/Oportunidades*: expanded to urban areas in 2002

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Relevant Literature

- Gender-targeted policies, women's bargaining power and household behavior. (Attanasio and Lechene (2002, 2010), Tommassi (2019), Calvi (2020), Armand et al (2020), Sokullu and Valente (2021))
- Empirical application of a collective labor supply model with home production. (Cherchye, De Rock and Vermeulen (2012), Lise and Yamada (2019), Gayle and Shephard (2019))
- Structural approach for ex-ante policy evaluation of development policies (Todd and Wolpin (2006), Attanasio, Meghir and Santiago (2012))

Model Setup

Consider a household with two parents and $n > 0$ kids,

- Egotistic parental preferences
- Household outcomes are Pareto efficient (Bobonis (2009), Attanasio and Lechene (2014))

$$\max_{\mathbf{t}^A, \mathbf{t}^B, q^D} \lambda(w^A, w^B, y, \mathbf{z}) U^A(l^A, q^A, Q; \mathbf{X}^A) + (1 - \lambda(w^A, w^B, y, \mathbf{z})) U^B(l^B, q^B, Q; \mathbf{X}^B)$$

$$\text{s.t.} \quad q^A + q^B + q^D + p^C h_D^C = y^A + y^B + w^C h_M^C + w^A h_M^A + w^B h_M^B; \quad y^A = z^A y; \quad z^A \in \mathbf{z}$$

$$Q = F_Q^M(h_D^A, h_D^B, h_D^C, q^D; \mathbf{S})$$

$$l^i + h_M^i + h_D^i = \bar{T} \quad \text{for } (i = A, B)$$

$$h_M^C + h_D^C + h_S^C = \bar{T}_C; \quad p^C = w^C + (d_i \times Post_t) \times edu\_transfer_{it}$$

- Decision-making power is a function of distribution factors $\mathbf{z}$:

  $\rightarrow$ Generating movements along the Pareto frontier but not affecting preferences (including mothers' share of non-labor income)

Individual Welfare in a Collective Framework: MMWI

The money metric welfare index (MMWI) can be defined as the solution to

$$MMWI^i = \min_{h_D^i, l^i, q^i, q^D} w^i l^i + q^i + w^i h_D^i + q^D + p^C h_D^C$$

s.t.

$$\begin{aligned} U^i(l^i, q^i, Q; \mathbf{X}^i) &\geq U^i(l^{i*}, q^{i*}, Q^*; \mathbf{X}^i) \\ Q^* &= F_Q(h_D^{A*}, h_D^{B*}, h_D^{C*}, q^{D*}; \mathbf{S}) \\ Q &= F_Q^s(h_D^i, q^D; \mathbf{S}) \end{aligned}$$

where (l^{i*}, q^{i*}, Q^*) denotes the optimal choices made within a two-parent household.

$\therefore$ Constituting a compensating variation capturing the price change from sharing the per unit cost of producing Q in collectivity to facing the full per unit cost of production in singlehood.

Evaluation Data

Oportunidades' Urban Evaluation Survey (ENCELURB)

- Baseline wave collected in 2002 with two followup waves in 2003 and 2004
- Detailed consumption and individual time use information

Focus on two sub-samples of eligible (i.e. poor) households:

- Single-parent households in which the parent is working
- Two-parent households in which both spouses are working in the market

Oportunidades' Administrative Disbursements Records

- Information on the bimonthly payments made to beneficiary households since the start of the program
- Can distinguish between education-related grants and non-education transfers

Evaluation Methodology

Exploiting the longitudinal nature of the ENCELURB data set, implement a matching difference-in-differences estimator for longitudinal data:

$$\hat{\alpha}^{MDID} = \frac{1}{N_1} \sum_{i \in T} \left\{ [y_{i,t_1} - y_{i,t_0}] - \sum_{j \in C} \tilde{\omega}_{ij} [y_{j,t_1} - y_{j,t_0}] \right\}$$

Where we construct $\tilde{\omega}_{ij}$ using a kernel-based matching algorithm.

