I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 11695

Efficient Labor Supply for Latin Families: Is the Intra-Household Bargaining Power Relevant?

Juan Carlos Campaña
J. Ignacio Gimenez-Nadal
Jose Alberto Molina

JULY 2018

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 11695

Efficient Labor Supply for Latin Families: Is the Intra-Household Bargaining Power Relevant?

Juan Carlos Campaña
University of Zaragoza

J. Ignacio Gimenez-Nadal
University of Zaragoza and BIFI

Jose Alberto Molina
University of Zaragoza, BIFI and IZA

JULY 2018

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Efficient Labor Supply for Latin Families: Is the Intra-Household Bargaining Power Relevant?*

This paper analyzes the efficient labor supply of male and female workers in Latin American countries employing the collective model framework (Chiappori et al.,2002). Using data from Time Use Surveys for Mexico (2009) and Colombia (2012), we find evidence of Pareto-efficient labor supply decisions within households, as the collective rationality is not rejected in the two countries. We find that higher female wages are related to more labor market hours of female workers, and male workers show an altruistic behavior towards females with the increase of their labor income. Sex ratio are related to transfers of additional income from male to female workers in Colombia, which sheds light on the relevance of distribution factors in the internal decision process of the couple. Our results suggest that the distribution of bargaining power within the household is an important factor that should be considered when analyzing household decisions.

JEL Classification: D10, J22

Keywords: household, collective models, labour supply, Latin America countries

Corresponding author:
Jose Ignacio Gimenez-Nadal
Faculty of Economics and Business
C/ Gran Via 2 3rd floor
CP 50005 – Zaragoza
Spain
E-mail: ngimenez@unizar.es

* We are very grateful for useful comments from Panayiota Lyssiotou and Jorge Velilla. This paper has benefited from funding from a pre-doctoral grant, awarded by the Government of Aragon in Spain and co-financed by the European Social Fund (BOA, December 2, 2014).

1. Introduction

Among the most important changes in Latin American countries in recent decades is the growing contribution of women to the work force, as millions of women have increased their level of education, leading many to enter the labor market. (CEPAL, 2014; World Bank, 2017). This trend has led more and more women to decide how much they want to work, in order to generate their own income, and contribute to their household income (Montaño, 2010, Mateo Díaz and Rodríguez-Chamussy, 2016). But to date, there are still gender inequalities in the time devoted to work in these countries, especially within households (Newman, 2002; Medeiros et al., 2007; Milosavljevic, 2007; Canelas and Salazar, 2014; Campaña., et al 2018), as men devote comparatively more time to paid work and women comparatively more time to unpaid work – especially care work. To evaluate the efficiency of public policies aimed at reducing inequalities within households, an understanding of how work is shared at home is essential for the design of effective public policies.

One commonly-used approach to analyze time-allocation decisions within households (from both theoretical and empirical evidence) is that of collective models (Chiappori, 1992; Browning et al., 1994; Browning and Chiappori, 1998; Chiappori et al., 2002; Chiappori and Mazzoco, 2018). According to this approach, the intra-family agreement is reached through the so-called sharing rule, after assuming only that intra-family decisions are Pareto-efficient. The sharing rule describes the way in which non-labor income is distributed among the members of the couple. Many studies have pointed to the validity of the collective model (see the surveys, Vermeulen, 2002; Donni and Chiappori, 2011; and Chiappori and Mazzocco, 2018), although the bulk of this evidence is focused on developed countries.

The provision of paid and unpaid work for Latin American countries within the household has been analyzed in prior research (Newman, 2002; Milosavljevic, 2007; Esplen, 2009; Gammage, 2010; Medeiros et al., 2010; Canelas and Salazar, 2014; Calero et al., 2016; Campaña et al., 2018), but the evidence within the framework of collective models for these countries is very limited, with certain exceptions. For Brazil, Tiefenthaler (1999) estimating multi-sector labor supply equations, rejects the unitary model in the informal and self-employment sectors for males and the formal and informal sectors for females. For Mexico, Reggio (2011) applies a household collective model, to understand what motivates parents to send their children to work. The author

finds that an increase in the bargaining power of a mother is associated with fewer hours of work for her daughters, but not for her sons. Also for Mexico, Attanasio and Lechene (2002) test the hypothesis of income pooling in household decisions, and Attanasio and Lechene (2014) investigate efficient responses to targeted cash transfers, using a collective model as the theoretical framework.

