Economics Bulletin

Volume 43, Issue 3

The effects of cash and in-kind transfers on intra-household inequality: Insights from a randomized experiment

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Abstract

In this paper, I study how intra-household inequality responds to transfers to women and whether the response depends on the transfer being in-kind or cash. Using data from an experimental evaluation of a welfare program in Ecuador, I estimate a structural model of household behavior in the presence of poverty transfers. Results suggest that there are important intra-household inequalities, but the transfer produces resource redistribution among household members. Moreover, in-kind transfers could be as effective as cash transfers in improving the within-household redistribution of resources. Finally, I document considerable heterogeneity in women's control of resources—a proxy for bargaining power—throughout their life cycle and across transfer modalities.

I am grateful for constructive feedback from Paul Glewwe, Joseph Ritter, Aaron Sojourner, Alfonso Cebreros, León Fernández, Joseph Mullins, Jeremy Lise, Arthur Lewbel, and Krishna Pendakur. I am also thankful to participants at the Development Economics seminar at the University of Minnesota, the Society of Labor Economists, the Society of Economics of the Household, the Bank of Mexico, the Research Institute for Development, Growth and Economics (RIDGE), the LACEA Network on Inequality and Poverty (NIP), and the LACEA-LAMES conference. I would also like to thank Melissa Hidrobo for sharing and explaining the data from the randomized evaluation in Ecuador. The views and conclusions presented in this paper are exclusively of the author and do not necessarily reflect those of Banco de México or its Board of Governors.

Citation: Jose L. Casco, (2023) "The effects of cash and in-kind transfers on intra-household inequality: Insights from a randomized experiment", *Economics Bulletin*, Volume 43, Issue 3, pages 1519-1527

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Submitted: February 22, 2023. **Published:** September 30, 2023.

1. Introduction

Is the intra-household allocation of resources across household members affected by cash transfer (CT) programs? If so, does the transfer modality matter? Using data from Ecuador, this paper provides evidence regarding how household resources are apportioned among its members, the role of different CTs in shifting intra-household resource allocation, and the implications in terms of women's bargaining power.

Analyzing the behavioral effects of CT programs under the assumption that households act as a single rational unit in which all family members equally benefit from the social program could be misleading. To overcome this limitation, this paper benefits from the literature on collective intra-household decision models.[1] Previous studies have found mixed results regarding the effect of CT programs on individual resource shares (see, for example, Klein and Barham, 2018; Tommasi, 2019; Sokullu and Valente, 2022). Moreover, an important yet overlooked issue in this literature is whether alternative transfer modalities impact resource distribution within households differently.

Using a collective household model referencing Dunbar et al. (2013) and Calvi (2020), I structurally estimate the resource shares for the father, mother, and children. The structure of the model allows for an examination of how transfer payments affect the share of household resources allocated to each member. Interestingly, in-kind transfers could be as effective as cash transfers in improving the within-household distribution of resources. Subsequently, I explore the potential implication of this redistribution of resources on women's bargaining power. Using the model's estimated parameters, I create a variable for measuring the amount of resources controlled by the woman relative to the man, similar to Tommasi (2019) and Calvi (2020). Results reveal that the mean distribution of women's resource control in beneficiary households is 12.6% higher in relation to non-beneficiary households. In addition, there is significant heterogeneity in the women's control of resources throughout their life cycle and transfer modalities. These findings provide new insights into the distributional impacts of different income support programs.

2. Data

I use data from a randomized evaluation of an intervention implemented by the World Food Programme in Ecuador called "Food, Cash, or Voucher" (see, IFPRI et al., 2015). The program was carried out in 2011 in two northern provinces of Ecuador: Carchi and Sucumbios. Beneficiaries received a monthly transfer of 40 U.S. dollars for six months (10% of the average household monthly income). The transfer was delivered in two different formats: cash or in-kind (a food basket or a redeemable voucher). The conditionality of the program was to attend a nutritional training program. Only poor households and households with at least one Colombian member were eligible for the program.

The intervention sample consists of 2,122 households. To ensure comparability across household types, I select only households with both natural parents and one to four children under 14

[1] See for instance, Chiappori (1992); Browning et al. (1994); Lewbel and Pendakur (2008); Lise and Seitz (2011); Browning et al. (2013); Dunbar et al. (2013); Calvi (2020).

years of age.[2] I consider adults between 18 and 80 years of age, married or in unions at baseline, and resurveyed at endline (1,149 households). To avoid outliers, households in the top or bottom one percent of the total household expenditures distribution are removed, along with households with incomplete data for any characteristic. The final sample comprises 957 households (83% of the original coupled households).