- A function of the propensity to participate in the program
- Construct a counterfactual for every household in the treatment group using data from observably similar households in the control group.

Impact of *Oportunidades* on Time and Consumption

Two-Parent Households

	Leisure		Home Production		Market Work		
	Mother	Father	Mother	Father	Mother	Father	Public Exp.
MDID	239.46*	-248.55	-419.03***	-70.57	179.57**	319.12	1967.24**
	(136.88)	(210.36)	(141.10)	(62.89)	(78.87)	(223.13)	(782.04)
Mean	2,321.40	3,196.48	2,452.89	360.61	1,049.70	2,266.90	6,610.25
N	478	478	478	478	478	478	478

[1] Monetary values reported in 2002 MXN pesos. 1USD = 10.43 MXN. [2] Annualized measures.

[2] Bootstrapped standard errors (100 repetitions).

- Significant increase of almost 10% in mothers' leisure hours
  - Through a strong reduction in home production hours
- Significant increase in public expenditures of almost 30% – mostly consisting of child-related expenses

Non-Working Mothers

Impact of *Oportunidades* on Time and Consumption

Single-Mother Households

	Leisure, A	H. Prod., A	M. Work, A	Public Exp.
MDID	-153.89	-303.26**	454.04***	-1837.54***
	(174.65)	(136.46)	(122.95)	(710.98)
Mean	2,446.98	1,946.62	1,430.40	4,599.45
N	632	632	632	632

[1] Monetary values reported in 2002 MXN pesos. 1USD = 10.43 MXN.
[2] Annualized measures. [3] Bootstrapped standard errors (100 reps.).

- No statistically significant impact on leisure hours
  - Increase in market work hours offsets the fall in home production hours

Identification – Part I

Proposition 1: Identification of Production Technology [Two-Parent HHs]

Let $(h_D^A, h_D^B, h_D^C, q^D)$ *be observed functions of* $(w^A, w^B, y, \mathbf{S}, \mathbf{z})$ *for two-parent households. The production function for two-parent households,* $F_Q^M(h_D^A, h_D^B, q^D, \mathbf{s})$ *is identified up to a strictly monotone (thus, invertible) transformation* G_M *so that* $F_Q^M(h_D^A, h_D^B, q^D, \mathbf{s}) = G_M^{-1}[\bar{F}_Q^M(h_D^A, h_D^B, q^D; \mathbf{s})]$.

- Proof follows from the results presented in Blundell, Chiappori, and Meghir (2005)
- *Intuition:* Observing all inputs of production and their relative prices allows us to obtain information about the marginal rate of technical substitution across inputs
- Integrating the MRTS allows us to pin down F_Q^M up to an invertible transformation (which we can derive when working parametrically)

Identification – Part I

Proposition 2: Identification of Production Technology [Single-Parent HHs]

Let (h_D^i, h_D^C, q^D) *be observed functions of* $(w^i, y^i, \mathbf{S})$ *for single parents* $i = (A, B)$ *with sufficient variation induced by at least one production shifter,* $s_j \in \mathbf{S}$*, in their marginal productivity. Then, the production function for single-parent households,* $F_Q^{S,i}(h_D^i, q^D, \mathbf{s})$ *is identified up to a strictly monotone (thus, invertible) transformation* G_S *so that* $F_Q^{S,i}(h_D^i, q^D, \mathbf{s}) = G_S^{-1}[\bar{F}_Q^{S,i}(h_D^i, q^D; \mathbf{s})]$.

- Proof and intuition follows from the result presented in Proposition 1.

Identification – Part II

Proposition 3: Identification of Parental Preferences and the Household's Bargaining Structure

Let l^i be an observed function of $(w^i, y^i, \mathbf{S})$ for $i = (A, B)$ for single-parent households and let (l^A, l^B) be observed functions of $(w^A, w^B, y, \mathbf{S}, \mathbf{z})$ for two-parent households. The Pareto weight and parental preferences are identifieds, if (1) the Pareto weight is responsive to changes in the distribution factor z^A, (2) married mothers' time allocation is responsive to exogenous changes in a distribution such as z^A, ultimately translating into changes in the intra-household allocation of leisure, and (3) parental productivity is responsive to changes in p^C.