Against this background, we use time use data surveys from Mexico (2009) and Colombia (2012) to estimate the collective model of labor supply proposed in Chiappori et al., (2002) to evaluate, among other factors, whether the intra-household bargaining power is an important variable. In doing so, we use gender-ratio as the distribution factor within households (Chiappori et al., 2002; Rapoport et al., 2011), and the GMM estimator (Generalized method of moments) is used to estimate the model. Our results point towards the validity of the collective model approach, as the test of collective rationality is accepted in both countries. This result indicates that the labor supply of couples in these countries is Pareto-efficient. Furthermore, higher female salaries are related to more labor market hours of female workers, cross-wages are negatively related to the labor supply of male and female workers, and male workers show an altruistic behavior towards females with the increase of their labor income. Sex ratio are related to transfers of additional income from male to female workers in Colombia. The presence of children is negatively related to the labor supply of female workers in Mexico, while in Colombia the presence of other household members over age 18 is positively related to the female labor supply.

Our contribution to the literature is twofold. First, we provide empirical evidence with the theoretical support of the collective model for the household labor supply, in countries that still only have limited evidence. Thus, we analyze data from two countries with different welfare regimes, in an attempt to extract common patterns in factors that influence the labor supply of male and female workers (living in couples), and the ways in which non-labor income is distributed among the members of the couple. Second, we focus on analyzing whether the intra-household bargaining power is an important variable, in order to test the gender inequality in our sample of developing countries. As Agarwal (1997) mentions for developing countries, it is important to study the approach to negotiation in households, as this provides a useful framework for analyzing gender relations and sheds light on how gender asymmetries are constructed and questioned. In addition, the distribution of bargaining power within the household is

a significant factor that must be considered when analyzing household decisions, which in turn have important repercussions for public policies (Reggio, 2011; Bargain et al., 2014; LaFave and Thomas, 2017).

The rest of the work is organized as follows. Section 2 describes the background. Section 3 explains the theoretical framework. Section 4 presents the data. Section 5 explains our econometric strategy and results, and Section 6 contains our conclusions.

2. Background

The study of household behavior began with the unitary approach, based on the assumption that the family is an individual entity, and so preferences of the household can be represented by a single behavioral function (Samuelson, 1956; Becker, 1973). However, this unitary approach is subject to a series of criticisms (see Chiappori and Mazzoco, 2018, for a review). The main assumption, which assumes that subjective preferences are individual, does not fit the usual structure of a household formed by a group of individuals with different preferences, among which an intra-family decision process takes place. Only when the home is single-family, or when the preferences of a member are explicitly taken as family preferences, will it be methodologically correct to use the unitary approach. Furthermore, this approach implies that the individual non-labor income is aggregated into a single family, so that the source of this exogenous income plays no role in the intra-family distribution of consumption of goods or labor supply. In addition, the unitary approach does not allow us to determine the intra-family distribution of consumption and labor supply, and consequently welfare. In other words, the traditional approach does not allow for the characterization of intra-family inequalities.

Given the limitations of the unitary approach, an alternative has developed, where the issues arising from intra-family negotiation are modelled. According to this approach, the presence of individuals in couples with different preferences is instrumented, admitting the existence of two individual functions of utility, one for each spouse. This general approach has given rise to two other approaches: the game theory (Manser and Brown, 1980; McElroy and Horney, 1981) and the collective model (Chiappori, 1988, 1991, 1992). Regarding game theory, the analysis of family behavior is placed in a cooperative context with negotiation, so that members of the household try to reach agreement on how to divide the gains derived from life in common, through

Nash or Kalai-Smorodinsky solutions. Regarding the collective model, intra-family agreement is reached through the so-called sharing rule, after assuming only that intra-family decisions are Pareto efficient.

Chiappori (1988, 1991) criticizes the use of the Nash negotiation as a decision process, given that the entire negotiation involves a breaking point or status quo. From the analysis of comparative statics, it can be deduced that the family demand function obtained in a negotiation context does not necessarily verify the restrictions that characterize a demand function generated from individual behavior. Browning and Chiappori (1998) provide arguments as to why the collective approach should focus on Pareto-efficient assignments. In the first place, in a context of repeated play, the assumption of perfect information about the preferences of the other member of the household would be justified and, in such a case, it is expected that the resulting assignment will be Pareto-efficient. Second, the Pareto efficiency assumption is the most natural generalization of the maximization assumption of a welfare function, in a unitary model with households of more than one member.

