Household Decision Making with Violence

Implications for Transfer Programs

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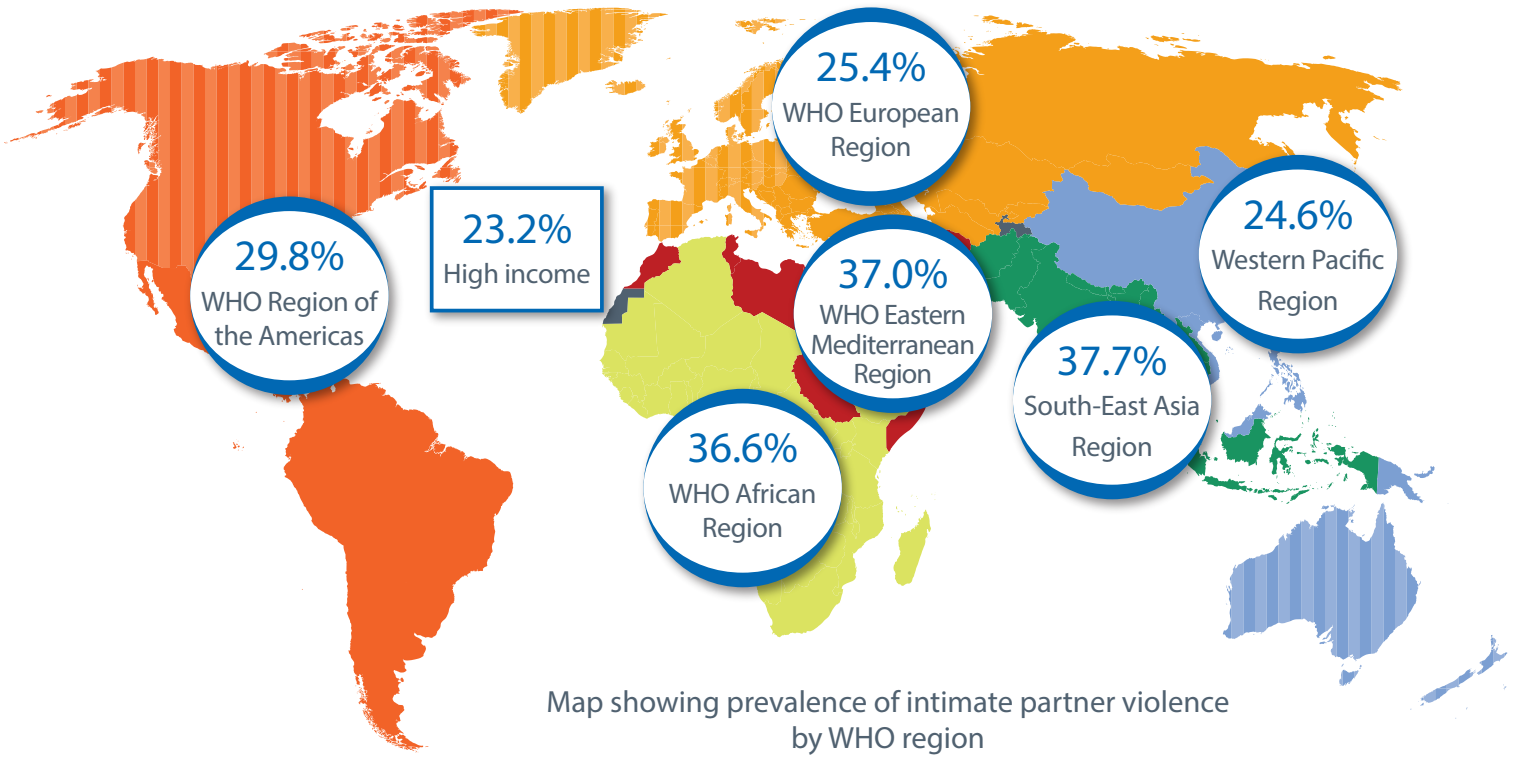
Prevalence of Intimate Partner Violence



Map showing prevalence of intimate partner violence by WHO region

1 out of every 3 women has been physically or sexually abused by an intimate partner.

Transfers to Women and Violence

- Governments of developing countries have social assistance programs that give transfers to women.
- The implicit assumption is that transfers allow women to achieve better outcomes for themselves and for their children.
- Transfers to women can **reduce violence** by
  - making women less economically dependent on their partners;
  - alleviating poverty stress.

  But can also **increase violence** by
  - threatening men's dominant position;
  - increasing the resources men can appropriate through violence.

Research Questions

- How does **intimate partner violence** respond to transfers to women?
- Does such response vary when the transfer is **in-kind** or **in-cash**?
- How to deliver transfers to women to **minimize violence**?

This paper

1. Propose a model of household decision making in which
   - the husband can use violence to solve spousal disagreement;
   - violence reduces female labor productivity.

2. Estimate the model using data from ***Food, Cash, or Voucher***, a randomized controlled trial giving in-kind or cash transfers to poor households in Ecuador.

3. Make out-of-sample predictions and simulate a policy giving in-kind or cash transfers to women in poor households, at the national level.

Main Findings

1. In-kind transfers have an additional margin in the reduction of violence, relative to cash transfers.
2. Delivering the transfers in-kind is cost-effective.
3. Introducing in-kind transfers at the national level can reduce violence.

Contributions

Theoretical Contribution

- Depending on the level of disagreement, any transfer is potentially extra-marginal.
- In-kind and cash transfers have different effects on violence.

Empirical Contribution

- Complement the results of a reduced-form impact evaluation.
- Make out-of-sample predictions relevant at the national level.
- Provide a market value for the cost of violence in an easily interpretable scale that can be used for cost-benefit analysis.

Related Literature

- Collective model of the household with endogenous weights:

  Chiappori (1988); Basu (2006); Iyigun & Walsh (2007); Attanasio & Lechene (2014).

- Household decision making with instrumental violence:

  Tauchen, Witte & Long (1991); Bloch & Rao (2002); Bowlus & Seitz (2006); Eswaran & Malhotra (2011); Anderberg & Rainer (2013).

- In-kind vs cash transfers:

  Cunha (2014); Cunha, De Giorgi & Jayachandran (2015).

- Effect of cash transfers on violence:

  Angelucci (2008); Bobonis, Gonzalez-Brenes & Castro (2013); Hidrobo & Fernald (2013); Hidrobo, Peterman & Heise (2016).

Model of the Household

Problem of the Household

$$\max_{q,l_f,d,v} \quad \mu(v,\widetilde{\omega}_f)u^f(Q,q) + (1-\mu(v,\widetilde{\omega}_f))\,u^m(Q,q)$$

$$st. \quad Q = F\left(d+\tau_k, \Gamma(v)(1-l_f)\right)$$

$$q + d = \Gamma(v) l_f w_f + w_m + \tau_c$$

Problem of the Household

$$\max_{q,l_f,d,v} \quad \mu(v,\widetilde{\omega}_f)u^f(Q,q) + (1-\mu(v,\widetilde{\omega}_f))\,u^m(Q,q)$$

$$st. \quad Q = F\left(d+\tau_k, \Gamma(v)(1-l_f)\right)$$
$$q + d = \Gamma(v) l_f w_f + w_m + \tau_c$$

- Q is a home produced public good,
- q is a market acquired public good,
- d is a market input of home production,
- f has a relative preference for Q,

Problem of the Household

$$\max_{q,l_f,d,v} \quad \mu(v,\widetilde{\omega}_f)u^f(Q,q) + (1-\mu(v,\widetilde{\omega}_f))\,u^m(Q,q)$$

$$st. \quad Q = F\left(d+\tau_k, \Gamma(v)(1-l_f)\right)$$
$$q + d = \Gamma(v) l_f w_f + w_m + \tau_c$$

- τ_k is a **non-marketable** in-kind transfer,
- τ_c is a cash transfer,

Problem of the Household

$$\max_{q,l_f,d,v} \quad \mu(v,\widetilde{\omega}_f)u^f(Q,q) + (1-\mu(v,\widetilde{\omega}_f))\,u^m(Q,q)$$

$$st. \quad Q = F(d+\tau_k, \Gamma(v)(1-l_f))$$
$$q + d = \Gamma(v) l_f w_f + w_m + \tau_c$$

- v is violence,
- $\widetilde{\omega}_f = \frac{w_f+\tau_k+\tau_c}{w_m}$ is the potential female income outside the marriage,
- $\mu(v,\widetilde{\omega}_f)$ is increasing in $\widetilde{\omega}_f$ and decreasing in v,
- $\Gamma(v)$ is decreasing in v.

The goal is to recover $\Gamma(v)$ and $\mu(v,\widetilde{\omega}_f)$.

Optimality Conditions

Technology of Home Production

For any input $z \in \{d, 1 - l_f\}$,

$$\frac{\frac{\partial Q}{\partial z}}{\frac{\partial q}{\partial z}} = \frac{\mu(v, \widetilde{\omega}_f)\frac{\partial u^f}{\partial q} + (1 - \mu(v, \widetilde{\omega}_f))\frac{\partial u^m}{\partial q}}{\mu(v, \widetilde{\omega}_f)\frac{\partial u^f}{\partial Q} + (1 - \mu(v, \widetilde{\omega}_f))\frac{\partial u^m}{\partial Q}}$$

Ratio between the marginal productivity and the marginal cost of the input z = Ratio between the household marginal willingness to pay for home good and the market good

Optimality Conditions

Technology of Home Production

Under the separability assumption,

$$\frac{\frac{\partial Q}{\partial (1-l_f)}}{\frac{\partial Q}{\partial d}} = \frac{\frac{\partial q}{\partial (1-l_f)}}{\frac{\partial q}{\partial d}}$$

Relative marginal productivity of female labor and the market input = Relative marginal cost of female labor and the market input