- Proof relies on the three conditions outlined to derive and prove the invertibility of a system of equations involving the marginal rate of substitution of the different types of consumption

Identification – Novelty and Intuition of Proposition 3

Three main conditions exploit the responsiveness of the intrahousehold allocation of leisure to exogenous variation in distribution factors:

1. The allocation of leisure between spouses is governed by their bargaining power, preferences for leisure and their relative labor market returns
2. How changes in the wife's share of non-labor income (directly affected by the receipt of the *Oportunidades* cash transfer through the non-educational component of the program's disbursements) ultimately affects the intrahousehold allocation of leisure through its effect on the Pareto weight [bargaining/empowerment effect]
3. How changes in the cost/price of keeping school-aged kids at home p^C (also affected by participation in *Oportunidades* by including information on the educational grants) affects the intrahousehold time allocation through its effect on the household's domestic productivity, which shifts the MRS of private (leisure) and public consumption [substitution effect]

Model Parametrization

Preferences:

$$U^i(l^i, q^i, Q; \mathbf{X}^i) = \alpha_1^i(\mathbf{X}^i)\ln(l^i) + \alpha_2^i(\mathbf{X}^i)\ln(q^i) + (1 - \alpha_1^i(\mathbf{X}^i) - \alpha_2^i(\mathbf{X}^i))\ln(Q)$$

Home Production Technology:

The production technology in two-parent households is defined as

$$F_Q^M(h_D^A, h_D^B, h_D^C, q^D; \mathbf{S}) = [\psi^A(\mathbf{S})(h_D^A)^\gamma + \psi^B(\mathbf{S})(h_D^B)^\gamma + (1 - \psi^A(\mathbf{S}) - \psi^B(\mathbf{S}))(h_D^C)^\gamma]^{\frac{\rho_M}{\gamma}}(q^D)^{1-\rho_M}$$

The production technology in single-parent households is defined as

$$F_Q^S(h_D^i, , h_D^C, q^D; \mathbf{S}) = [\phi^i(\mathbf{S})(h_D^i)^{\beta^i} + (1 - \phi^i(\mathbf{S}))(h_D^C)^{\beta^i}]^{\frac{\rho_S^i}{\beta^i}}(q^D)^{1-\rho_S^i} \quad \text{for } i = (A, B)$$

Pareto weight:

$$\lambda(w^A, w^B, y, \mathbf{z}) = \frac{\exp(\lambda_0 + \lambda_1(w^A/w^B) + \lambda_2 z_0^A + \lambda_3 z_1^A + \lambda_4 z_s)}{1 + \exp(\lambda_0 + \lambda_1(w^A/w^B) + \lambda_2 z_0^A + \lambda_3 z_1^A + \lambda_4 z_s)}$$

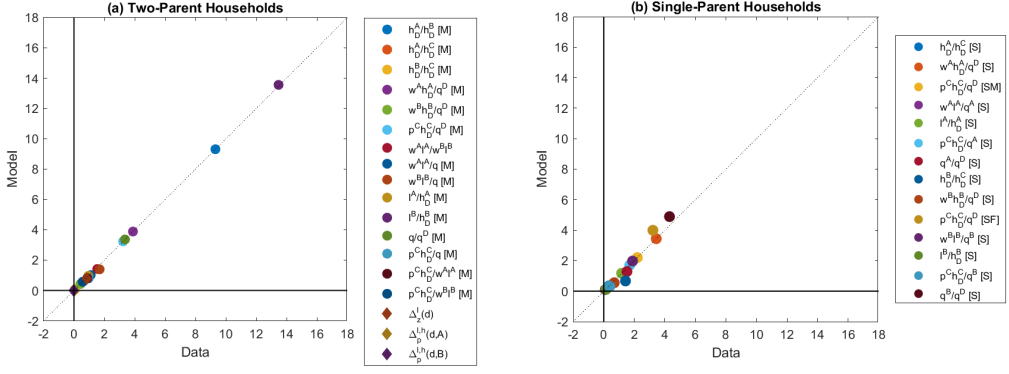
Estimation Approach

1. Treatment effects model: estimate the heterogeneous impact of the program on parents' home time and leisure ratios by z^A and p^C.

