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# **The Distributive Consequences of *Machismo*: A Simulation Analysis of Intra-household Discrimination**

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## **Abstract:**

Empirical evidence questions the unitary allocation model of the household that underpins the standard measurement of monetary poverty and inequality. Intra-household gender discrimination has been widely shown to shape expenditure decisions, nutrition status, and human capital accumulation of household members. However, conventional poverty and inequality analyses are conducted for the household as a whole, which might lead to different conclusions compared with studies based on individuals. Using recent developments in intra-household bargaining modelling, this paper constructs non-cooperative allocation rules dominated by gender discrimination among household members. Estimates for Chile show a substantial worsening of poverty and inequality under such allocation rules. This suggests that intra-household discrimination deserves some of the attention typically directed to extra-household discrimination in labour markets, access to public services or political participation.

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# **The Distributive Consequences of *Machismo*: A Simulation Analysis of Intra-household Discrimination**

## **1. Introduction**

Gender relations, power struggles, empowerment and participation are all key issues in today's socioeconomic development. At the household level, intra-household economics have long shown the limitations of the benevolent dictator paradigm to characterize decision-making within the household (Haddad et al., 1997). A host of empirical studies clearly show that welfare of individual members depends significantly on who controls earned and transferred incomes (Thomas, 1994; Doss, 1996). Studies taking advantage of the special design of social programmes (close to a controlled natural experiment) show that household expenditure on children's food and human capital increases when benefits are targeted directly to women. This evidence holds for contexts as different as the UK and Mexico (Lundberg et al., 1997; Coady and Skoufias, 2004). At a broader level, international financial institutions have started to claim that the poverty reduction and debt relief initiatives that they sponsor foster participation, protection and empowerment of specific vulnerable groups such as women or children (World Bank, 2000).

Despite the increasing interest, however, the workings of intra-household relations remain a 'black box' (Pahl, 1989). By concentrating on testing against the unitary model, the intra-household literature has overlooked a critical question: what impact do bargaining relations have on poverty and inequality? This paper tackles this question by simulating income distributions that result from incorporating gender discrimination in the intra-household allocation of resources. Acknowledging the multidimensionality of poverty, Section 2 summarizes existing anthropological,

sociological and economic evidence suggesting intra-household bargaining, which is then used in Section 3 to construct alternative non-cooperative allocation rules within the household. Among these rules, different forms of gender discrimination among household members are articulated into what could be interpreted as *machismo* rules. Section 4 re-estimates monetary poverty and inequality indicators for Chile after household incomes are reallocated according to the simulated bargaining rules. Impacts are intended to isolate primarily the immediate effects of interpersonal gender discrimination, *machismo*, within the household, which means that neither second-round effects nor the effects of gender discrimination outside the household are explicitly factored in. By wrongly assuming cooperation within non-cooperative households, Section 5 concludes, policy makers might incur in gross mistakes regarding the impact of their interventions on individuals.

## **2. Modelling Bargaining Behaviour**

The unitary household model (as in Ashenfelter and Heckman, 1974), which underlies the standard measurement of monetary poverty, assumes that resources generated by household members in the factor markets or transferred by the State are re-allocated according to each individual's needs. The so-called 'common pool' hypothesis of a benevolent dictator underpins the dynamics of intra-household allocation under the classic standard consumer theory. Under the unitary model, the household optimizes — for all its members — a combination of leisure and consumption goods, subject to budget constraints. However, empirical evidence increasingly points away from such an allocation, suggesting instead the presence of bargaining behaviour within the

household.<sup>1</sup> Importantly, the intra-household bargaining hypothesis may have substantive welfare implications if the ability of a given member to control household incomes (and to discriminate among other household members in that re-allocation) is sufficient to alter the original distribution of incomes resulting from factor markets and public and private transfers. In effect, using evidence reported for Bangladesh, Indonesia, Ethiopia, and South Africa, Quisumbing and Maluccio (2003) show that exogenous factors including spouses' pre-marriage assets and their education level affect household outcomes such as individual shares in food, education, health, child's clothing, and tobacco and alcohol. Similarly, Thomas (1994) shows for Brazil, Ghana and the US that children's nutritional status depends on the household head's gender and education levels. Lundberg et al. (1997), for the UK, and Coady and Skoufias (2004), for Mexico, show that policy shifts making women recipients of social benefits have a positive effect on the educational and health status of children in the benefiting households. For Chile, Cuesta (2005) shows the distinctive impacts of cash and in-kind social transfers on the supply of labour across household members. Although an unambiguous conclusion in favour of an endogenous pattern of bargaining remains elusive, the map of distributive effects from social transfers is inconsistent with unitary models. Contrary to the predictions of unitary models (Ashenfelter and Heckman, 1974), the source and nature of resources brought to the household *does* matter in the decisions of individual household members.

Anthropological and sociological evidence has also questioned the pooled income hypothesis underlying the unitary model both in developed (Blumberg and Coleman, 1989) and developing countries (Blumberg, 1988; Jejeebhoy, 1995).