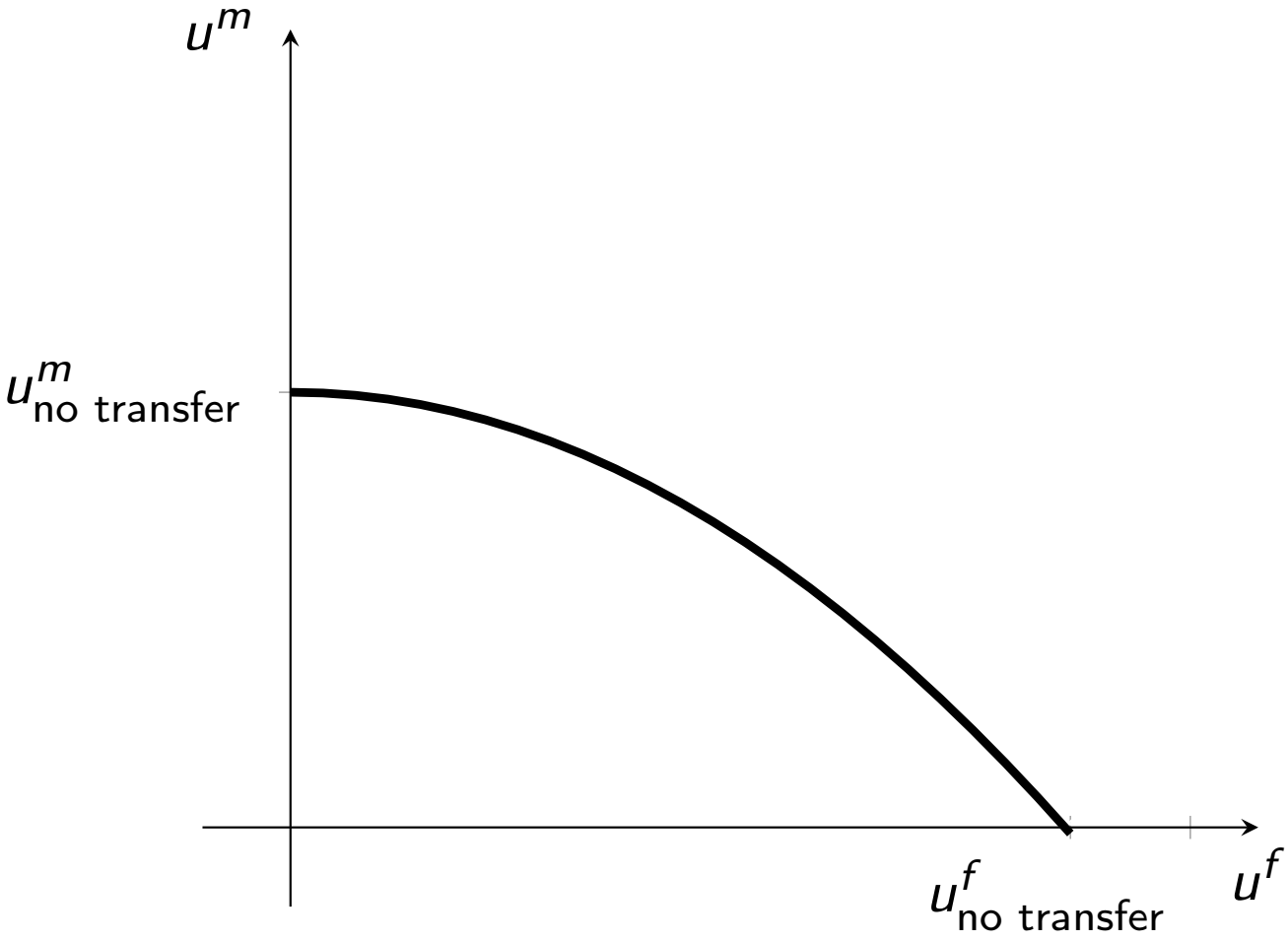
Optimality Conditions

Violence

$$\frac{\partial \mu(v, \widetilde{\omega}_f)}{\partial v} \Delta u_f^m = \left[\mu(v, \widetilde{\omega}_f) \frac{\partial u^f}{\partial Q} + (1 - \mu(v, \widetilde{\omega}_f)) \frac{\partial u^m}{\partial Q} \right] \frac{\partial Q}{\partial v}$$
$$+ \left[\mu(v, \widetilde{\omega}_f) \frac{\partial u^f}{\partial q} + (1 - \mu(v, \widetilde{\omega}_f)) \frac{\partial u^m}{\partial q} \right] \frac{\partial q}{\partial v}$$

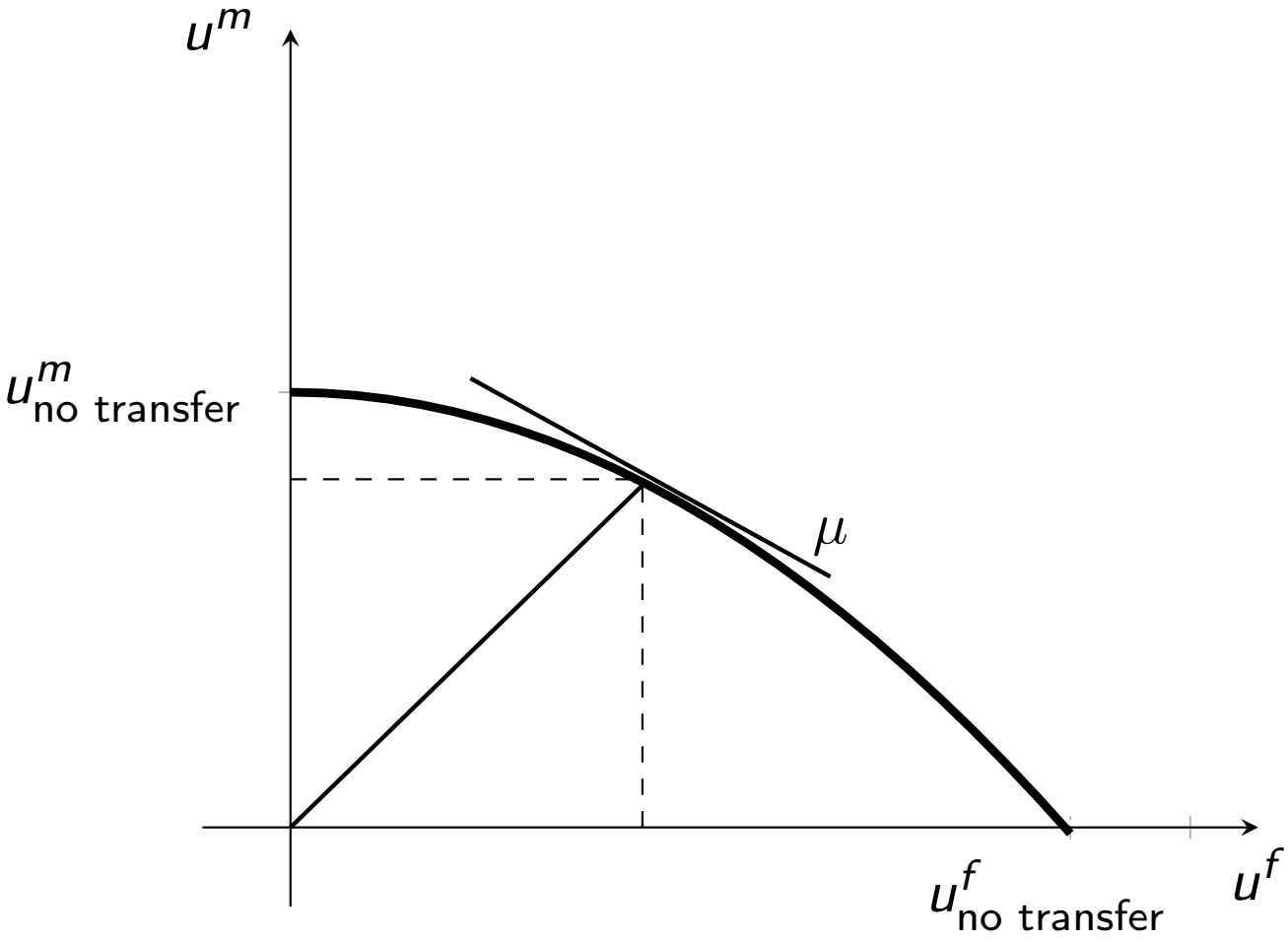
Marginal benefit of violence $=$ Marginal cost of violence

Bargaining



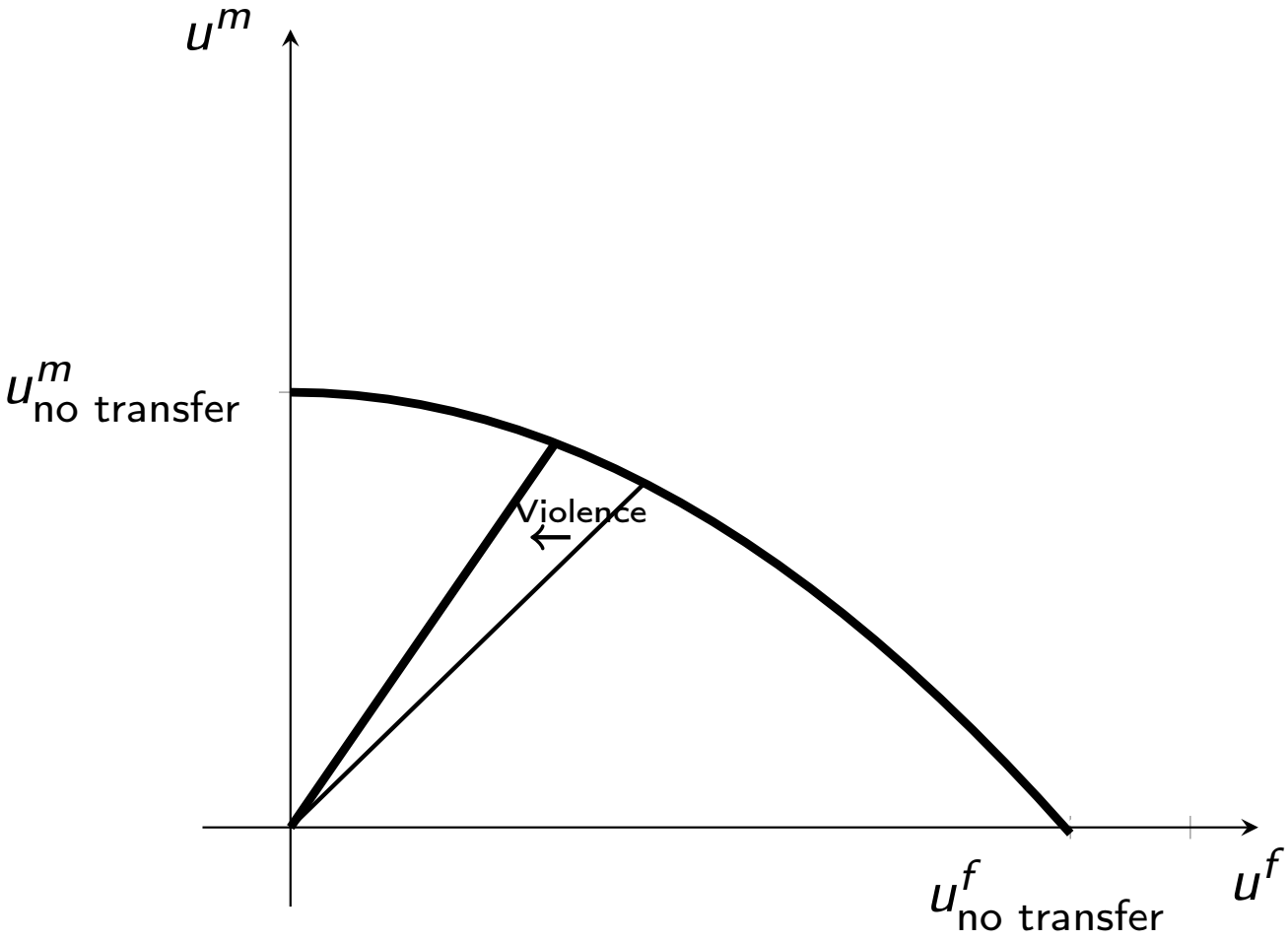
The weighted sum of the utilities is a short-cut for a bargaining problem.