From the seminar papers published by Chiappori (1988) and Apps and Rees (1988), the approach of household collective models has gradually gained more acceptance, both in theoretical terms and in applied empirical work (Browning et al., 1994; Haddad and Hoddinott, 1994; Browning and Chiappori, 1998; Duflo, 2000; Barmby and Smith, 2001; Chiappori et al., 2002; Quisumbing and Maluccio, 2003; Vermeulen, 2006; Blundell et al., 2007; Chau et al., 2007; Donni, 2007; Kalugina et al., 2009; Rapoport et al., 2011; Lyssiotou 2017; Molina et al., 2018).

3. The collective model on labour supply

Our theoretical framework is based on the collective model of labor supply from Chiappori et al., (2002). The collective model assumes that intra-familial decisions are Pareto efficient. It is considered that the home is formed by two individuals of working age, m = male, f = female, whose rational preferences can be represented by individual utility functions that, in general, are assumed to be altruistic. Thus, each individual's preferences are defined in terms of own vectors of goods and time, as well as the vectors of the other member:

$$u^i = u^i(q^m, q^f, l^m, l^f, \boldsymbol{z}) \quad (1)$$

where $u^i, i = m, f$ are strictly quasiconcave functions, increasing and twice continuously differentiable. The arguments are the consumption of each of the spouses, $q^i, i = m, f$, and whose prices are normalized to the unit, as well as their leisure times $l^i, i = m, f$, with $\boldsymbol{z}$ being a vector of the variables of preference that include the characteristics of the family. In addition, the household budget constraint is:

$$q^m + q^f + \omega^m l^m + \omega^f l^f \leq y + \left(\omega^m + \omega^f\right)T \quad (2)$$

where $\omega^i, i = m, f$ denotes the individual salary, $\boldsymbol{y}$ is the non-labor family income, and T is the amount of time available.

According to the collective approach, demand functions can be derived from an intra-familial decision process whose only requirement is that it must lead to efficient assignments in the Pareto sense. Given the initial assumption that individual utility functions are strictly quasi-concave, and that the budget constraint defines a convex set, the utility possibilities will be strictly convex. Consequently, all efficient Pareto assignments can be characterized as points of a linear social welfare function, with positive weights for both household members in joint well-being. Therefore, the above problem can be expressed in the following terms:

$$Max_{q^m, q^f, l^m, l^f}\, \mu(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z}) u^m(q^m, q^f, l^m, l^f, \boldsymbol{z}) + [1 - \mu(\omega^m, \omega^f, y, s, \boldsymbol{z})] u^f(q^m, q^f, l^m, l^f, \boldsymbol{z})$$

subject to: $q^m + q^f + \omega^m l^m + \omega^f l^f \leq y + \left(\omega^m + \omega^f\right)T \quad (3)$

where "s" is a vector of distribution factors and $0 \leq \mu \leq 1$. In this optimization problem, the weights $\mu(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z})$ and $[1 - \mu(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z})]$ are the Lagrangian multipliers (normalized), interpreted as indicators of the bargaining power of household members in the process of intra-familial distribution. It is assumed that they are continuously differentiable and homogenous of zero degree in $\boldsymbol{y}$ and $\boldsymbol{w}$. As can be seen from these expressions, the collective framework implies that the bargaining power (μ) depends on the individual salary (ω^m, ω^f) on the non-labor income of the household ($\mathbf{y}$), on the set of family characteristics, (z), and on the distribution factors (s). The distribution factors denote variables that influence family behavior through their effect on the intra-familial decision process (that is, on the negotiation power function μ), but which do not affect

either the preferences of the individual or the budgetary restriction of the household (Browning et al, 1994; Browning and Chiappori, 1998).[1]

Assuming an inner solution, and whenever individual preferences are assumed to be weakly separable in (q^i, l^i), Pareto-efficient decisions are expressed in terms of the following leisure demand functions of the two spouses:

$$l^m(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z}) = L^m[\omega^m, \omega^f, y, \boldsymbol{z}, \mu(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z})] \quad (4)$$

$$l^f(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z}) = L^f[\omega^m, \omega^f, y, \boldsymbol{z}, \mu(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z})] \quad (5)$$