Table 1: Descriptive Statistics by Treatment and Control Groups

	Total (N=957)		Beneficiaries[a] (N=696)		Non-beneficiaries[b] (N=261)		Difference (N=957)
	Mean	SD	Mean	SD	Mean	SD	$a-b$
Adult Members Characteristics							
Adult Females	1.22	0.52	1.23	0.52	1.19	0.53	0.317
Adult Males	1.22	0.53	1.20	0.48	1.27	0.62	0.086
Average Age of Women (ages18–79)	32.76	9.80	32.79	10.04	32.66	9.14	0.852
Average Age of Men (ages18–79)	34.65	10.78	34.64	11.15	34.66	9.75	0.978
Female High School	0.58	0.49	0.58	0.49	0.57	0.50	0.740
Male High School	0.57	0.50	0.57	0.49	0.56	0.50	0.841
Household Characteristics							
Number of Children (ages 0–14)	1.92	0.94	1.90	0.91	1.98	1.01	0.286
Number of Children (0–5 years old)	0.82	0.75	0.85	0.76	0.76	0.74	0.131
Share of Girls	0.48	0.41	0.49	0.42	0.46	0.39	0.388
Average Age of Children (ages 0–14)	6.55	3.85	6.41	3.85	6.95	3.85	0.087
Extended Household	0.35	0.48	0.34	0.47	0.37	0.48	0.509
Intimate Partner Violence (IPV)	0.33	0.47	0.33	0.47	0.33	0.47	0.951
Lives in Carchi Province	0.38	0.49	0.40	0.49	0.32	0.47	0.448
Total Non-durable Expenditure (USD)	407.18	263.79	398.36	243.85	430.71	310.09	0.241
Labor Income (USD)	469.91	1064.34	436.54	992.42	558.89	1233.54	0.273
Shares of Assignable Good							
Father Share (%)	1.59	2.30	1.63	2.33	1.50	2.24	0.522
Mother Share (%)	1.60	2.20	1.64	2.23	1.50	2.10	0.453
Children Share (%)	2.11	2.43	2.20	2.46	1.85	2.31	0.107
p-value from joint F-test							0.117

Notes: p-values are reported from Wald tests on the equality of means of pooled treatment and control for each variable using standard errors clustered at the intervention cluster level. F-test of joint orthogonality is implemented using an OLS regression of the treatment indicator on the list of variables.

Table 1 indicates that the average number of adult females and males is around 1.22. The average age of adult females is approximately 33 years old, and the proportion of adult women with high school is 0.58. In terms of family composition, on average, households have 1.9 children, the mean age of children is around seven years old, and 48% of children are girls. Also, 33% of households experienced intimate partner violence. The average household's total expenditure is 407.18 USD (in 2011 prices), and expenditures in clothing and footwear represent around 1.5% to 2% of the total household budget. Most variables appear well-balanced across treatment and control groups. Additionally, the null hypothesis of joint orthogonality cannot be rejected, revealing that the validity of the initial randomization still holds for my restricted sample.

[2]This restriction is data-driven, as households were asked how much they spend on clothing and footwear for girls and boys under 14 years of age in the survey.

3. Structural Analysis of Household Behavior

3.1. Intra-household Allocation with Children

Consider a household formed by three types of agents $i \in \{♀, ♂, k\}$. The agents within this household could have distinct preferences; however, they have to jointly decide on the purchase of goods. As in Browning et al. (2013) and Dunbar et al. (2013), I assume economies of scale in consumption through a linear (Barten-type) consumption technology, which takes the form of a matrix denoted by A, and enables the conversion of the household's purchased quantities x into a bundle of private good equivalents c^i.[3]