Bargaining



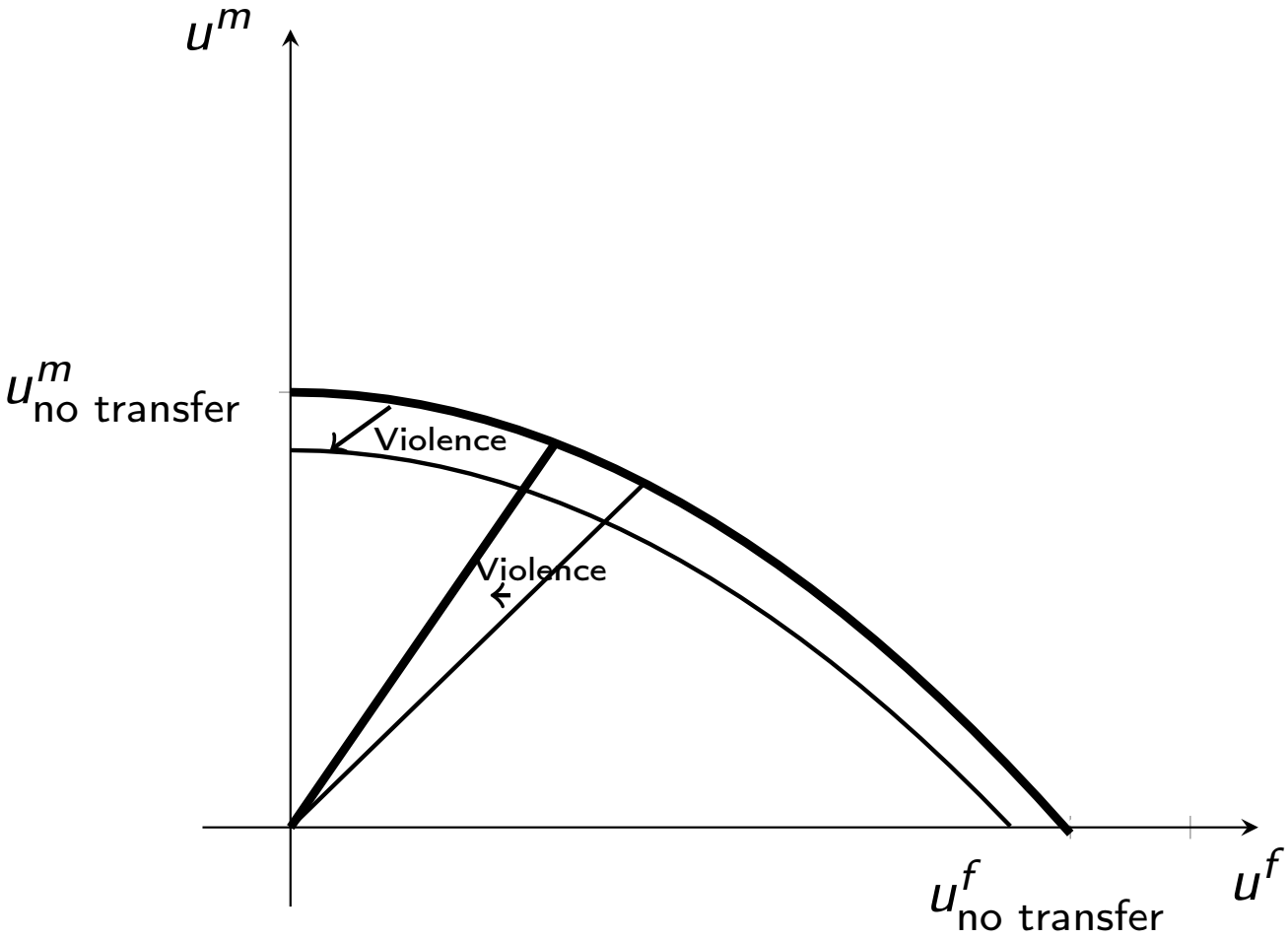
In the absence of violence, the allocation is Pareto-efficient.

Bargaining



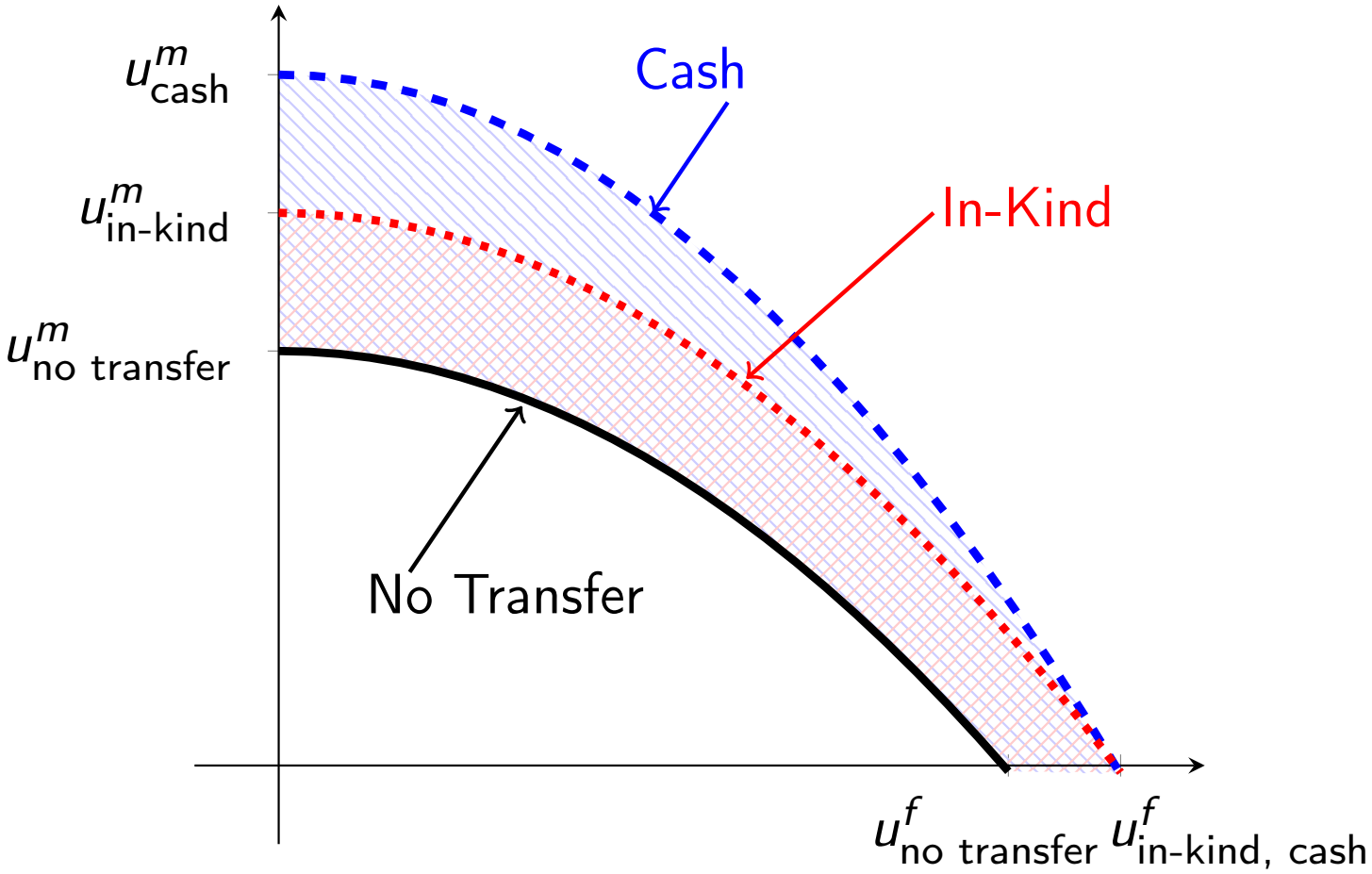
Yet the male can use violence to increase his say in the household decisions.

Bargaining



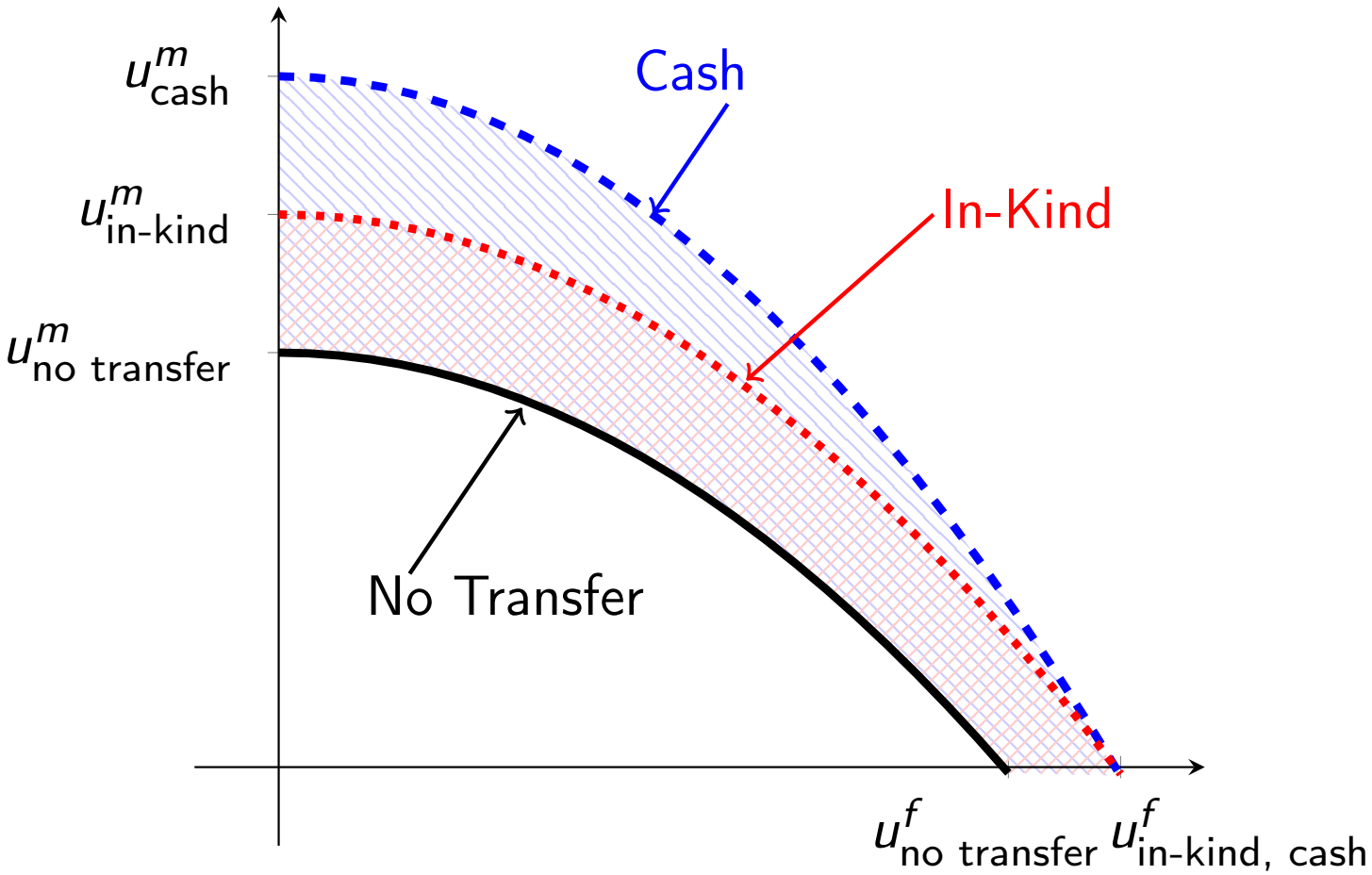
But violence comes at the cost of destroying the overall resources available.