2. Sequential GMM estimator:
   - **Step 2A:** Estimate home production parameters using the FOCs for productive efficiency.
     $\rightarrow$ Yields $\hat{\boldsymbol{\theta}}_1 = [\boldsymbol{\theta}_1^M; \boldsymbol{\theta}_1^{S,A}; \boldsymbol{\theta}_1^{S,B}] = (\hat{\rho}, \hat{\gamma}, \hat{\boldsymbol{\psi}}, \hat{\beta}^A, \hat{\boldsymbol{\phi}}^A, \hat{\beta}^B, \hat{\boldsymbol{\phi}}^B)$
   - **Step 2B:** Using the estimates obtained in Step 2A, estimate preference and Pareto weight parameters using the remaining FOCs and **additional restrictions** generated by the program.
     $\rightarrow$ Yields $\widehat{\boldsymbol{\theta}}_2 = (\widehat{\boldsymbol{\lambda}}, \widehat{\boldsymbol{\alpha}}_1^A, \widehat{\boldsymbol{\alpha}}_2^A, \widehat{\boldsymbol{\alpha}}_1^B, \widehat{\boldsymbol{\alpha}}_2^B)$

Structural Estimation: Model Fit

Figure: Model Fit of Estimation with Quasi-Experimental Moments



Structural Estimation Results: Pareto Weight

	Estimate
Pareto Weight Parameters:	
λ_0 [Constant]	1.208
λ_1 $[w^A/w^B]$	0.749
λ_2 $[z_0^A]$	0.693
λ_3 $[z_1^A]$	0.838
λ_4 [Sex ratio]	-2.336
Sample mean $\lambda(\mathbf{z})$	0.541

- Both relative market returns (w^A/w^B) and women's contribution to total household income (z^A) significantly $\uparrow$ mothers' bargaining power.

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- Both relative market returns (w^A/w^B) and women's contribution to total household income (z^A) significantly $\uparrow$ mothers' bargaining power.
- The sex ratio – defined as the number of women per men for different age groups at the state level – $\downarrow$ women's bargaining power.

Structural Estimation Results: Parental Preferences

- For mothers, on average:
  1. Single mothers' utility weight for leisure is 0.291 and for private market consumption is 0.257
  2. Married mothers' utility weight for leisure is 0.266 and for private market consumption is 0.145

- For fathers, on average:
  1. Single fathers' utility weight for leisure is 0.429 and for private market consumption is 0.379
  2. Married fathers' utility weight for leisure is 0.459 and for private market consumption is 0.375

Preference Parameters: Mothers

Preference Parameters: Fathers

Program Evaluation: Bargaining Power

Implement the MDID estimator to quantify the impact of the program on intrahousehold inequality using the estimates from the preferred specification:

		Conditional Sharing Rule		**MMWI**		
	Pareto Weight	Mother	Father	Mother	Father	Domestic Output
MDID	13.017***	27.699***	-11.674*	1.042***	0.535*	14.391*
	(1.853)	(6.048)	(6.202)	(0.353)	(0.253)	(7.983)

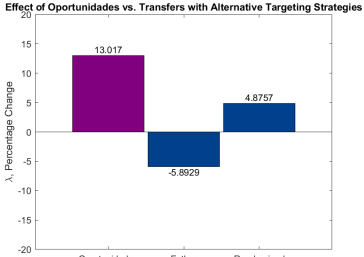
Notes: [1] Percentage changes are reported. [2] $N = 415$.