Each agent i, have their own utility function $U^i\left(c^i\right)$. Therefore, efficient allocations can be described as resulting from the following household's maximization problem:

$$\begin{aligned} \max_{c^{♀},c^{♂},c^k,x} \quad & \overline{U}\left(U^{♂}, U^{♀}, U^k, p/y\right) \\ & x = A \sum c^i \\ & y = x'p \end{aligned} \tag{1}$$

where $\overline{U}\left(U^{♂}, U^{♀}, U^k, p/y\right) = \sum \mu^i (p/y) U^i$, household expenditure is given by y, and each household member's Pareto weight $\mu^i (p/y)$ is a function of prices, household expenditure, and other individual characteristics. Pareto efficiency allows us to use duality theory and decentralization welfare theorems to characterize the solution of the model expressed in Eq. (1). Then, we can obtain the quantity of private good equivalents, c^i , for each member $i \in \{♀, ♂, k\}$. Pricing these bundles at within household shadow prices $A'p$ it is possible to obtain the resource shares η^i, which represents the fraction of the household's total resources that are assigned to each agent within the household.

3.2. Identification and Estimation Strategy

To identify the resource shares, I rely on private assignable goods (see, Dunbar et al., 2013). A private assignable good has the characteristic that it is consumed exclusively by one member of the household and therefore does not exhibit economies of scale in consumption.[4] Two restrictions are imposed by Dunbar et al. (2013) and Calvi (2020) for identification. The first is that η^i does not depend on household expenditure y, at least at low expenditure levels.[5] The second is some restrictions on the shapes of individual Engel curves.

In this framework, women are treated as an aggregate person; therefore, the resource share of women is divided equally among the women in the household (the same applies for men and children). Women's total resource share in households with $N^{♀}$ women is thus given by $H^{♀} = N^{♀}\eta^{♀}$, where $H^{♀}$ denotes the proportion of total household expenditure consumed by women. Let's assume that individual preferences are described by utility functions that belong to the PIGLOG

[3]This consumption technology provides a structure to model sharing and jointness of consumption ($c = c^{♀} + c^{♂} + c^k = A^{-1}x$).

[4]A good is private if it is not shared (e.g., food), while a good is assignable if it can be identified who in the household consumed it (e.g., clothing).

[5]There is evidence in the literature that supports this identification assumption (see, for instance, Menon et al., 2012; Bargain et al., 2018).

class. Then, each household member's private assignable good Engel curve is linear in the logarithm of own expenditure:

$$
\begin{aligned}
W^{\male} &= \alpha^{\male} H^{\male} + \beta^{\male} H^{\male} \ln\left(\frac{H^{\male} y}{N^{\male}}\right) \\
W^{\female} &= \alpha^{\female} H^{\female} + \beta^{\female} H^{\female} \ln\left(\frac{H^{\female} y}{N^{\female}}\right) \\
W^{k} &= \alpha^{k} H^{k} + \beta^{k} H^{k} \ln\left(\frac{H^{k} y}{N^{K}}\right)
\end{aligned}
\tag{2}
$$

where α^i and β^i represent linear combinations of underlying preference parameters. I restrict preferences to be similar across people and across household types, which implies that $\beta^{\male} = \beta^{\female} = \beta^k = \beta$. To relax this assumption in the estimation, the resource shares and the preference parameters are allowed to vary with observable household characteristics. Also, evidence suggests that CT programs may impact the decision process and change individual preferences over time (De Rock et al., 2022). To account for this, in Eq. (2), the preference parameters and resource shares are allowed to vary with the program participation ($\Lambda^i = \delta_0^{\Lambda_i} + \delta_1^{\Lambda_i} X_1 + \ldots + \delta_n^{\Lambda_i} X_n + \delta_{CT}^{\Lambda_i} CT$, for each $i = \female, \male, k$ and $\Lambda = \alpha, \beta, H$). Finally, I include additive error terms correlated across equations and clustered at the sampling unit level. Since receiving the transfer is random due to the program design, the estimation is straightforward. The model parameters are estimated via Nonlinear Seemingly Unrelated Regression (NLSUR).

3.3. *Effect of CT on the Resource Shares*

The estimated coefficients of the effect of CT on the resource shares of fathers $\left(\eta^{\male}\right)$, mothers $(\eta^{\female})$, and children $\left(\eta^{k}\right)$ are reported in Table 2.