In-kind vs Cash Transfers



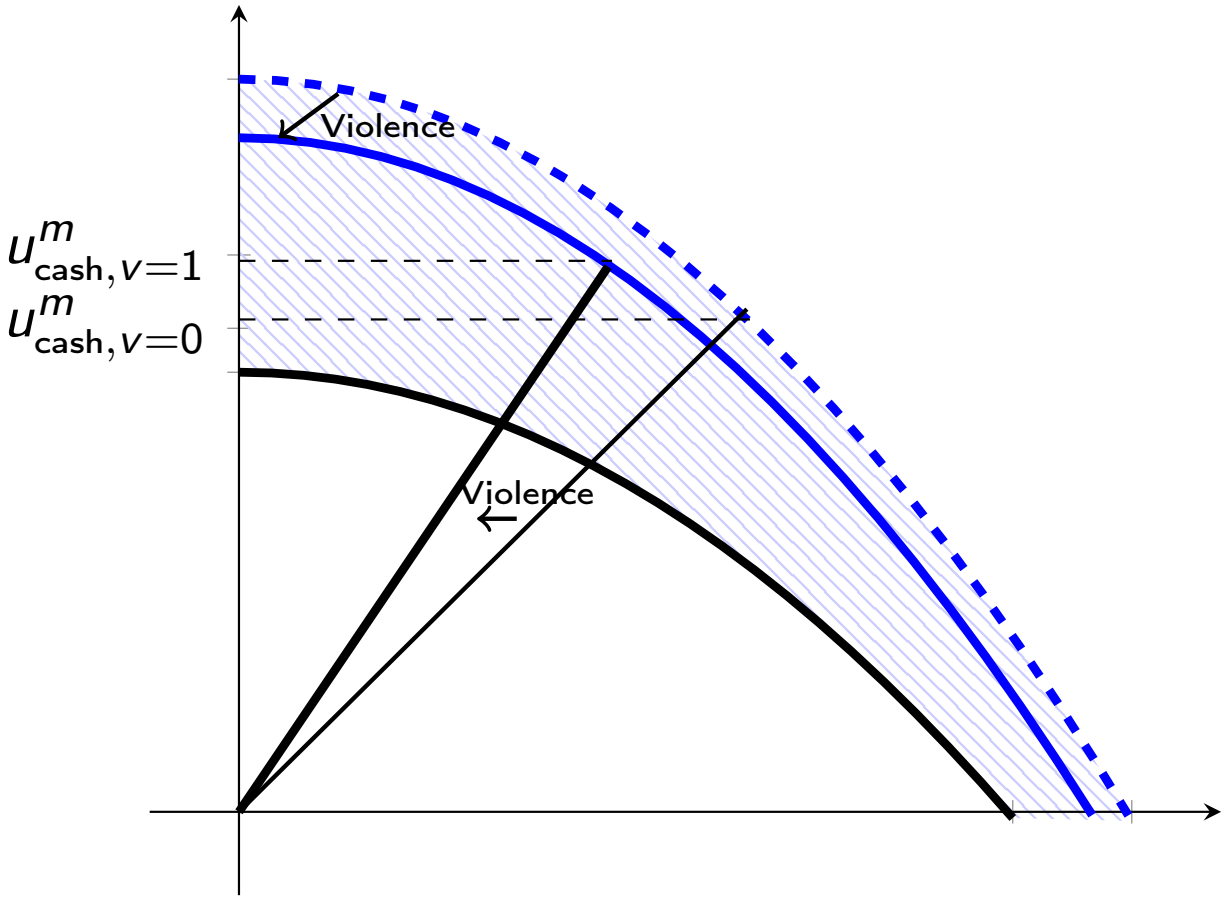
Consider a transfer that is *infra-marginal* for the female, but *extra-marginal* for the male.

In-kind vs Cash Transfers



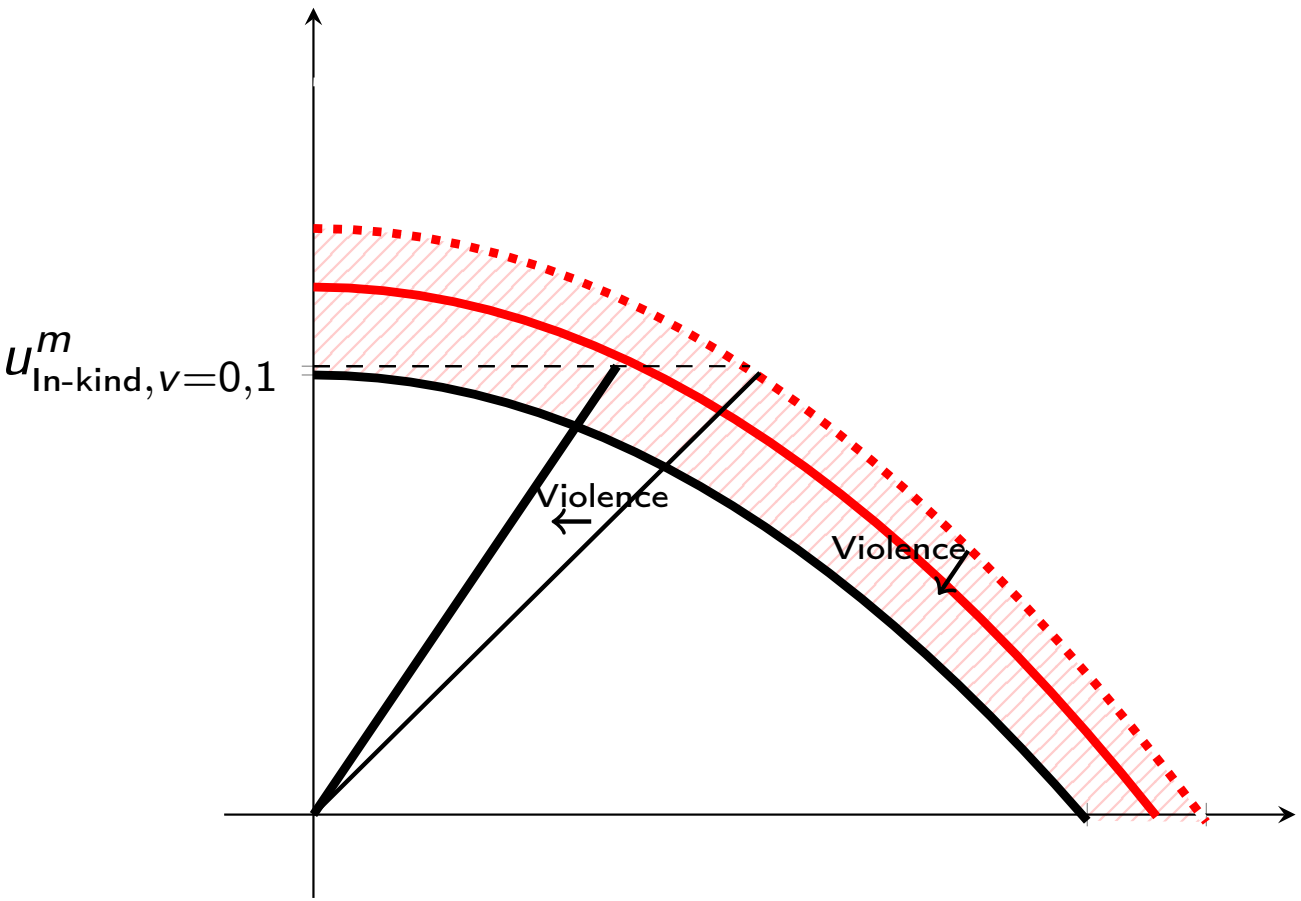
The utility gains the husband can appropriate are lower when the transfers are in-kind.

Cash Transfers and Violence



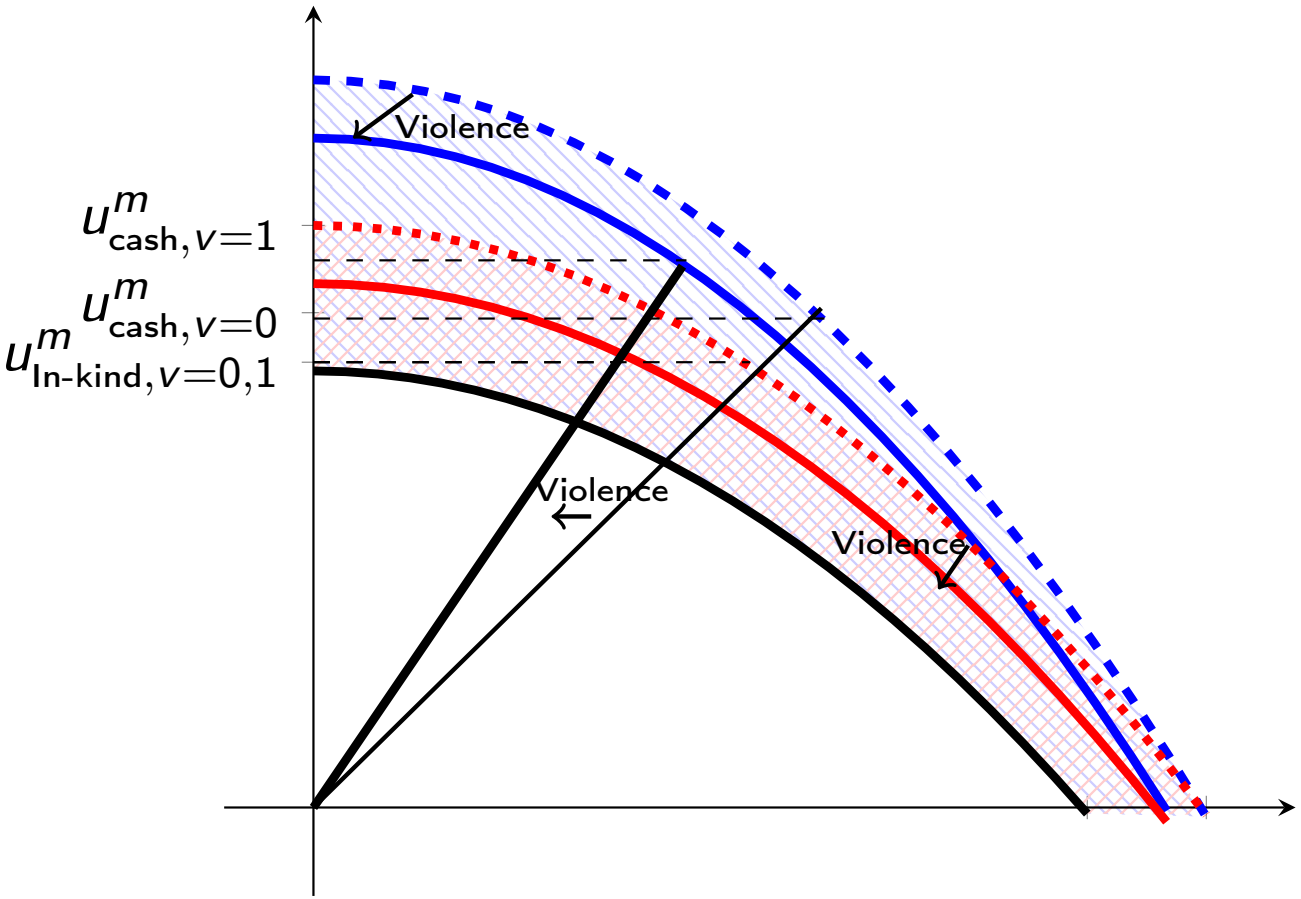
There is a trade-off between male's say in the household decisions and the overall resources available.

In-kind Transfers and Violence



There is a trade-off between male's say in the household decisions and the overall resources available.

In-kind vs Cash Transfers and Violence



In-kind transfers make violence less productive as an appropriation device.