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<sup>1</sup> See Strauss and Thomas (1995); Doss (1996); Behrman (1997); Haddad et al. (1997); and Quisumbing (2003) for reviews on bargaining studies.

Asymmetric balance of power within the household is reflected by gender differentials in consumption patterns (Pahl, 1989), domestic violence (Rao, 1997), fertility decisions and participation in social activities (Casique, 2000). A feature of resource allocation in countries like India, Mexico, Cameroon or Honduras is that resources earned by women from activities such as weaving, home production, street vending, small and medium agro-business, are all contributed to household incomes, while men withhold a substantial part of their incomes (between 25% and 30%) for themselves. As demonstrated below, this evidence can be pieced together to characterize alternative intra-household non-cooperative bargaining rules that are different from the unitary model.

In terms of modelling, Blundell and MaCurdy (1999) show that the household resource allocation reached under bargaining is a two-stage optimization process, in which individuals maximize their own utility after some previous resource allocation has taken place, achieving a Pareto-efficient equilibrium that guarantees a certain degree of utility beyond a minimum level or *threat point*. In models of marriage formation and dissolution, threat points refer to consumption utility levels that if not satisfied lead members to dissolve the household. In such models, threat points are often specified as functions of ‘extra-household environmental parameters’ (McElroy, 1990) such as institutional, demographic and legal factors. Different characterisations of these unobservable threat points include the level of utility attained alternatively if household members were divorced (McElroy and Horney, 1981), engaged in a non-cooperative games with other members of the household (Lundberg and Pollak, 1993), or lived in extreme poverty (Licona, 1997).<sup>2</sup>

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<sup>2</sup> Assuming that household members engage in a cooperative Nash game, McElroy and Horney (1981) approximate this threat point as the level of utility outside marriage, that is, the utility that each person would obtain in case of divorce. Other cooperative models, such as in Lundberg and Pollak (1993), assume that household members bargain cooperatively but if cooperation does not take them to an

Unfortunately, there is not a widely accepted proxy for the threat point (see Bergstrom, 1997) and in some cases divorce-based threat points are not adequate (Doss, 1996). In the case of Chile, divorce was unlawful at the time of the collection of data used in this study in 1996. Instead, Lundberg and Pollak's (1993) notion of socially established gender roles dominating or influencing decisions at the household is maintained in our model. Household members are believed to be part of gender-based spheres within the household. Bargaining can be such that these two spheres relate or, instead, remain separated at the time of resource allocation, giving rise to the male dominant or machismo allocation rules (as explained below).

We use the income necessary to purchase a basket of goods and services satisfying basic needs (i.e., the extreme poverty line) as a proxy for each individual threat point. Using the poverty line as a proxy for the threat point is particularly appealing for a distributive analysis as it incorporates poverty directly in the household decision-making process.<sup>4</sup> Also, it conveniently restricts the extra-household factors considered to affect threat points to only those determining the cost of the food basket. In a model of marriage dynamics, this simplification would overlook important interactions. However, in an analysis of poverty, it allows to isolate the effects strictly caused by gender discrimination among household members and not by other factor exogenous to the household such as wage discrimination, for instance. Also, the estimated effects refer only to immediate or first-round effects, before further adjustments in behaviour or threat points do take place within the household.

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equilibrium, socially prescribed gender roles will do. In this 'separate sphere model' (Lundberg and Pollak 1993: 990), the non-cooperative outcome resulting from gender roles is the threat point.

The initial unitary household model is extended into a collective model equivalent to a problem where each household member maximizes his or her utility after their specific individual weights (the so-called *sharing rule*, Chiappori, 1992) are assigned.<sup>5</sup> See appendix 1. Under the bargaining mechanism, factorial incomes *initially* generated by each individual add up to individual transferred incomes to generate a distribution of individual incomes,  $y_i^o$ :

$$y_i^o = H_i w_i + N_i + S_i^c + S_i^K \quad [1]$$

These incomes are transformed into his or her final income  $y_i^R$  after some bargaining allocation rule,  $\theta_i$ , redistributes initial incomes. The resulting final income of each individual then becomes:

$$y_i^R = \theta_i [H_i w_i + H_j w_j + N_i + N_j + S_i^c + S_j^c] + S_i^K \quad [2]$$

where  $H_i w_i$  refers to individual labour incomes from the main occupation;  $N_i$ , individual primary incomes other than labour, that is, financial incomes, rents, home production and pensions;  $S_i^c$ , social cash transfers received by the individual;  $S_i^K$ , social in-kind transfers received by the individual; and  $\theta_i$ , the vector of individual income shares resulting from the redistribution within the household.

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<sup>4</sup> The resulting model – shown in Appendix 1 -- follows the tradition of quasi-homothetic preference models of household allocation using the basic food basket as minimum level of individual consumption. See Ashenfelter and Heckman (1974).

<sup>5</sup> When the sharing rule provides each household member's exact needs, then the intra-household allocation becomes unitary. In other words, the unitary rule can be interpreted as a special case of bargaining behaviour.