Chiappori et al., (2002) focus on the labor supply of spouses, where h^i *(i=m,f,)* represents the labor offer of each of the spouses, so that $0 \leq h^i \leq 1$. Thus, the labor supply can be considered as the difference between the total time (1) and leisure (h^i=1-l^i), and the model can be presented in terms of labor supply. In this sense, the utility functions of household members can be represented as $u^i = u^i(q^m, q^f, 1 - l^m, 1 - l^f, \boldsymbol{z})$, with *i=m,f.* Based on this approach, the optimization problem arises in terms of the labor supply of household members, giving rise to well-defined Mashallian demands on labor supply: $(h^i(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z}) = L^i[, \omega^f, y, \boldsymbol{z}, \mu(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z})])$.

In this theoretical framework, a parameter of interest is known as the sharing rule. Given the theoretical properties indicated above, the decision process within the family can be characterized, on the basis of the second theorem of welfare economics, in terms of a two-stage decision process. In the first place, the non-labor income is distributed among the members of the couple and, subsequently, each member of the couple chooses their labor supply (and their consumption of the good), subject to the respective budget constraint. The function Φ is known as the "sharing rule" and describes the way in which the non-labor income is distributed among the members of the couple, which depends on wages, total non-labor income, distribution factors, and other observed characteristics.

[1]The distribution factors affect consumption and leisure only through the chosen point of the Pareto border, in such a way that they modify the weight given to the utility function of each individual, but they do not modify said border. Several distribution factors have been used in the literature, with the differences in income between the spouses being the most common (Browning et al., 1994). Chiappori et al. (2002) use the proportion of the sex ratio (proportion of men compared to women) and legislation on divorce. Crespo (2009) used, among others, differences in the level of education between spouses. Blau and Goodstein, (2016) use inheritance, and Lyssiotou, (2017) uses child benefits.

Thus, if the labor supply functions are differentiable, and assuming there are no corner solutions, these functions can be expressed as:

$$h^f = H^f[\omega^f, \Phi(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z}), \boldsymbol{z}] \quad (6)$$

$$h^m = H^m[\omega^m, y - \Phi(\omega^m, \omega^f, y, \boldsymbol{s}, \boldsymbol{z}), \boldsymbol{z}] \quad (7)$$

where H^i is the labor supply function of the individual $i = m, f$. In this framework, only one distribution factor is needed for stability and integration requirements (Chiappori et al., 2002). From these labor supply functions, a series of conditions that function as Slustky restrictions are derived, in the sense that they constitute a set of partial derivatives and inequalities that must be fulfilled by labor supply functions. It is important to note that these conditions do not depend on any assumption made about the functional form of the preferences. In addition, the partial derivatives of the sharing rule can be obtained as a function of the first partial derivatives of job offers.

Parametric specification of the Collective Model

To estimate the collective model of labor supply, we first specify the form of the labor supply function, using a static model known as "semi-logarithmic model" according to which the following system is estimated:

$$h^f = f^0 + f^1 log\omega^f + f^2 log\omega^m + f^3 y + f^4 log\omega^f log\omega^m + f^5 \boldsymbol{s} + f^6 \boldsymbol{z} \quad (8)$$

$$h^m = m^0 + m^1 log\omega^f + m^2 log\omega^m + m^3 y + m^4 log\omega^f log\omega^m + m^5 \boldsymbol{s} + + m^6 \boldsymbol{z} \quad (9)$$

This functional form of labor supply satisfies a set of desirable properties, among which we highlight that it is possible to recover (partially) the sharing rule. From this system, the sufficient and necessary conditions to test compliance with the collective model are expressed as follows:

$$\frac{m^4}{f^4} = \frac{m^5}{f^5} \quad (10)$$

in such a way as to express the conditions of Slutsky that must be fulfilled in the collective model. This is known as the test of collective rationality.