Background and Data

Ecuador

- 35% of women have been physically abused by an intimate partner, yet 90% of the victims are still married to the perpetrator.
- The main social assistance program, *Bono de Desarrollo Humano* gives transfers to women and covers at least 40% of the population.

Data

"Food, Cash or Voucher"

Type of program	Randomized control trial
Year	2011
Objective	Improving nutrition
Target population	Poor households
Payee	Women
Duration	6 months
Treatment	40 dollars monthly transfer (10% of monthly income)
Modality	**In-Kind** (*Food* or *Voucher*) or **In-Cash**
Time of observation	Baseline and follow-up
Data	Female labor time allocation and wages
	Household demographics and food expenses
	Intimate partner violence
Impact Evaluation	**Hidrobo, Peterman & Heise (2016).**
Main Result	The program reduces violence by 6 to 7 percentage points.
	The effects do no differ across treatment arms.

Effects of *Food, Cash, or Voucher*

$$v_{ij1} = c + \beta_{\text{in-kind}} T_i^{\text{in-kind}} + \beta_{\text{cash}} T_i^{\text{cash}} + v_{ij0} + \phi_j + e_{ij}$$

	Full Sample		Not Working Female		Working Female	
Violence at baseline:	16%		**16%**		**17%**	
Any transfer	−0.061*		-0.045		-0.097*	
	(0.033)		(0.035)		(0.050)	
In-kind		-0.066*		-0.044		−0.114**
		(0.035)		(0.037)		(0.052)
Cash		-0.052		-0.047		-0.066
		(0.037)		(0.038)		(0.057)
p-value: In-Kind vs. Cash		0.57		0.92		0.24
Clusters	145	145	145	145	128	128
N	1,230	1,230	835	835	395	395

Heterogeneous Effects

Use the to understand heterogeneity.

Women not working at baseline

- The technology of home production requires $d^* > \tau_k$.
- The transfer is **infra-marginal** for **both** agents.
- **Lower reduction of violence**, as violence is less costly.

Women working at baseline

- The transfer can be **extra-marginal** for **one** of the agents.
- In-kind transfers resolve part of the spousal disagreement.
- **Higher reduction of violence**, as violence is more costly.

Identification and Estimation

Identification and Estimation

1. Impose functional forms.
2. Use the optimality conditions and identification restrictions to recover $\Gamma(v)$ and $\mu(v, \widetilde{\omega}_f)$.
3. Use the recovered parameters and functional forms to simulate the model.
4. Simulate the effect of a policy giving in-kind or cash transfers to women in poor households, at the national level.

Functional Forms

Productivity cost of violence	$\Gamma(v) = e^{\gamma(v)} \in (0, 1]$ and $e^{\gamma(0)} = 1$
Female relative weight	$\mu(v, \widetilde{\omega}_f) = \mu(v)$
Technology of home production	$Q = e^{\gamma(v)}(d + \tau_k)^{\theta}(1 - l_f)^{1-\theta}$
Utility of the female	$u^f(Q, q) = \alpha_i^f \log(Q) + \log(q)$ for every household i
Utility of the male	$u^m(Q, q) = \log(Q) + \log(q)$ for all households

Problem of the Household

$$\max_{q,l_f,d,v} \; \mu(v)\left(\alpha_i^f \log(Q) + \log(q)\right) + (1-\mu(v))\left(\log(Q) + \log(q)\right)$$

$$st. \quad Q = e^{\gamma(v)}(d+\tau_k)^{\theta}(1-l_f)^{1-\theta}$$

$$q + d = e^{\gamma(v)} l_f w_f + w_m + \tau_c$$

Observable from the data

$$v, l_f, 1-l_f, e^{\gamma(v)} l_f w_f, w_m, d, \tau_k, \tau_c$$

To be Identified

$$\theta,\ e^{\gamma(v)},\ \alpha_i^f,\ \mu(v)$$

Optimality Conditions

Technology of home production

Relative marginal productivity of female labor and the market input = Relative marginal cost of female labor and the market input

Violence

Marginal benefit of violence = Marginal cost of violence

Identification and Estimation

Technology of home production

1. Optimality condition:

$$\frac{\frac{\partial Q}{\partial (1-l_f)}}{\frac{\partial Q}{\partial d}} = \frac{\frac{\partial q}{\partial (1-l_f)}}{\frac{\partial q}{\partial d}}.$$

2. Replace the functional forms:

$$\frac{1-\theta}{\theta}\frac{d+\tau_k}{(1-l_f)} = e^{\gamma(v)} w_f.$$

3. Apply logs:

$$\log\left(\frac{d_{it}+\tau_{k,it}}{(1-l_{f,it})\, w_{f,it}}\right) = \log\left(\frac{\theta}{1-\theta}\right) + \gamma(v_{it}) + \epsilon_{it}.$$

4. Estimate θ and $e^{\gamma(v)}$ through OLS:

$$\log\left(\frac{d_{it}+\tau_{k,it}}{(1-l_{f,it})\, \omega_{f,it}}\right) = \beta_0 + \beta_1 v_{it} + \beta_2 v_{it}^2 + \ldots + \epsilon_{it}.$$

Identification and Estimation

Violence

1. Optimality condition:

$$\frac{\partial \mu(v,\widetilde{\omega}_f)}{\partial v}\Delta u_f^m = \left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial Q} + (1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial Q}\right]\frac{\partial Q}{\partial v} + \left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial q} + (1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial q}\right]\frac{\partial q}{\partial v}.$$

2. Replace the functional forms and assume $\mu(v) = \Gamma(v)^\delta e^\kappa$:

$$(1+\rho) = (\alpha_i^f - 1)\,\mu(v)\left[-\log(Q)\frac{\varepsilon_v^\mu}{\varepsilon_v^\Gamma}^\delta - 1\right]$$

- ρ is the ratio between female labor income and q.
- ε_v^μ and ε_v^Γ are the elasticity of the female relative weight and the productivity cost.
- δ is a new parameter to be identified
- e^κ is a constant that captures female's weight in the absence of violence.

Identification and Estimation

Violence

3. Apply logs:

$$\log(1+\rho_{it}) + (\log(Q_{it})+1) \simeq \log\left(\alpha_i^f - 1\right) + \underbrace{\kappa + \delta\gamma(v_{it}) + \log(\delta-1) + \epsilon_{it}}_{\eta_{it}},$$

4. Estimate the $\widehat{\alpha_i^f}$ through a household FE-OLS:

$$\log(1+\rho_{it}) + \left(\log(\widehat{Q}_{it})+1\right) = a_i + \eta_{it}.$$

5. Use the residuals to estimate δ through a NLLS, and recover $\mu(v)$:

$$\hat{\eta}_{it} - \kappa = \delta\widehat{\gamma}(v_{it}) + \log(\delta-1) + \epsilon_{it}$$

Results

Trade-Off of the Perpetrator

Productivity cost of violence

On average, violence destroys **4% of female labor productivity** with a market value of **10 dollars** a month.

$$\widehat{Q}_{it} = e^{-0.85v_{it}^{2}} \left(d_{it} + t_{k,it}\right)^{0.86} \left(1 - l_{f,it}\right)^{0.14}$$

Effect of violence on weights

On average, violence reduces the female say in the household decision making by **12%.**

$$\mu(v) = \frac{1}{2} e^{3.05\widehat{\gamma}(v)}$$

Trade-off

It is *is if*, **perpetrators** were willing to **sacrifice** one day of female labor income every month (**10 dollars**) to reduce their partners' say by **12%**.

Predicted Prevalence of Violence

	Prevalence of Violence
No Transfer	17.63 %
Food, Cash, or Voucher	8.23%
Cash transfers (only)	9.86 %
In-kind transfers (only)	7.41 %

- **17 out of every 100** women beneficiary of *Food, Cash, or Voucher* are victims of intimate partner violence.
- A **cash** transfer reduces violence for **7 of these 17** women.
- An **in-kind** transfer reduces violence for **10 of these 17** women.

Cost-benefit

- Hidrobo, Hoddinott, Peterman, Margolies & Moreira (2014) suggest that the monthly costs of providing a transfer for *Food, Cash, and Voucher* are:

Food	11.46 dollars
Cash	2.99 dollars
Voucher	3.27 dollars

- The **8.5 dollars** cost difference of delivering the transfers **in-kind** instead of **in-cash** are offset by the **10 dollars** monthly reduction of income per victim of violence.

Out-of-Sample Predictions

Scaling-up the Program

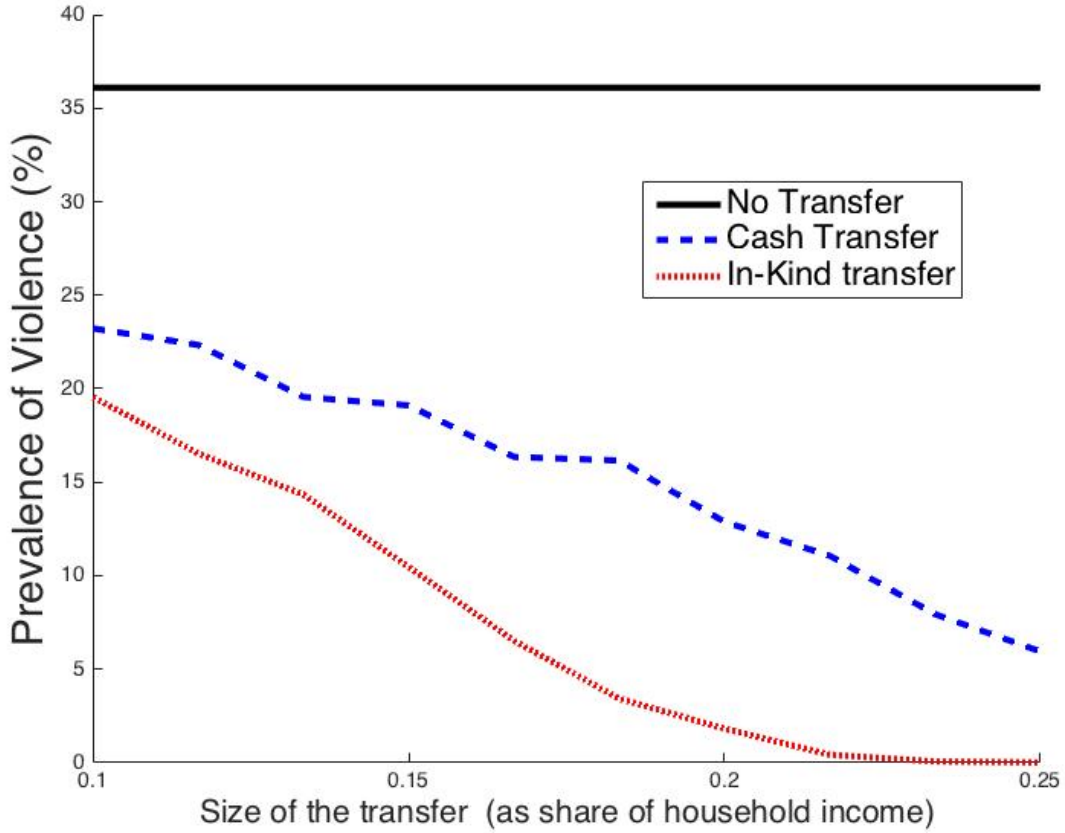
- Use the **cross-sectional national** representative data.
- Concentrate among the households beneficiaries of *Bono de Desarrollo Humano*.
- Assume the technology of home production (θ), the productivity cost of violence ($e^{\gamma(v)}$), and the effect of violence on weights ($\mu(v)$) are the same for all poor households.
- The **disagreement** in the household (α_i^f) is **not observable**.
  1. Use *Food, Cash, or Voucher*.
  2. Regress $\widehat{\alpha}_i^f$ on household observable characteristics.
  3. Use these coefficients to predict $\widetilde{\alpha}_i^f$ at the national level.
  4. Use $\theta, e^{\gamma(v)}, \mu(v)$ from *Food, Cash, or Voucher* and the distribution of $\widetilde{\alpha}_i^f$ and the empirical distribution of w_f to at the national level simulate the model.