It is worth noting that the non-assignability property of in-kind transfers (Chiappori, 1992) ensures that in the final income equation [2], in-kind transfers initially received by each individual are not subject to further re-allocation within the household. For example, another household member cannot capture the monetary-equivalent benefit implicit in the provision of free public education of a child. The same does not hold for a cash benefit transferred to a wife, which is susceptible to being appropriated by her husband, for instance.

### **3. *Machismo* Bargaining Specifications**

To achieve a full model of bargaining, we need to unravel how the sharing rule,  $\theta_i$ , is assigned, that is, whether or not household members act cooperatively. In specifying the allocation rule existing evidence on intra-household behaviour becomes relevant, although it may be sometimes inconclusive and contradictory. Quisumbing and Maluccio (2003), for instance, report that increases in the ratio of wives' to husbands' assets (an indicator of women's power within the household) have a positive effect on the household expenditure share on children's health in Indonesia but negative in Bangladesh. Instead, in Ethiopia, the only significant impact that the wife's position has is on the food and tobacco and alcohol shares, while in South Africa her position only affects the household expenditure share on education.

Existing evidence shows at least two forms of bargaining behaviour suggesting gender discrimination. A first form of bargaining is described as a ***machismo allocation***. Under this allocation, individuals act non-cooperatively by first retaining the income necessary to satisfy their threat point, and excess income is then shared according to the needs of each individual of the same gender. In this model, there are no inter-gender transfers within the household: the sharing rule among

females is separated from the sharing rule among males. The sharing vector  $\theta_i^m$  for males captures the individual share of each male with respect to the needs of all males in the household; similarly, the female sharing vector,  $\theta_i^f$ , captures each female's needs with respect to the total needs of females in the household. In-kind transfers do not play a role in this intra-household redistribution. See Annex 1 for the formalization of this non-cooperative bargaining specification.

Rubalcava and Contreras (2000) for Chile, Thomas (1994) for Brazil, Ghana and the US, and Klasen (1998) for Germany, show that mothers and fathers allocate resources differently among daughters and sons. Comparing separately the nutritional status of sons and daughters or the expenditure shares on different items, these studies suggest that the gender of the household head has a significantly positive effect on a child of the same gender. Mothers channel relatively more resources into daughters, and fathers into sons, although mothers typically channel more resources to both boys and girls than fathers do. However, the evidence is not conclusive: Haddad and Hoddinott (1990) in Cote d'Ivoire and Thomas et al. (1997) in Indonesia, also report mothers showing preferences for boys. Of course, evidence on parental gender preferences has not been reported in practice as extreme as in this stylized allocation rule. Nevertheless, as a simulation exercise, the extreme allocation rule allows us to estimate the potential consequences of a severe form of discrimination.

A second allocation rule presents a more realistic allocation. It also describes a non-cooperative intra-household behaviour. In this allocation, which we call a **male dominant allocation**, males and females first retain sufficient income to satisfy their basic needs at the threat point. Then, males contribute only a part of their excess incomes, while females contribute the totality of any excess income that they generate. As in the machismo allocation, in-kind transfers are not redistributed within

the household. Also, household members do not engage in intra-household redistribution unless initial incomes exceed the individual's threat point. See Annex 1.

Contreras and Cáceres (1999) report evidence of this sort of discrimination against females among Chilean households. This is reflected in the different shares of education expenditures according to gender of the child (especially among poor households). Anthropological studies also suggest a form of male dominance. In particular, males are reported to retain substantial proportions of their generated incomes, while women's earned incomes are fully pooled for the household redistributive process. In India, Blumberg (1988) reports that males retain about 30% of their generated incomes in Kerala, and 26% in Tamil Nadu; for the same states, females retain 10% and 2% respectively. Roldán (1987) reports male retention shares of about 25% of their generated incomes in Mexico City, while Gideon (1999) reports male retention shares of 37% in rural areas, and 32% in urban areas of Honduras. In these cases, too, females are reported not to retain a significant share of their incomes. Other studies suggest the existence of differentials in contribution shares by gender but do not report the magnitude of such differentials (for example, Blumberg, 1988, for Cameron and Ghana). In the light of this evidence, an average retention rate of 25% is assumed for males while no retention is assumed among female household members.

**<Table 1: Bargaining Allocation Rules vs. Unitary Rule>**

#### **4. The Measurement of Poverty Incidence and Income Inequality under the Simulated Bargaining Allocation Rules**

This section discusses the consequences for poverty incidence and income inequality arising from intra-household allocation if alternative non-cooperative bargaining specifications were assumed to govern Chilean household behaviour in 1996 (see Annex 2 for a description of the data used). The impact of a specific allocation is estimated by comparing the poverty incidence and income distribution indicators among successive household income distributions. The baseline distribution refers to the standard unitary case where poverty indicators are estimated along a distribution of per capita household incomes. Alternative distributions result from applying the intra-household allocation of incomes according to the simulated rules in Table 1. Prior to these comparisons, however, a number of corrections regarding the original distribution of incomes obtained from the Chilean CASEN household survey (Mideplan, 1996) are in order. First, incomes are netted out of income taxes according to statutory tax rules and the prediction of non-filing taxpayers estimated for Chile by Engel et al. (1999). Second, in-kind transfers are imputed into the monetary distribution of household incomes according to statutory benefits and identified beneficiaries in the household following Cuesta (2005). Third, income poverty and distribution measures are both computed using successively alternative equivalence scales so as to separate the effects attributable to household composition from those caused by intra-household bargaining. Specifically, the Amsterdam Scale of Deaton and Muellbauer (1980) adjusts household needs according to physiological needs differentials, while the widely used Rothbarth Scale for Chile (World Bank, 1997) takes into account the efficiency gains associated with the size and age composition of the household.