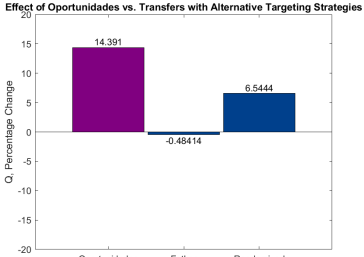
- $\uparrow$ in mothers' Pareto weight
- $\uparrow$ in mothers' individual welfare measure [unadjusted for WTP for public good]
- $\downarrow$ in fathers' individual welfare [unadjusted for WTP for public good], but $\uparrow$ on fathers' welfare when adjusting for the WTP for public consumption
- $\uparrow$ in the production of the public good Q

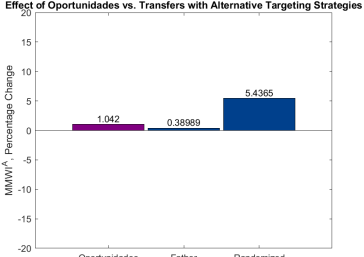
The Impact of Counterfactual Policies

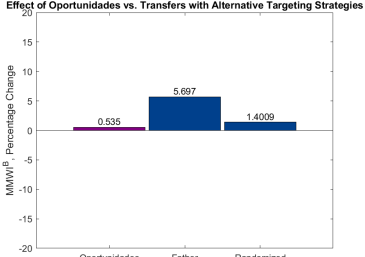
- Take the impact documented for the *Oportunidades* program as a benchmark.
- Use the model to investigate whether gender-targeted policies exacerbate or mitigate existing patterns of (unobserved) gender inequality within the household
- To exploit the experimental setup of the program and its evaluation data, take the households observed at baseline (i.e. in 2002) and while keeping everything else fixed at 2002 values,
  - **Alternative targeting designs:** Assign the *Oportunidades* cash transfer to (i) the father (reducing z^A in all beneficiary households), (ii) randomly to mothers and fathers (z^A randomly moving in opposite directions in beneficiary households) .
  - **Change spouses' wages instead of non-labor income:** Let τ denote a wage subsidy targeted to the mother (father) such that $w^A = (1+\tau)w^A_{old} \quad (w^B = (1+\tau)w^B_{old})$.