National Level Data

Encuesta Nacional sobre Relaciones Familiares y Violencia de Género contra las Mujeres

Representative	National
Year	2011
Data	Household demographics, wages, and violence
Bono de Desarrollo Humano	Social assistance program
Target population	Poor households
Treatment	50 dollars monthly cash transfer (2011)
Payee	Women
Prevalence of violence	37%

Increasing the Size of the Transfers



The differential effect of in-kind and cash transfers is not linear in the size of the transfer.

Conclusion

- Depending on the level of disagreement, any transfer if potentially extra-marginal.
- Not all forms of empowerment are equally relevant for all women.
- Even abstracting from the human right dimension, intimate partner violence imposes productivity cost.
- The fact that a woman is no longer abused represents an economic gain of 10 dollars a month.

Appendix

Definition of violence

Index of Violence

Count of the different forms of violence that reported by the respondent.

Physical violence	punch, kick, strangle, attack with weapon, threaten with a weapon, push, or slap
Sexual violence	forced sex, non approved sex acts
Range	$v \in \left[\frac{0}{9}, \frac{9}{9}\right]$
Average	$v = \frac{2}{9}$

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Extensions of the model

Partially Marketable In-kind Transfer

Problem of the Household

$$\max_{q^f, q^m, l_f, d, v} \quad \mu(v, \widetilde{\omega}_f) u^f(Q, q^f, v) + (1 - \mu(v, \widetilde{\omega}_f)) u^m(Q, q^m, v)$$

$$st. \quad Q = F(d + \phi\tau_k, \Gamma(v)(1 - l_f))$$
$$q^f + q^m + d = \Gamma(v) l_f w_f + w_m + \tau_c + (1 - \phi)\tau_k$$

- A share $\phi > 0$ of the in-kind transfer τ_k is non-marketable.
- Equivalent to $\tau_k' = \phi\tau_k$ and $\tau_c' = \tau_c + \phi\tau_k$, with $\tau_k' \leq \tau_c'$.

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Private Goods and Direct (dis)Utility from Violence

Problem of the Household

$$\max_{q^f, q^m, l_f, d, v} \quad \mu(v, \widetilde{\omega}_f) u^f(Q, q^f, v) + (1 - \mu(v, \widetilde{\omega}_f)) u^m(Q, q^m, v)$$

$$st. \quad Q = F(d + \tau_k, \Gamma(v)(1 - l_f))$$

$$q^f + q^m + d = \Gamma(v) l_f w_f + w_m + \tau_c$$

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Private Goods and Direct (dis)Utility from Violence

Optimality Conditions

$$\frac{\partial Q}{\partial d}\left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial Q}+(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial Q}\right]=\frac{1}{2}\left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial q^f}+(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial q^m}\right]\frac{\partial q}{\partial d}$$

$$\frac{\partial Q}{\partial 1-l_f}\left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial Q}+(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial Q}\right]=\frac{1}{2}\left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial q^f}+(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial q^m}\right]\frac{\partial q}{\partial(1-l_f)}$$

$$\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial q^f}=\quad(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial q^m}$$

$$\frac{\partial \mu(v,\widetilde{\omega}_f)}{\partial v}\Delta u_f^m+(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial v}=\left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial Q}+(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial Q}\right]\frac{\partial Q}{\partial v}$$
$$+\frac{1}{2}\left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial q^f}\frac{\partial q^f}{\partial v}+(1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial q^m}\frac{\partial q^m}{\partial v}\right]$$
$$+\quad\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial v}$$

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Alternative interpretation of the model

Alternative Interpretation

$$\begin{aligned} \max_{q,l_f,d,v} \quad & u^m(Q,q) \\ st. \quad & Q = F\left(d + \tau_k, \Gamma(v)(1-l_f)\right) \\ & q + d = \Gamma(v) l_f w_f + w_m + \tau_c \\ & u^f(Q,q) \geq \overline{u}^f(Q,q,v) \end{aligned}$$

$$\begin{aligned} \max_{q,l_f,d,v} \quad & u^m(Q,q) + \lambda\left[u^f(Q,q) - \overline{u}^f(Q,q,v)\right] \\ st. \quad & Q = F\left(d + \tau_k, \Gamma(v)(1-l_f)\right) \\ & q + d = \Gamma(v) l_f w_f + w_m + \tau_c \end{aligned}$$

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Food, Cash, or Voucher

List of Pre-Approved Goods

Source: Hidrobo, Hoddinott, Peterman, Margolies & Moreira (2014)

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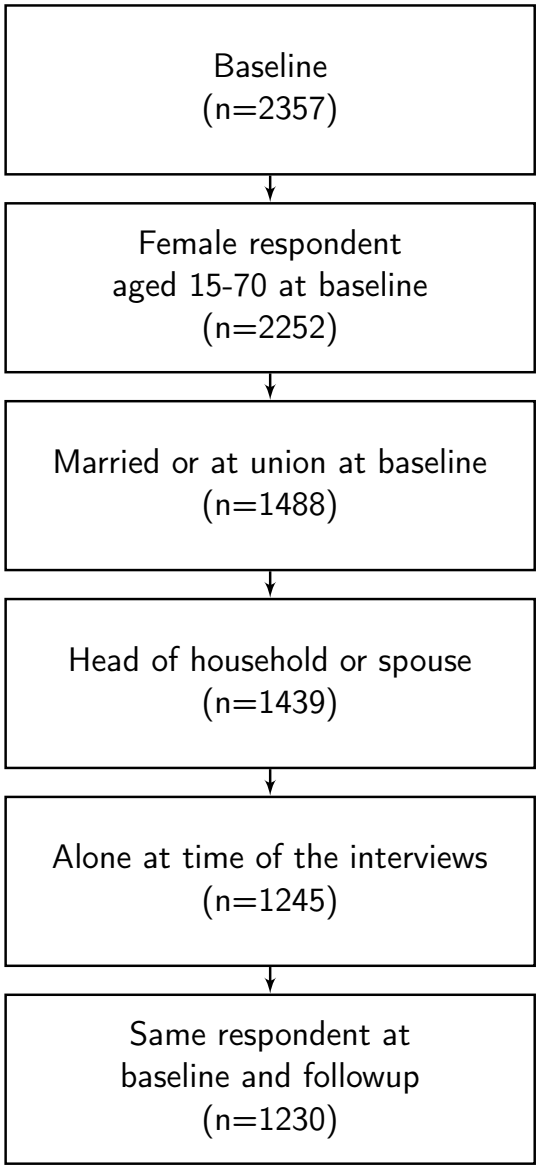
Sample Flowchart



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Descriptive Statistics

	All	Control	Treatment		p-value
			In-Kind	Cash	In-kind vs. Cash
Panel A. Demographics					
No. of household members	5.37	5.58	5.26	5.37	0.52
Male head of household	0.97	0.97	0.97	0.98	0.33
Panel B. Intimate Partner Violence					
Any type of violence	0.29	0.27	0.32	0.28	0.25
Physical or sexual violence	0.16	0.12	0.18	0.16	0.75
Panel C. Variables for the Estimation					
Household income a day	14.00	14.87	13.65	13.69	0.92
Household day expenses in food	3.96	3.88	3.94	4.09	0.09
Female employed	0.32	0.31	0.32	0.34	0.69
Female labor income a day	6.55	7.36	6.17	6.41	0.95
Female hours of work a day	5.21	5.68	4.93	5.25	0.30
Female hours of household work a day	7.30	7.52	7.22	7.18	0.80
Male employed	0.96	0.96	0.96	0.97	0.60
Male labor income a day	12.40	13.14	12.22	11.92	0.78

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Recovering female wages

Per Hour Wage from Female Labor Income

- The female per hour wage from the data is $e^{\gamma(v)} w_f$.
- To disentangle w_f from $e^{\gamma(v)}$, use a Heckman Two-Step procedure among the female-working households, as if the wages of abused working females were not observed.
- As exclusion restrictions, use the cohabitation status of the couple and the number of children.
- The female wage variable used for the estimation is,

$$w_f = \begin{cases} w_f & \text{if} \quad v = 0 \quad \text{and} \quad l_f > 0 \\ \widehat{w}_f & \text{if} \quad v = 1 \quad \text{and} \quad l_f > 0 \end{cases}$$

where $\widehat{w}_f$ are the Heckman Two-Step predicted female relative wages.

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Heckman

	Log Wages	Selection
Age	0.0317*	0.0030
	(0.0165)	(0.0273)
Age, squared	-0.0003	0.0001
	(0.0002)	(0.0003)
Female's education years	0.0325**	0.0011
	(0.0158)	(0.0199)
Female with secondary education or more	0.0755	0.0169
	(0.1081)	(0.1617)
Female's hours of work a day	-0.0319	0.4806***
	(0.1758)	(0.0491)
Female's hours of work a day, squared	-0.0067	-0.0316***
	(0.0119)	(0.0040)
Carchi	-0.1489*	0.0252
	(0.0784)	(0.1243)
Married couple		0.2006*
		(0.1081)
No. children form 0 to 5		-0.1253
		(0.0910)
No. children from 6 to 14		-0.0409
		(0.0541)
Constant	-0.6354	-0.7589
	(0.9177)	(0.5322)
Lambda	0.90	
Clusters	141	
N	922	