The empirical estimates reported in Table 2 show that both equivalence scales and social transfers have sizeable effects on the measurement of poverty incidence,

using the official poverty lines set by Chile's Ministry of Development and Planning (Mideplan, 1999). This is to be expected both from the substantial reductions in household needs from the equivalence scales<sup>6</sup> and the size of transfers. Poorer households are typically bigger in size, have more children, and receive larger social transfers than non-poor households. As expected, poverty incidence measurements using the Amsterdam scale are slightly lower (by 0.8%) than the extreme poverty incidence of the per capita monetary case, and an additional 6% lower for moderate poverty (see rows "Amsterdam" and "Per capita monetary", respectively, in Table 2). Differences with the per capita distribution, however, are much larger using the Rothbarth scale: 1.2% lower for extreme poverty and 9% for moderate poverty (see rows "Rothbarth" and "Per capita monetary" in Table 2).

The comparison between the per capita monetary distribution and the per capita distribution of both monetary incomes and in-kind transfers tells us the extent to which the above differences are attributable to the inclusion of in-kind transfers *vis-à-vis* the use of equivalence scales. The inclusion of in-kind transfers appears to reduce extreme poverty incidence by 4%, with roughly the same reduction observed for moderate poverty. This result suggests that the non-assignability of in-kind transfers has significant consequences for the reduction of poverty, both at extreme and moderate levels, and even if no further intra-household allocation empowers particular members. This result contradicts Larrañaga (1999)'s finding — using only monetary transfers along — that social transfers are able to substantially reduce the ranks of the extreme poor but are unable to take them away from moderate poverty.

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<sup>6</sup> As an illustration, the Amsterdam Scale would reduce the total needs of a two-adult household with two children by 25% of the needs estimated on per capita basis. The reduction would rise to 40% in the case of the Rothbarth scale for a Chilean household of that composition.

As for the distributive effect of bargaining rules, poverty incidence under both the *machismo* and male dominant rules shows unambiguous increases compared with the unitary model. Predictably, such increases in poverty incidence are wide in range: the difference between the unitary and male dominant rules amounts to 20%, most of which is concentrated on the incidence of extreme poverty. This sizeable increase of extreme poverty under the male dominant rule indicates that incomes retained by males are decisive for the satisfaction of needs among household members who cannot meet their basic needs on their own.<sup>7</sup>

The increase in poverty incidence caused by a male dominant rule is similar to that of the *machismo* allocation. Table 2 shows that the differences in poverty incidence between the *machismo* and unitary rules are slightly lower than 20% for total poverty. Again, this difference is accounted for by the increase in extreme poverty. The separate income distributions by gender (see rows ‘Female Distribution’ and ‘Male Distribution’ in Table 2), indicate that *machismo* allocations take their toll not only among females but also among males. The increase in female poverty is 3% higher than male poverty, suggesting that the contribution of females to household incomes is relevant. Underlying this result is the continued upward trend in female participation in the labour market since the mid-1980s and the (slight) reduction in male labour participation rates for the same period (Mizala and Romaguera, 2001).

As with poverty, the income distribution under intra-household bargaining allocation rules is markedly worse than under the unitary case (see Table 2). The deterioration of inequality indexes under the *machismo* and male dominant allocation rules is again similar in magnitude, although it is the *machismo* rule that brings the

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<sup>7</sup> This result is not caused by the selection of 25% as the retention rate of male transferable incomes (see above). Similar incidences of poverty were obtained using retention rates of 20% to 35% of male transferable incomes.

largest deterioration *vis-à-vis* the unitary rule. Its Atkinson index amounts to 0.86, exceeding the 0.61 and 0.80 dispersion coefficients of income distributions under the unitary and male dominant rules, respectively. This result also holds for the Gini and the Theil inequality indexes, which suggests that the deterioration of income distribution is robust to the use of indicators sensitive to different regions of that distribution (Atkinson, 1970). Nonetheless, the increase of almost 40% of the estimated Atkinson index from the unitary to *machismo* rules is the largest among the estimated increases of the remaining indexes. This suggests that, also in terms of inequality, those at the bottom of the household distribution bear the brunt of the redistributive consequences of interpersonal gender discrimination within the household.