Policy Experiment: Alternative Cash Transfer Designs

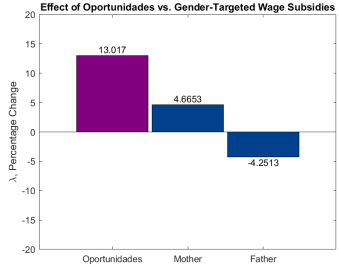


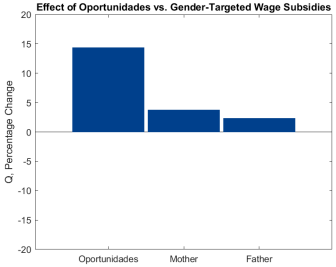


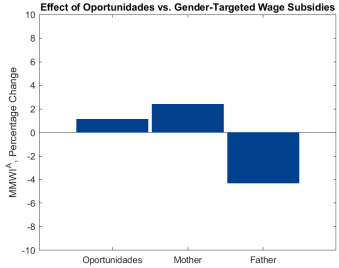


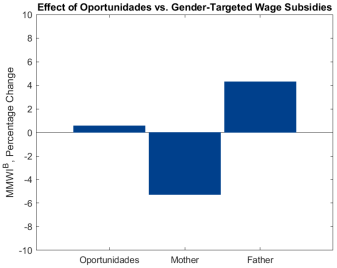


Policy Experiment: Wage Subsidies of 15%

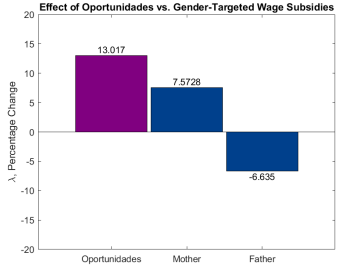


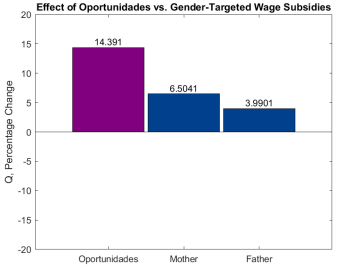


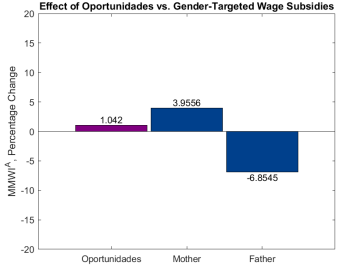


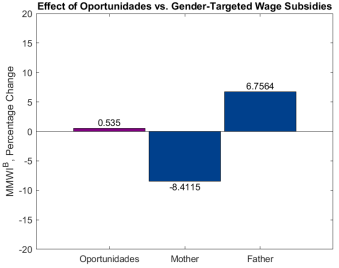


Policy Experiment: Wage Subsidies of 25%

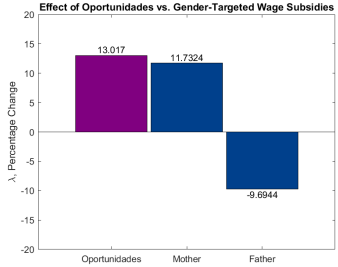


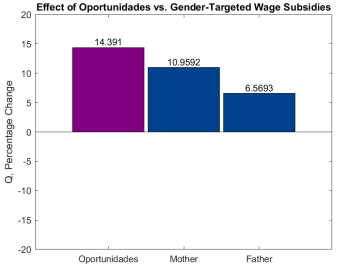


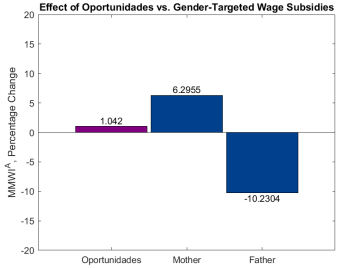


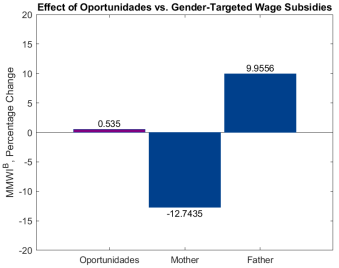


Policy Experiment: Wage Subsidies of 40% [Comparable to EITC]









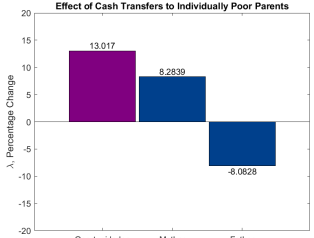
Policy Experiment: Revisiting the Targeting Strategy of Oportunidades

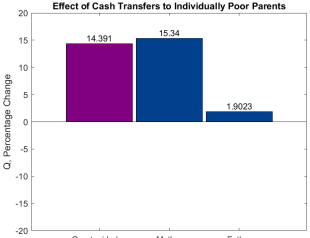
Motivating question: Did the original targeting strategy exclude potential beneficiaries by assessing eligibility at the household level?

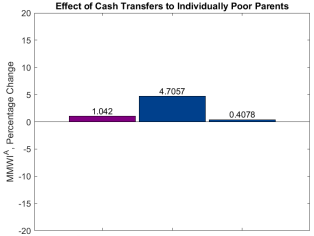
- Include non-poor households in the estimation sample
- Use the estimates to compute MMWI for each parent
- Using the MMWI, are there *individually* poor mothers in non-poor households?