Table 2: Effect of CTs on Resource Shares

	A: Pooled			B: By Transfer Modality		
	(1)	(2)	(3)	(4)	(5)	(6)
	Men	Women	Children	Men	Women	Children
Treatment						
Pooled	-0.110***	0.081**	0.029			
	(0.039)	(0.041)	(0.031)			
Cash				-0.127**	0.096**	0.031
				(0.052)	(0.048)	(0.042)
In-Kind				-0.109**	0.089**	0.020
				(0.042)	(0.045)	(0.031)
Controls		✓			✓	
Parameters		126			132	
R^2		0.182-0.402			0.160-0.403	
N		957			957	

Notes: Including controls are the number of adult women and men, number of children, the proportion of girls in the household, indicator of extended household, men and women age, men and women education, number of children less than 5, number elderly women and men, IPV, and regional dummies. R^2 range across the different equations of the NLSUR model. Standard errors clustered at the intervention cluster level. *p<0.10; **p<0.05; ***p<0.01.

In Panel A, I estimate the system in Equation 2 to assess the effect of the pooled treatment; then, in Panel B, I show the estimates of the in-kind and cash treatment arms. In contrast to Tommasi et al. (2016) and Sokullu and Valente (2022), who found that CT increased men's or their children's resource shares while decreasing women's resource shares, I find that the transfer (pooled treatment) decreases fathers' resource share while increasing mothers' and children's.

Regarding the proportion of this resource reallocation, the positive effect on mothers is larger in magnitude than on children. Consistent with other studies (see, Klein and Barham, 2018; Tommasi, 2019), these results imply that CT could have an important role in households' redistribution of resources. In Panel B of Table 2, the magnitude of the impact varies depending on the transfer modality. Although in-kind transfers have a slightly smaller effect than cash transfers, both considerably impact how resources are allocated within households.

Columns (4) – (6) of Table 2 show that results are stable to the choice of the treatment variable, corroborating the robustness of the benchmark specification. These findings provide evidence that transfers not only have the potential to decrease inequality—at least in the short term—but also that in-kind transfers are nearly as effective as cash transfers in improving the within-household redistribution of resources

4. Implications for Women's Bargaining Power

I next estimate the predicted resource shares for women $\left(\hat{H}^{♀}\right)$, men $\left(\hat{H}^{♂}\right)$, and children $\left(\hat{H}^{k}\right)$ in each household (Table 3). In non-beneficiary households, women's resource shares are 58% of men's, whereas, in beneficiary households, women's resource shares are 97% of men's.

Table 3: Estimated Resource Shares and Control of Resources

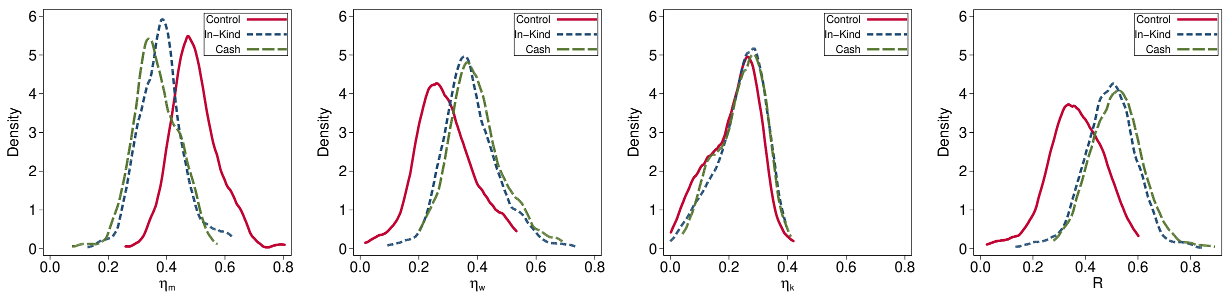
	A: Resource Shares							
	No CT (N=261)				CT (N=696)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Men	0.498	0.088	0.228	0.841	0.384	0.086	0.075	0.651
Women	0.289	0.103	0.012	0.567	0.372	0.098	0.085	0.723
Children	0.213	0.089	0.000	0.459	0.245	0.083	0.011	0.440
	B: Control of Resources							
$R = \frac{\hat{\eta}^{♀}}{\hat{\eta}^{♀}+\hat{\eta}^{♂}}$	0.364	0.110	0.014	0.595	0.490	0.107	0.120	0.892
Diff.	[0.126]***							
$R_{ALT} = \frac{\hat{\eta}^{♀}+\hat{\eta}^{k}}{\hat{\eta}^{♀}+\hat{\eta}^{k}+\hat{\eta}^{♂}}$	0.502	0.088	0.159	0.772	0.616	0.086	0.349	0.925
Diff.	[0.114]***							
	Cash (N=234)				In-Kind (N=462)			
R_{Cash} vs. $R_{In-Kind}$	0.520	0.098	0.278	0.894	0.495	0.100	0.133	0.851
Diff.	[-0.025]***							

Notes: The table reports the estimated resource shares and women's resource control in beneficiary and non-beneficiary households. *p<0.10; **p<0.05; ***p<0.01.