< **Table 2: Estimated Poverty and Income Dispersion Indicators under Alternative Allocation Rules** >

## **5. Conclusions**

Standard measures of monetary poverty and inequality along per capita household income distributions have assumed a unitary model governing intra-household allocation. The increasing evidence against the unitary model raises questions over the role of the *additional* redistributive round that takes place once factor incomes and State transfers reach the household. Estimates for Chile show that both poverty incidence and income inequality may change substantially when gender-based non-cooperative bargaining governs relations among household members. Estimates show that ‘mild’ forms of bargaining would typically bring redistributive results close to those observed under the non-discriminatory unitary allocation. However, taking

account of severe forms of gender discrimination would result in substantial increases in household poverty and inequality in Chile. *Machismo* allocation rules would affect more dramatically the final incomes of both males and females and, most importantly, already extremely poor households would bear the brunt.

Although these results should not be interpreted literally as real-life impacts, they point to potentially large consequences of extreme discriminatory practices *within* the household. Further research needs to factor in second-round distributive effects resulting from reactions of discriminated household members, alternative threat points with extra-household determinants, and also needs to go beyond the monetary metric. Our estimated effects, however, call for more attention to discriminatory practices within the household instead of focussing exclusively on extra-household discrimination at the labour market, in the provision of public services or in politics.



## References

- Ashenfelter O., Heckman J.J. 1974. The estimation of incomes and substitution effects in a model of family labour supply. *Econometrica* **42**(1): 73-85.
- Atkinson A.B. 1970. On the measurement of inequality. *Journal of Economic Theory* **2**: 244-63.
- Behrman J.R. 1997. Intra-household distribution and the family. In *Handbook of population and family economics*, vol. 1a, Rosenzweig M.R., Stark O. (eds). North-Holland Publishing Company, Amsterdam.
- Bergstrom T. 1997. A survey of theories of the family. In *Handbook of population and family economics vol 1a*, Rosenzweig M.R., Stark O. (eds). North-Holland Publishing Company, Amsterdam.
- Blumberg R.L. 1988 Income under female versus male control: hypothesis from a theory of gender stratification and data from the Third World. *Journal of Family Issues* **9**(1): 51-84.
- Blumberg R.L., Coleman M.T. 1989. A theoretical look at the gender balance of power in the American couple. *Journal of Family Issues* **10**(2): 225-50.
- Blundell R.W., MaCurdy T.E. 1999. Labour supply: a review of alternative approaches. In *Handbook of Labour Economics, Volume 3A*, Ashenfelter O., Card D. (eds). North-Holland, New York.
- Browning M., Bourguignon F., Chiappori P.A., Lechêne V. 1994. Income and outcomes: a structural model of intra-household allocation. *Journal of Political Economy* **102**(6): 1067-96.
- Casique M. 2000. Mexican married women's autonomy and power within the household. Paper presented at the Latin American Studies Association, Rio de Janeiro, January
- Chiappori P.A. 1992. Collective labour supply and welfare. *Journal of Political Economy* **100**(3): 437-467.
- Coady D., Skoufias E. 2004 On the Targeting and Redistributive Efficiencies of Alternative Transfer Instruments. *Review of Income and Wealth* **50**(1): 11-27.
- Contreras D., Cáceres J. 1999. Reasignación de recursos en los hogares pobres de Chile. *Cuadernos de Economía* **36**: 727-80.
- Cuesta J. 2005. Social Transfers as a Determinant of Intra-household Distribution: The Case of Chile. *Journal of Income Distribution*, **13**. Forthcoming.
- Deaton A., Muellbauer J. 1980. *Economics and consumer behaviour*. Cambridge University Press, Cambridge.
- Doss C. 1996. Testing among models of intrahousehold resource allocation. *World Development* **24** (10): 1597-1609.
- Engel E., Galetoviz A., Raddatz, C. 1999. Taxes and income distribution in Chile: some unpleasant redistribution arithmetics. *Journal of Development Economics* **59**(1): 155-92.
- Gideon J. 1999. Looking at economies as gendered structures. An application to Central America. *Feminist Economics* **5**: 1-28.
- Haddad L., Hoddinott, J. 1990. Women's income and boy-girl anthropometric status in the Côte d'Ivoire. *World Development* **22**(4): 543-33.
- Haddad L., Hoddinott J., Alderman H. eds. 1997. *Intra-household resource allocation in developing countries: Methods, models, and policy*. Johns Hopkins University Press, Baltimore, for the International Food Policy Research Institute.
- Jejeebhoy S.J. 1995 *Women's education, autonomy, reproductive behaviour: experience from developing countries*. Clarendon Press, Oxford.
- Klasen S. 1998. Marriage, bargaining and intra-household resource allocation: excess female mortality among adults during early German development. *Journal of Economic History* **58**(2): 432-67.
- Larrañaga O. 1999. *Distribución y crecimiento económico en Chile*. Documento LC/L.1226. ECLAC, Santiago de Chile.