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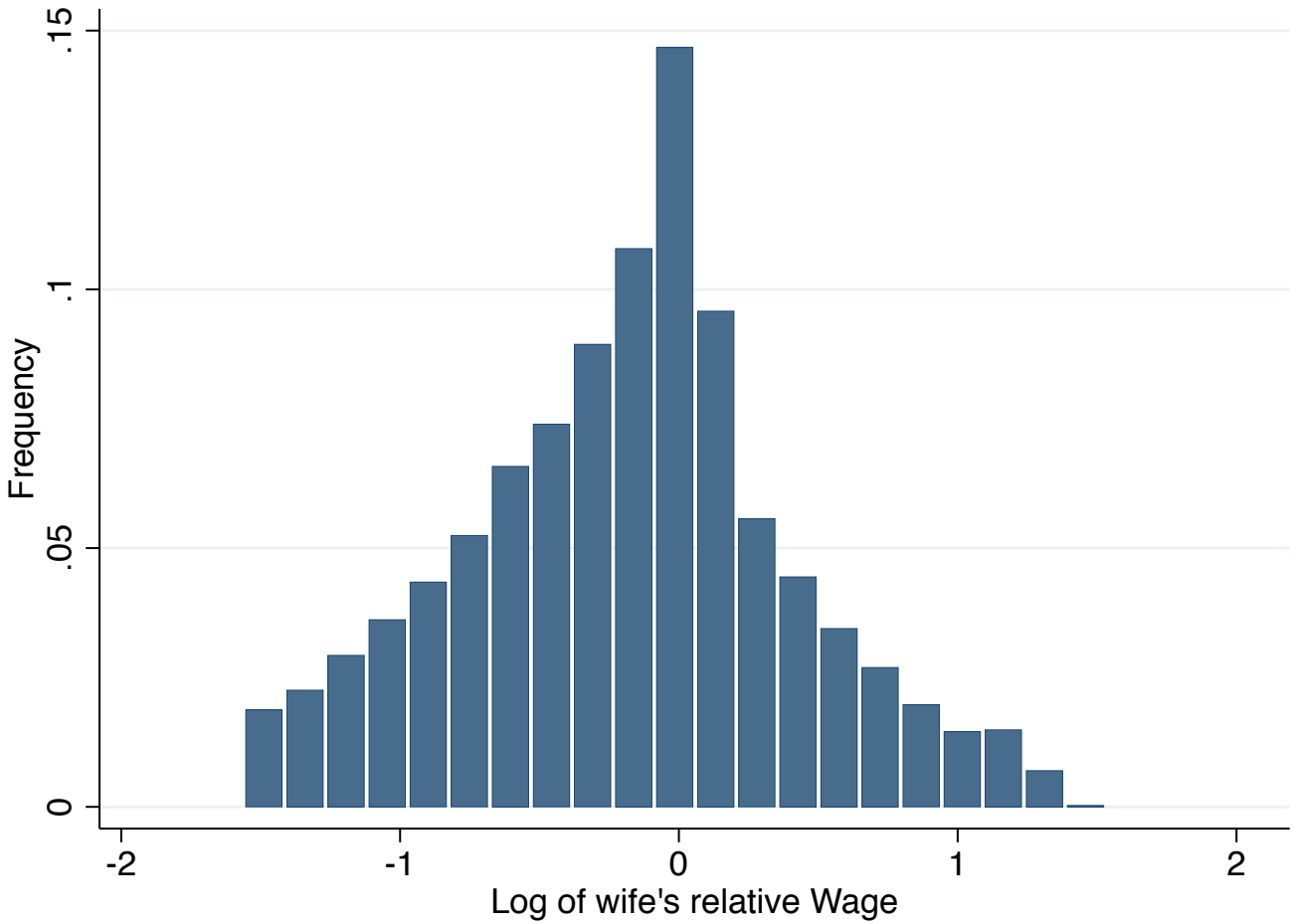
Distribution of Female Relative Wages



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Identification and estimation

Identification

Technology

The optimality condition for the technology of home production is

$$\frac{\frac{\partial Q}{\partial (1-l_f)}}{\frac{\partial Q}{\partial d}} = \frac{\frac{\partial q}{\partial (1-l_f)}}{\frac{\partial q}{\partial d}}.$$

Replacing with the Cobb-Douglas functional form for Q,

$$\frac{1-\theta}{\theta}\frac{d+\tau_k}{(1-l_f)} = e^{\gamma(v)} w_f.$$

Applying logs, θ and $e^{\gamma(v)}$ are identified through

$$\log\left(\frac{d_{it}+\tau_{k,it}}{(1-l_{f,it})\, w_{f,it}}\right) = \log\left(\frac{\theta}{1-\theta}\right) + \gamma(v_{it}) + \epsilon_{it},$$

where ϵ is a measurement error term uncorrelated with v.

back

Estimation

1. Estimate $\widehat{\theta}$ and $e^{\widehat{\gamma}(v)}$ through

$$\log\left(\frac{d_{it}+\tau_{k,it}}{(1-l_{f,it})\widetilde{\omega}_{f,it}}\right) = \underbrace{\beta_0}_{\log\left(\frac{\theta}{1-\theta}\right)} + \underbrace{\beta_1 v_{it} + \beta_2 v_{it}^2 + \ldots}_{\gamma(v)\simeq \text{ polynomial of } v} + \epsilon_{it}.$$

   Use the estimated $\widehat{\theta}$ and $e^{\widehat{\gamma}(v)}$ to recover $\widehat{Q}$.

2. Estimate the $\widehat{\alpha_i^f}$ through a household FE-OLS

$$\log(1+\rho_{it}) + \left(\log(\widehat{Q}_{it})+1\right) = \underbrace{a_i}_{\log\left(\alpha_i^f - 1\right)} + \eta_{it}.$$

3. Use the residuals of the previous step to estimate δ through a NLLS, and recover $\mu(v) = e^{\delta\gamma(v)}e^{\kappa}$.

$$\hat{\eta}_{it} - \kappa = \delta\widehat{\gamma}(v_{it}) + \log(\delta - 1) + \epsilon_{it}$$

4. Use $\widehat{\theta}, e^{\widehat{\gamma}(v)}, \widehat{\mu}(v)$, the distribution of $\widehat{\alpha}_i^f$, and the empirical distribution of w_f to simulate the model.

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Identification

Violence

The optimality condition for violence is

$$\frac{\partial \mu(v,\widetilde{\omega}_f)}{\partial v}\Delta u_f^m = \left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial Q} + (1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial Q}\right]\frac{\partial Q}{\partial v} + \left[\mu(v,\widetilde{\omega}_f)\frac{\partial u^f}{\partial q} + (1-\mu(v,\widetilde{\omega}_f))\frac{\partial u^m}{\partial q}\right]\frac{\partial q}{\partial v}$$

Replacing with the functional forms:

$$\frac{\partial \mu(v)}{\partial v}\left(1-\alpha_i^f\right)\log(Q) = \left[\mu(v)\frac{\alpha_i^f}{Q} + (1-\mu(v))\frac{1}{Q}\right]\frac{Q}{e^{\gamma(v)}}\frac{\partial e^{\gamma(v)}}{\partial v} + \left[\mu(v)\frac{1}{q} + (1-\mu(v))\frac{1}{q}\right] l_f w_f \frac{\partial e^{\gamma(v)}}{\partial v}$$

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Identification

Violence

After some algebra,

$$(1+\rho) \quad = \quad \left(\alpha_i^f - 1\right) \mu(v) \left[-\log(Q) \frac{\varepsilon_v^\mu}{\varepsilon_v^\Gamma} - 1 \right].$$

- $\rho = \frac{e^{\gamma(v)} l_f w_f}{q}$ is the ratio between female labor income and q.
- $\varepsilon_v^\mu = \frac{\partial \mu(v)}{\partial v} \frac{v}{\mu(v)}$ is the elasticity of the female relative weight.
- $\varepsilon_v^\Gamma = \frac{\partial e^{\gamma(v)}}{\partial v} \frac{v}{e^{\gamma(v)}}$ is the elasticity of the productivity cost.

Assume that

$$\frac{\varepsilon_v^\mu}{\varepsilon_v^\Gamma} = \delta \rightarrow \mu(v) = \left[e^{\gamma(v)} \right]^\delta e^\kappa.$$

- δ is a new parameter to be identified.
- e^κ is a constant that captures female's weight in the absence of violence, $\mu(0) = e^\kappa = \frac{1}{2}$.

back

Identification

Violence

The optimality condition for violence transforms into

$$\log(1+\rho_{it}) + (\log(Q_{it})+1) \simeq \log\left(\alpha_i^f - 1\right) + \underbrace{\kappa + \delta\gamma(v_{it}) + \log(\delta-1) + \epsilon_{it}}_{\eta_{it}},$$

where ϵ is a measurement error term.

back

Estimation

1. Estimate $\widehat{\theta}$ and $\widehat{\gamma}(v)$ through

$$\log\left(\frac{d_{it}+\tau_{k,it}}{(1-l_{f,it})\widetilde{\omega}_{f,it}}\right) = \underbrace{\beta_0}_{\log\left(\frac{\theta}{1-\theta}\right)} + \underbrace{\beta_1 v_{it} + \beta_2 v_{it}^2 + \ldots}_{\gamma(v)\simeq \text{ polynomial of } v} + \epsilon_{it}.$$

   Use the estimated $\widehat{\theta}$ and $e^{\widehat{\gamma}(v)}$ to recover $\widehat{Q}$.

2. Estimate the $\widehat{\alpha_i^f}$ through a household FE-OLS

$$\log\left(1+\rho_{it}\right) + \left(\log(\widehat{Q}_{it})+1\right) = \underbrace{a_i}_{\log\left(\alpha_i^f-1\right)} + \eta_{it}.$$

3. Use the residuals of the previous step to estimate δ through a NLLS, and recover $\mu(v) = e^{\delta\gamma(v)}e^{\kappa}$.

$$\hat{\eta}_{it} - \kappa = \delta\widehat{\gamma}(v_{it}) + \log\left(\delta-1\right) + \epsilon_{it}$$

4. Use $\widehat{\theta}$, $e^{\widehat{\gamma}(v)}$, $\widehat{\mu}(v)$, the distribution of $\widehat{\alpha}_i^f$, and the empirical distribution of w_f to simulate the model.

back

Estimation

1. Estimate $\widehat{\theta}$ and $\widehat{\gamma}(v)$ through

$$\log\left(\frac{d_{it}+\tau_{k,it}}{(1-l_{f,it})\,\widetilde{\omega}_{f,it}}\right) = \underbrace{\beta_0}_{\log\left(\frac{\theta}{1-\theta}\right)} + \underbrace{\beta_1 v_{it}+\beta_2 v_{it}^2+\ldots}_{\gamma(v)\simeq \text{ polynomial of } v} + \epsilon_{it}.$$

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3. Use the residuals of the previous step to estimate δ through a NLLS, and recover $\mu(v) = e^{\delta\gamma(v)}e^{\kappa}$.

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4. Use $\widehat{\theta}$, $e^{\widehat{\gamma}(v)}$, $\widehat{\mu}(v)$, the distribution of $\widehat{\alpha}_i^f$, and the empirical distribution of w_f to simulate the model.