The partial derivatives of the sharing rule are given by the following equalities:

$$\Phi_y = \frac{f^3 m^4}{\Delta} \quad (11)$$

$$\Phi_s = \frac{m^4}{\Delta} f^5 \quad (12)$$

$$\Phi_{\omega^f} = \frac{f^4}{\Delta} \frac{m^1 + m^4 log\omega^m}{\omega^f} \quad (13)$$

$$\Phi_{\omega^m} = \frac{m^4}{\Delta} \frac{f^2 + f^4 log\omega^f}{\omega^m} \quad (14)$$

where $\Delta = f^3 m^4 - f^4 m^3$

We obtain the sharing rule equation, solving these differential equations

$$\Phi = \frac{1}{\Delta}(m^1 f^4 log\omega^f + f^2 m^4 log\omega^m + f^4 m^4 log\omega^f log\omega^m + f^3 m^4 y + m^4 f^5 s) + k(\boldsymbol{z}) \quad (15)$$

where the function k (z) is not identifiable, since the variable z affects both the sharing rule and the preferences.

4. Data

The data used to estimate this collective model comes from time use surveys of Mexico (2009) and Colombia (2012).[2] These surveys are the first independent surveys on the use of time in these countries. Previously, information on how individuals allocate their time was only available through modules in other types of surveys, such as integrated household surveys. Time use surveys have become the typical instrument used to analyze the time-allocation decisions of individuals (Gershuny, 2000; Aguiar and Hurst, 2007; Ramey and Ramey, 2010; Gimenez-Nadal and Sevilla, 2012). The two surveys are representative at the national level and the target population are all members of households, age 12 and above, for Mexico, and age 10 and above for Colombia; for Mexico the reference period is the previous week, while for Colombia it is the previous day.

Our sample consists of heterosexual couples (married or living together) when both partners have answered all sections of the survey, who are not students or retirees, and are between 21 and 65 years old (inclusive). Furthermore, both partners have positive hours of work. After these restrictions are fulfilled, our sample is 2,418 couples in

[2]The methodologies for the time use surveys used in this paper have been defined by the relevant institutes of statistics in each country: INEGI (National Institute of statistics and geography) in Mexico and DANE (National Administrative Department of statistics) in Colombia.

Mexico, and 4,921 couples in Colombia. The dependent variables, female and male hours of work, are defined for Mexico as total hours of work per week in all jobs, while for Colombia it is total hours of work per day on all jobs. The measure of salary is the hourly wage. Non-labor income in both cases includes income from transfers (income from other households, and subsidies from the government or from private institutions) or other income (income from renting houses, apartments, vehicles, machinery and equipment), and for Mexico it also includes income from bank interest and income from stocks or dividends. Hourly wages (female and male) and non-labor income for both countries are expressed in US Dollars.[3]

Regarding our distribution factor, which is the sex ratio (the number of men per 100 women), for the case of Mexico the information is obtained from the census of the population and housing of Mexico, 2010, while for Colombia, the information is obtained from the 1985-2005 Census Conciliation and Population Projections 2005-2020.[4] Our sex ratio is computed considering 32 federal entities for Mexico and 6 regions for Colombia.[5]

Table 1 shows summary statistics for our sample. Regarding the hours of labor supply, in both countries males spend more time in market work than females. In Mexico, males dedicate 50.17 hours a week to work while females spend 37.17 hours a week. In Colombia, males dedicate 8.89 hours a day to work while females spend 7.56 hours a day. The hourly wage of males is higher than the hourly wage of females, in both countries (with this difference being 0.37 dollars in Mexico and 0.35 dollars in Colombia). Regarding non-labor income, for Mexico it is 23.46 dollars per month and for Colombia it is 31.71 dollars per month. Regarding the sex ratio, in Mexico there are 96.26 men and in Colombia there are 97.59 men for every 100 women. Regarding the years of education, in Mexico, males and females have, on average, the same years of education (9.9 years), while in Colombia females on average have 0.63 more years of education than males (males have 10.47 years and females have 11.10 years of

[3]The exchange rate used according to the years of their time use surveys for Mexico is 1 US dollar, equivalent to 13.18 Mexican pesos and for Colombia it is 1 US dollar, equivalent to 1824.19 Colombian pesos.

[4]This information is provided by the INEGI (National Institute of Statistics and Geography) of Mexico and the DANE (National Administrative Department of Statistics) of Colombia.