- Licona G. H. 1997. Oferta laboral familiar y desempleo en México. Los efectos de la pobreza. *El Trimestre Económico* **64**: 531-68.
- Lundberg S, R. A. Pollak 1993. Separate spheres bargaining and the marriage market. *Journal of Political Economy* **101** (6): 988-1010.
- Lundberg S., Pollak R.A., Wales T.J. 1997. Do husbands and wives pool their resources? Evidence from the United Kingdom Child Benefit. *Journal of Human Resources* **32**(3): 463-80.
- McElroy M. 1990. The empirical content of Nash-bargained household behaviour. *Journal of Human Resources* **25**, Fall: 559-83.
- McElroy M., Horney M. 1981. Nash-bargained household behaviour. Toward a generalization of the theory of demand. *International Economic Review* **22**(2): 333-49.
- Ministerio de Desarrollo y Planificación (Mideplan) 1996. *Encuesta de Hogares CASEN*. Ministerio de Desarrollo y Planificación de la República de Chile, Santiago de Chile.
- 1999. *Pobreza y distribución del ingreso en Chile, 1990-1998*. Ministerio de Desarrollo y Planificación de la República de Chile, Santiago de Chile.
- Mizala A., Romaguera P. 2001. La legislación laboral y el mercado del trabajo en Chile: 1975-2000. Documentos de Trabajo Centro Economía Aplicada No. 114. Universidad de Chile Santiago de Chile.
- Pahl J. 1989. *Money and marriage*. Macmillan, London.
- Quisumbing A. (ed.) 2003. *Household Decisions, Gender and Development. A Synthesis of Recent Research*. International Food Policy Research Institute, Washington DC.
- Quisumbing A., Maluccio, J. 2003. Resources at marriage and intra-household allocation: evidence from Bangladesh, Ethiopia, Indonesia and South Africa. *Oxford Bulletin of Economics and Statistics* **65**(3): 283-327.
- Rao V. 1997 Wife-beating in rural South India: a qualitative and econometric analysis. *Social Science and Medicine* **44**(8): 1169-80.
- Roldán M. 1987. Renegotiating the marital contract. Intra-household patterns of money allocation and women's subordination among domestic outworkers in Mexico City. In *A house divided: women and income in the Third World* Dwyer D., Bruce, J. (eds). Stanford University Press, Stanford, CA.
- Rubalcava L., Contreras D. (2000) Does gender and birth matter when parents specialize on child's nutrition? Evidence from Chile. *Journal of Applied Economics* **3**(2): 353-86.
- Strauss J.A., Thomas D. 1995. Human resources: Empirical modeling of household and family decisions. In *Handbook of development economics*, Srinivasan T.N., Behrman, J. (eds). North Holland, Amsterdam.
- Thomas D. 1994. Like father, like son; like mother, like daughter. Parental resources and child height. *Journal of Human Resources* **29**(4): 950-88.
- Thomas D., Contreras D., Frankenberg E. 1997. Child health and the distribution of household resources at marriage. RAND, Santa Monica, CA (unpublished).
- World Bank 2000 *Manual de Estrategias de Reducción de la Pobreza*. World Bank, Washington DC.
- 1997 *Chile: poverty and income distribution in a high-growth economy: 1987-1995*. World Bank Report No. 16377-CH, vol. 2. World Bank, Washington DC..

**Table 1: Bargaining Allocation Rules vs. Unitary Rule**

Allocation Rule	Individual incomes pooled together?			Gender discrimination in the re-allocation of resources within the household?
	Factor incomes	Cash transfers	In-kind transfers	
Unitary	Yes	Yes	Yes	No
<i>Machismo</i> Bargaining	Yes, but only exceeding individual threat points	Yes, but only exceeding individual threat points	No	Yes: redistribution of excess incomes only to same sex individuals
Male dominant Bargaining	Yes, but only 75% of income exceeding individual threat points for males, and 100% of excess incomes for females	Yes, but only 75% of income exceeding individual threat points for males, and 100% of excess incomes for females	No	No

Source: Author

**Table 2: Estimated Poverty and Income Dispersion Indicators under Alternative Allocation Rules**

	Poverty Incidence		Income Dispersion		
	Extreme	Total	Atkinson Index	Gini Index	Theil Index
<b>Unitary:</b>					
(a) Per capita household distribution of primary incomes and cash transfers	6.7%	24.9%	0.68880	0.51880	0.54775
(b) Per capita household distribution of primary incomes, cash transfers and in-kind transfers.	2.3%	16.0%	0.61908	0.47615	0.46720
<b>Male Dominant</b>	22.5%	37.6%	0.80969	0.60334	0.78263
<b><i>Machismo</i></b>	22.4%	34.0%	0.86344	0.58612	0.73108
<b>Scaled Unitary Rules:</b>					
(a) Amsterdam scaled household distribution of primary incomes, cash transfers and in-kind transfers	1.5%	9.2%	---	---	---
(b) Rothbarth scaled household distribution of primary incomes, cash transfers and in-kind transfers	1.1%	5.6%	---	---	---
<b><i>Machismo</i> Separated Distributions</b>					
(a) <i>Machismo</i> , female distribution	23.5%	35.4%	---	---	---
(b) <i>Machismo</i> , male distribution	21.4%	32.4%	---	---	---

Source: Author's estimates from CASEN household survey (Mideplan, 1996)..