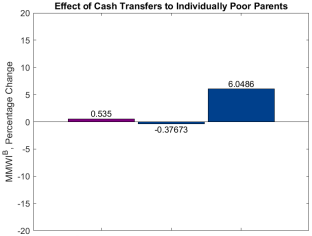
	Ind. Pov. Rate
All	28.16%
Mothers	**53.72%**
Only Mothers	53.07%
Fathers	2.59%
Only Fathers	1.94%
Both	0.65%
Intra. Pov. Ineq.	96.47%

Policy Experiment: Targeting Individually Poor Parents in Non-Poor Households









Concluding Remarks

- Offer an **alternative approach** to recovering the primitives of the model when the intrahousehold allocation of time and consumption is **partially** observed.
  - → Exploiting the exogenous variation of a policy experiment on parental time allocation.
- Participation in *Oportunidades* significantly increased mothers' bargaining power in two-parent households by **13%**, translating into
  - → a **1.04%** increase in her individual welfare. [USD 159]
  - → a **14%** increase in the production of the public good Q.
    - By empowering the parent with the higher preference for the public good
    - Effective substitution of parental time for monetary investments
- *Oportunidades* is as **effective** as wage subsidies and alternative cash transfer designs at empowering mothers.
- The program's targeting strategy can be improved by determining program eligibility on the basis of **individual-level** poverty scores.
  - → Similar effects can be expected when targeting individually poor mothers in non-poor households [left untargeted by the program as it computed poverty rates at the household level, ignoring the unequal sharing of resources within the household]

Thank you!

Structural Estimation Results: Mothers' Preferences

	Estimate
Wife's Preferences for Leisure Parameters:	
$\alpha^A_{1,1}$ [Constant]	-0.960
$\alpha^A_{1,2}$ [Age]	0.000
$\alpha^A_{1,3}$ [Education]	-0.029
$\alpha^A_{1,4}$ [Number of Children]	-0.828
Sample mean $\alpha^A_1(\mathbf{X})$ (Married)	0.266
Sample mean $\alpha^A_1(\mathbf{X})$ (Single)	0.291
Wife's Preferences for Private Market Consumption Parameters:	
$\alpha^A_{2,1}$ [Constant]	-22.590
$\alpha^A_{2,2}$ [Age]	0.667
$\alpha^A_{2,3}$ [Education]	-0.404
$\alpha^A_{2,4}$ [Number of Children]	0.120
Sample mean $\alpha^A_2(\mathbf{X})$ (Married)	0.145
Sample mean $\alpha^A_2(\mathbf{X})$ (Single)	0.257

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Structural Estimation Results: Fathers' Preferences

	Estimate
Husband's Preferences for Leisure Parameters:	
$\alpha^B_{1,1}$ [Constant]	-5.062
$\alpha^B_{1,2}$ [Age]	0.019
$\alpha^B_{1,3}$ [Education]	1.776
$\alpha^B_{1,4}$ [Number of Children]	-1.033
Sample mean $\alpha^B_1(\mathbf{X})$ (Married)	0.459
Sample mean $\alpha^B_1(\mathbf{X})$ (Single)	0.429
Husband's Preferences for Private Market Consumption Parameters:	
$\alpha^B_{2,1}$ [Constant]	2.036
$\alpha^B_{2,2}$ [Age]	0.001
$\alpha^B_{2,3}$ [Education]	-0.044
$\alpha^B_{2,4}$ [Number of Children]	-0.552
Sample mean $\alpha^B_2(\mathbf{X})$ (Married)	0.375
Sample mean $\alpha^B_2(\mathbf{X})$ (Single)	0.379

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Impact of *Oportunidades* on Time Allocation and Consumption: Non-Working Mothers

	Leisure, Mother	Home Prod., Mother	Leisure, Father	Home Prod., Father	Market Work, Father	Public Exp.
MDID	241.275**	-241.275**	-131.267	9.637	119.655	648.493***
	(119.868)	(119.868)	(115.502)	(28.186)	(113.741)	(118.961)
Mean	3,149.81	2,674.19	3,324.76	174.15	2,325.09	4,729.65
N	1187	1187	1188	1188	1188	1188

[1] Monetary values reported in 2002 MXN pesos. 1USD = 10.43 MXN pesos. [2] All measures are annualized.
[3] Bootstrapped standard errors (100 repetitions).

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