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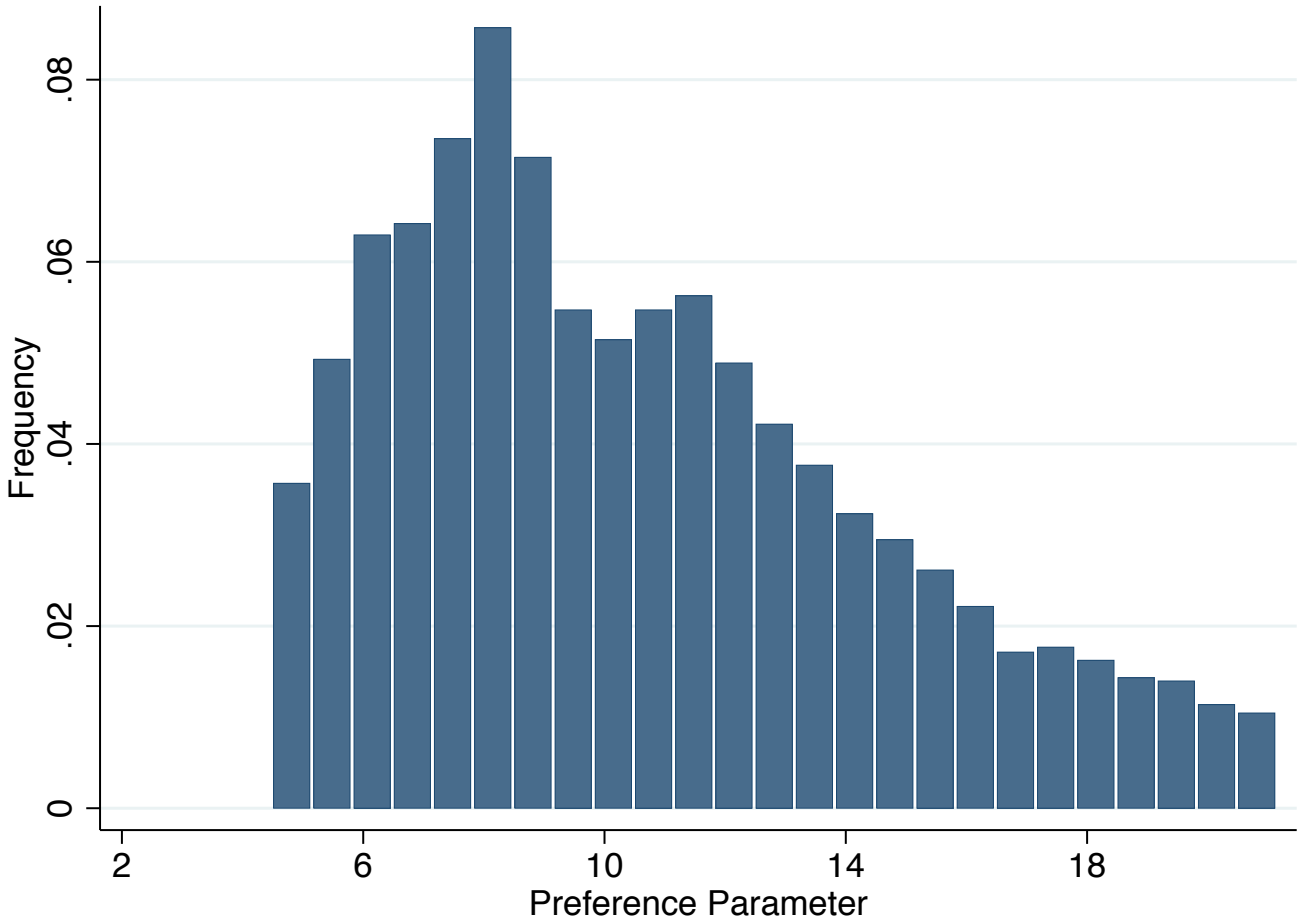
Distributions of disagreement in preferences

Distribution of Disagreement in Preferences



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Scaling-up the program at the national level

Descriptive Statistics

	Food,Cash,or Voucher	*Bono de Desarrollo Humano*
No. of household members	5.37	4.91
Male head of household	0.97	0.97
Married couple	0.42	0.64
No. children form 0 to 5	0.75	0.73
No. children from 6 to 14	0.92	1.37
Female age	34.81	40.97
Male age	38.67	44.76
Couple age difference	3.35	3.78
Female education years	8.02	4.08
Male education years	8.03	4.23
Female more educated than male	0.18	0.22

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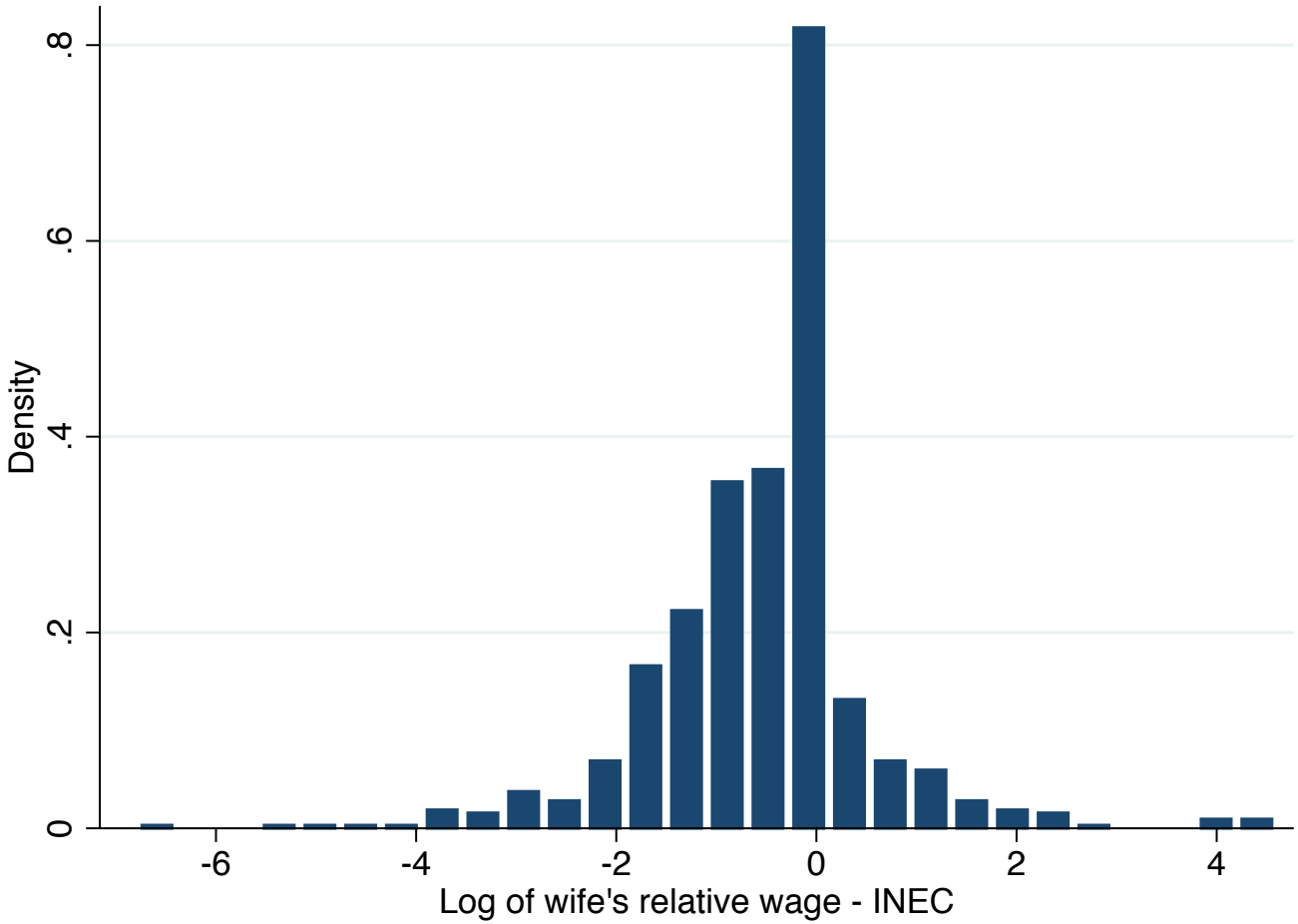
Distribution of Female Relative Wages



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Household Observable Characteristics Predicting Disagreement in Preferences

Observable Characteristic	α_i^f
No. of household members	0.53
	(0.34)
Male head of household	3.26
	(2.45)
Married couple	0.16
	(0.83)
No. children form 0 to 5	-0.09
	(0.54)
No. children from 6 to 14	-0.42
	(0.48)
Female age	0.04
	(0.04)
Couple age difference	0.06
	(0.06)
Male education years	0.02
	(0.14)

Observable Characteristic	α_i^f
Female education years	-0.09
	(0.16)
Female more educated than male	-0.07
	(1.13)
Female employed	0.92
	(1.14)
Female labor income a day	0.21
	(0.16)
Female hours of work a day	-0.04
	(0.19)
Female hours of household work a day	-0.08
	(0.11)
Male employed	1.85
	(3.19)
Male labor income a day	0.11
	(0.08)
Male hours of work a day	0.08
	(0.16)

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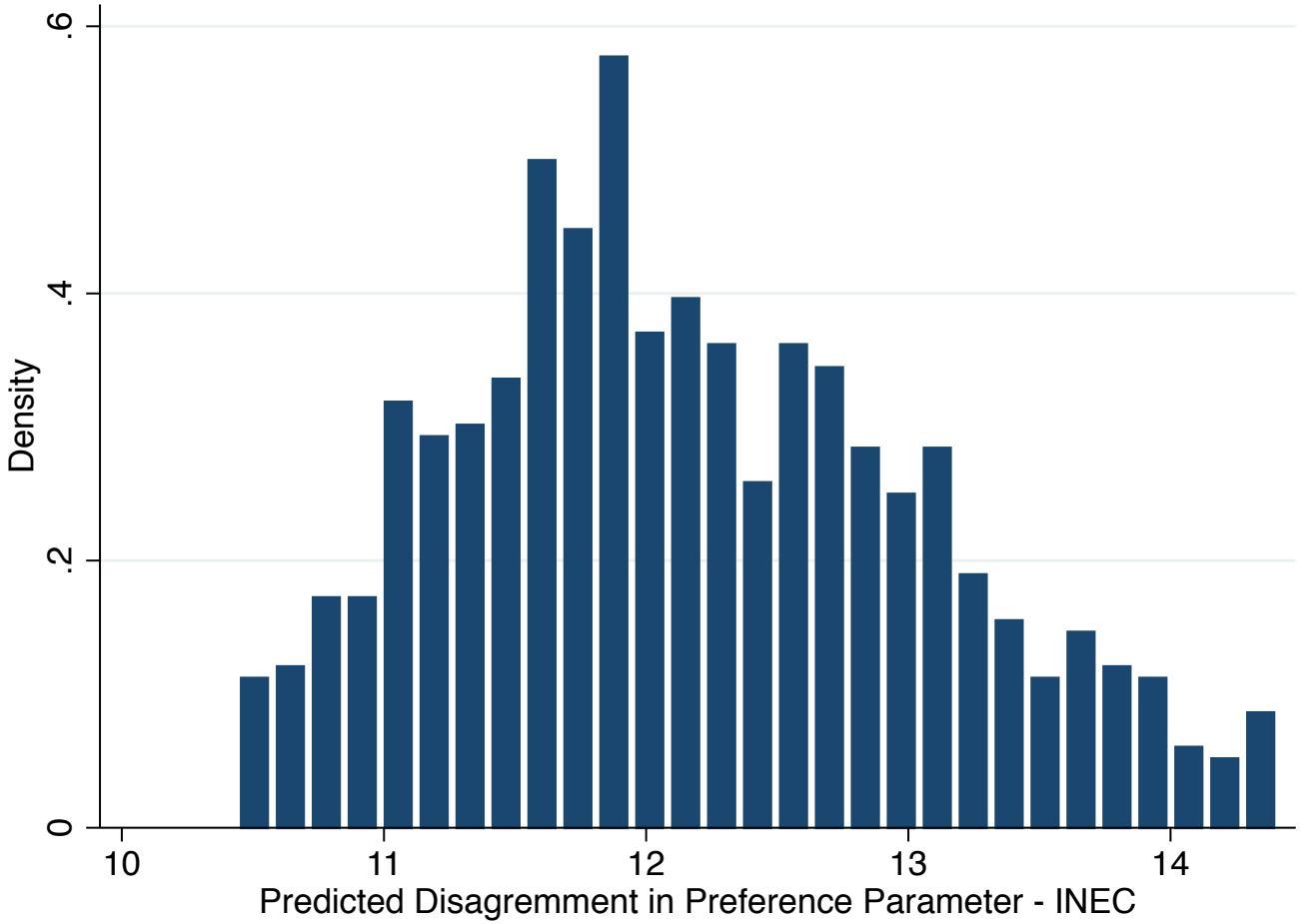
Distribution of Disagreement in Preferences

National Level



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