Note: Poverty incidence estimated according to the official poverty lines for 1996 (as in Mideplan, 1999). The extreme poverty lines is set as the per capita daily cost of the basic food basket, officially set at US\$0.53 and US\$0.69 in rural and urban areas, respectively. A 75% additional increase of the

basic food basket in rural areas and 100% in urban areas set the total poverty lines, resulting in US\$0.93 and US\$1.38 in rural and urban areas, respectively. Moderate poverty incidence is the difference between total and extreme poverty.

## APPENDIX 1: HOUSEHOLD MAXIMIZATION PROBLEM WITH INTRA-HOUSEHOLD BARGAINING

After the classical maximization problem in the unitary household model is expanded to include the sharing rule, the intra-household bargaining problem becomes a two-stage problem in which individuals maximize their own utility after some previous resource allocation has taken place (Blundell and MaCurdy (1999)):

$$\max_{C_i, L_i} U = (C_i - \chi_i)^{\alpha_i} (L_i - \lambda_i)^{\beta_i} \quad , \alpha_i + \beta_i \geq 1 \quad (\text{A1})$$

$$\text{s.t. } Y^0 = Lw + C \quad (\text{A2})$$

$$Y^0 = Tw + N + S^c + S^k \quad (\text{A3})$$

$$Y^R = \theta_i Y^0 \quad (\text{A4})$$

$$L_i \leq T \quad (\text{A5})$$

$$L_i + H_i = T \quad (\text{A6})$$

$$C_i, L_i > 0 \quad (\text{A7})$$

$$(C_i - \chi_i) \geq 0 \quad (\text{A8})$$

$$(L_i - \lambda_i) \geq 0 \quad (\text{A9})$$

$$\sum_i L_i = L \quad (\text{A10})$$

$$\sum_i C_i = C \quad (\text{A11})$$

$$\sum_i w_i = w \quad (\text{A12})$$

$$\sum_i X_i = X \quad (\text{A13})$$

$$\sum_i N_i = N \quad (\text{A14})$$

$$\sum_i S_i^s = S^s, \quad s = c, k \quad (\text{A15})$$

$$\sum_i \theta_i = 1 \quad (\text{A16})$$

where  $C$  represents individual consumption;  $L$ , the leisure composite;  $H$ , work effort (measured in working hours);  $\chi$ , the minimum level of consumption (whose equivalent income value can be thought as the extreme poverty line);  $\lambda$ , the minimum level of leisure;  $w$ , wage or unitary labor income;  $Y^p$  is the initial full income;  $Y^R$  is the final full income after the intra-household re-allocation takes place;  $T$ , the maximum time available;  $N$ , the non-labor primary income;  $S^c$ , cash social transfers; and  $S^k$ , in-kind social transfers on education, health, housing subsidies.

As a special case of unitary household model (where the sharing rule assigns resources to their members based on their exact needs), the predicted incomes of household members after the two stages of the unitary model can be expressed as follows. In order to track the intra-household transfers, net receivers of transfers (typically, children or the elder) are separated from net contributors to the household (such as income earners):

**Table A1.1: The Unitary Household Model**

		Household Net Generators	Household Net Recipients
First Stage	a) Intrahousehold Redistribution	$y_i^1 = \chi_i$ if $y_i^0 \geq \chi_i$	$y_i^1 = \chi_i$ if $\sum_{i=1}^M (y_i^0 - S_i^k) \geq M \cdot \chi_i$ $y_i^1 = y_i^0$ if $\sum_{i=1}^M (y_i^0 - S_i^k) < M \cdot \chi_i$
	b) No Intrahousehold Redistribution	$y_i^1 = y_i^0$ if $y_i^0 < \chi_i$	$y_i^1 = y_i^0$ if $y_i^0 < \chi_i$
Second Stage	a) Intrahousehold redistribution	$y_i^R = \chi_i + [ \sum_{i=1}^M (y_i^0 - S_i^k) - M \cdot \chi_i ] \theta_i$	
	b) No Intrahousehold Redistribution	$y_i^R = y_i^0$	

**Source:** Author

**Notes:**  $\chi_i$  indicates the minimum equivalent income to purchase the official basket of goods in Chile.

M is the number of members of the household.

The predicted final income distributions under non-cooperative gender discrimination rules are:

**Table A1.2: The Machismo Bargaining Model**

		Household Net Generators	Household Net Recipients
First Stage	a) Intrahousehold Redistribution	$y_i^1 = \chi_i$ if $y_i^0 \geq \chi_i$	$y_i^1 = \chi_i$ if $\sum_{i=1}^{M_g} (y_i^0 - S_i^k) \geq M_g \cdot \chi_i$ $y_i^1 = y_i^0$ if $\sum_{i=1}^{M_g} (y_i^0 - S_i^k) < M_g \cdot \chi_i$
	b) No Intrahousehold Redistribution	$y_i^1 = y_i^0$ if $y_i^0 < \chi_i$	$y_i^1 = y_i^0$ if $y_i^0 < \chi_i$
for g = male, female			
Second Stage	a) Intrahousehold redistribution	$y_i^R = \chi_i + [ \sum_{i=1}^{M_g} (y_i^0 - S_i^k) - M_g \cdot \chi_i ] \theta_i^g$ for g = male, female	
	b) No Intrahousehold Redistribution	$y_i^R = y_i^0$	

**Source:** Author

**Notes:**  $\chi_i$  indicates the minimum equivalent income to purchase the official basket of goods in Chile.

M is the number of members of the household.