The CT raises the total share allocated to children (21% vs. 25%). I also compute the amount of resources controlled by women relative to men ($R = \frac{\hat{\eta}^{♀}}{\hat{\eta}^{♀}+\hat{\eta}^{♂}}$), finding a difference of 12.6 ppt between the beneficiary and non-beneficiary households (the alternative metric yields a difference of 11.4 ppt). These results are congruent with those of Klein and Barham (2018) and Tommasi (2019), who found that *PROGRESA* increased women's resource control, although the effect of CT in Tommasi (2019) is smaller in magnitude.

Figure 1: Empirical Distributions of Resource Shares and Control of Resources by Transfer Modality

(a) Men's Share **(b)** Women's Share **(c)** Children's Share **(d)** Control of Resource

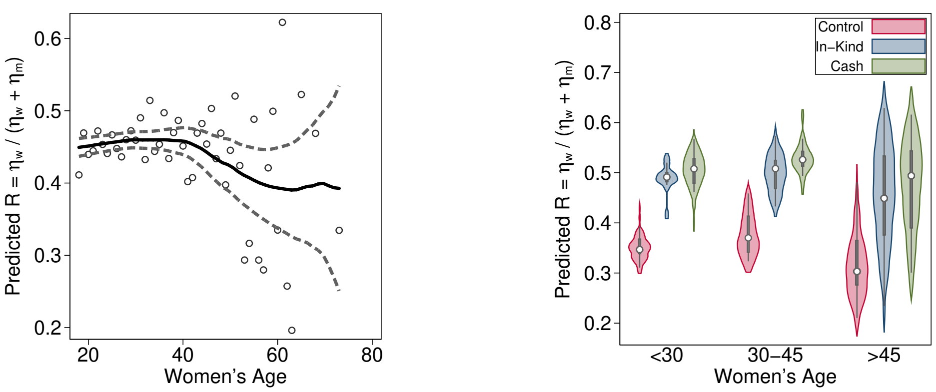


Notes: Each panel differentiates between cash (dotted green line), in-kind (short dotted blue line), and control (continuous red line) groups.

Then, in Fig. 1, I assess the within-household redistribution of resources caused by different CT modalities. Interestingly, both transfer modalities induced a redistribution of household resources from fathers to mothers and children, with women reaping the most significant benefits. Moreover, a cash transfer is marginally more effective than an in-kind transfer in increasing women's control over household resources (bottom of Table 3).

Figure 2: Women's Control of Resource over Age Profiles

(a) Control of Resources **(b)** Control of Resources by Modality



Notes: A ratio equal to 0.5 suggests that there is no gender asymmetry in the intra-household allocation of resources.

I next investigate how women's resource control evolves across the lifecycle (Fig. 2). For each age profile $a \in (18, \ldots, 60)$, I calculate $\left(\hat{R}_a\right)$ as the mean predicted resource control for women among all households with women's average age equal to a. Panel (a) illustrates a decreasing trend in women's resource control. During women's core reproductive ages, the allocation of resources between adult females and males is relatively symmetric.

At post-reproductive ages, women's resource control experiences a steady decline. This outcome is similar to that of Calvi (2020). In Panel (b), this measure is disaggregated among different treatment modalities and age categories. The results demonstrate that cash transfers outperform in-kind transfers in enhancing women's resource control both during their reproductive years and in the post-reproductive stage. These findings suggest that both transfer modalities are valuable tools for improving the within-household redistribution of resources; nevertheless, cash transfers yield slightly more favorable outcomes.

5. Conclusion

This paper applies a structural framework to analyze how intra-household resource allocations and women's resource control responds to different CT modalities. Using experimental data, I provide evidence that CTs induce a redistribution of resources within the household, increasing the share of resources allocated to women and children. Moreover, I found that transfers not only have the potential to decrease inequality but also that in-kind transfers could be as effective as cash transfers in improving the within-household redistribution of resources and women's bargaining power. The findings reported here shed new light on the distributional impacts of different modalities of income support programs.

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