**Table A1.3: The Male Dominant Bargaining Model**

		Household Net Generators	Household Net Recipients
First Stage	a) Intrahousehold Redistribution	$y_i^1 = \chi_i$ if $y_i^o \geq \chi_i$	$y_i^1 = \chi_i \text{ if } [0.75 \sum_{i=1}^{M_m} (y_i^0 - S_i^k)] + [ \sum_{i=1}^{M_f} (y_i^0 - S_i^k) ] \geq M \cdot \chi_i$ $y_i^1 = y_i^o \text{ if } [0.75 \sum_{i=1}^{M_m} (y_i^0 - S_i^k)] + [ \sum_{i=1}^{M_f} (y_i^0 - S_i^k) ] < M \cdot \chi_i$
	b) No intrahousehold Redistribution	$y_i^1 = y_i^o$ if $y_i^o < \chi_i$	$y_i^1 = y_i^o$ if $y_i^o < \chi_i$
Second Stage	a) Intrahousehold redistribution	$y_i^U = \chi_i + \theta_i [0.75 \sum_{i=1}^{M_m} (y_i^0 - S_i^k)] + [ \sum_{i=1}^{M_f} (y_i^0 - S_i^k) ] + 0.25 [y_i^o - S_i^k - X_i]$ <p>for males</p> $y_i^U = \chi_i + \theta_i [0.75 \sum_{i=1}^{M_m} (y_i^0 - S_i^k)] + [ \sum_{i=1}^{M_f} (y_i^0 - S_i^k) ]$ <p>for male recipients, and both female generator and recipients</p>	
	b) No Intrahousehold Redistribution	$y_i^U = y_i^o$	$y_i^U = y_i^o$

**Source:** Author

**Notes:**  $\chi_i$  indicates the minimum equivalent income to purchase the official basket of goods in Chile.  $M$  is the number of members of the household.  $Y^U$  refers to the final full income after the male dominant rule acts within the household.



## APPENDIX 2: Data Descriptive Statistics

The 1996 CASEN household survey was designed, collected, and computed by the Ministry of Development and Planning, in collaboration with the University of Chile and ECLAC. The CASEN survey collects a nation-wide stratified random sample of households. The sampling method in 1996 includes all cities larger than 40,000 inhabitants and, subsequently, randomly selects urban and rural towns, villages and settlements according to conglomerates as defined by the National Institute of Statistics' Census. The 1996 CASEN survey collects 134,202 individual observations comprised in 33,636 households. Table A2 presents key descriptive statistics.

**Table A2: The 1996 CASEN Descriptive Statistics**

	Female		Male	
	Head	Non-head	Head	Non-head
<b>Individual characteristics</b>				
Proportion (%)	10.8	89.2	39.8	60.2
Schooling years	8.3	7.6	9.8	6.4
Age	54.5	26.9	45.1	17
Marriage Rate (%)	13.5	42.6	90.7	8.5
Location in urban areas (%)	89.3	84.5	83.4	82.8
Location in Santiago (%)	44.1	40.9	39.3	39.1
<b>Household characteristics</b>				
Size		3.9		4.2
Number of children		0.8		1.3
Number of children aged 0-11		0.6		1.0
Number of elder		0.4		0.1
Number of servants		0.1		0.1
Number of non-participant females		0.9		0.4
<b>Labour characteristics</b>				
Participation (%)	45.8	33.3	82.0	43.2
Weekly working hours	41.7	41.8	46.6	44.2
<b>Incomes (1986US\$)</b>				
<b>Individual incomes</b>				
Principal occupation, net of taxes	106.5	59.0	285.8	80.8
Labour incomes other than labour	18.6	18.0	22.5	14.5
Cash transfers	1.5	1.1	1.2	1.2
Education in-kind transfers	0.02	5.1	0.01	8.2
Health in-kind transfers	2.2	1.6	0.9	1.2
<b>Other household members' incomes</b>				
Principal occupation, net of taxes	208.6	444.1	171.6	430.6
Primary incomes other than labour	3.0	4.6	3.7	5.1
Cash transfers	14.3	21.1	20.3	20.6
Education in-kind transfers	3.1	5.1	4.5	5.6
<b>All household incomes</b>				
All primary		474.3		502.6
All monetary		499.9		527.7
All monetary and in-kind		526.1		553.1

**Source:** Author's estimates from 1996 CASEN household survey (MIDEPLAN, 1996).

**Notes:** Incomes expressed in monthly 1986 US\$. Primary incomes other than labour refer to pensions, financial incomes, rents and self-consumption.