[5] For our estimates, we group them into four large regions for each country, as follows: Center region, West-center region, North region, and the South-southeast region for Mexico; and San Andres and Atlantic region, Bogota and Central region, the Eastern region, and the Pacific region for Colombia.

education). Ethnic characteristics are the same for males and females in both countries (6% indigenous in Mexico and 5% indigenous in Colombia). Table 1 also gives summary statistics of the number of children in different age groups, number of other household members (from 18 years and up) and other characteristics (individual, demographic, and household characteristics) used in our estimations.[6]

5. Econometric strategy and results

Our econometric strategy is based on Chiappori et al., (2002). These authors propose, for the estimation of equations 8 and 9, the use of an estimator based on the Generalized Method of Moments (GMM), which allows both equations to be estimated at the same time. Following Chiappori et al., (2002), Rapoport et al., (2011), and Lyssiotou, (2017), we instrument wages and non-labor income using a second-order polynomial in age and years of education, occupational categories, ethnic characteristics, regions and areas (urban area dummy).

Tables 2 and 3 show the results of estimating the system of Equations (8) and (9) for Mexico and Colombia, respectively. The results for the unrestricted model (i.e., we do not impose the fulfillment of the collective rationality hypothesis) are shown in columns 1 and 2 of the respective tables. We find that the logarithm of male hourly wage is positively related to male labor supply in both Mexico and Colombia, as the regression coefficients are positive and statistically significant at standard levels of significance, but there is no statistically significant association with the labor supply of female workers. The same applies to females, as the logarithm of female hourly wage is positively related to the female labor supply in both Mexico and Colombia, but it has no statistically significant association with the labor supply of male workers. Regarding the logarithm of the cross-wages, we find that for Mexico it is negatively related to the labor supply of female workers, while for Colombia it is negatively related to the labor supply of both male and female workers.

Non-labor household income is positively related to the labor supply of male workers in Mexico, while Colombia has no significant association with female and male labor participation. The results for non-labour household income may be surprising a priori, but an analysis of this variable indicates that more than 80% of Colombian households

[6] We follow the works of Chiappori et al (2002), Kalugina et al (2009), Rapoport et al (2011) and Lyssiotou (2017) for the choice of the variables included in our econometric estimations.

analyzed do not have non-labor household income, which may explain why this variable does not affect the labour supply of couples. The sex ratio has no influence on the labor supply of male and female workers in either country.

The presence of children is not statistically associated with the labor supply of males, but it is related to the labor supply of females in both Mexico and Colombia. In Mexico, the number of children between 0-4 and 5-12 years has a negative and statistically significant relation to the labor supply of female workers, while in Colombia the number of children between 5-12 and 13-17 has a positive and statistically significant relation on the labor supply of female workers. In addition, the fact that there are more members in the household (e.g., grandparents, uncles…) is positively related to the labor supply of females in Colombia.

The GMM estimations of the unrestricted model yield values for the Hansen test ($\square^2$) that allows us to accept the validity of the instruments for both Mexico (p=.99) and Colombia (p=.23). Regarding the collective rationality test, to see if the application of the collective model is consistent with the data, when applying the test of equation (10), we observe that this equality is fulfilled. The evidence shows that collective rationality cannot be rejected at the 10% level for both Mexico ($\square^2$=0.02) and Colombia ($\square^2$=2.02). All this evidence leads us to conclude that families in Latin American countries take decisions that are Pareto efficient, and the collective model is valid to model their decisions regarding labour supply.

Columns 3 and 4 of Tables 2 and 3 show the results of the estimates associated with the restricted collective model of labor supply for Mexico and Colombia, where the fulfillment of the collective rationality condition (e.g., equation 10, $\frac{m^4}{f^4} = \frac{m^5}{f^5}$) is imposed. The coefficients of the restricted model, compared with the unrestricted model, are similar, but we observe certain notable changes in the coefficients. For the case of Mexico, the logarithm of cross-wages becomes significant at standard levels in the case of male workers, and in Colombia the logarithm of male hourly wage becomes non-significant for the labor supply of males. Furthermore, in Colombia the number of children (age ranges between 5-12 and 13-17 years) is no longer significant for the labor supply of female workers. Again, the Hansen test ($\square^2$) does not reject the validity of the instruments for both Mexico and Colombia; for México (Table 2) with associated p-values of 0.99, and for Colombia (Table 3) with associated p-values of 0.08.

Column 5 of Tables 2 and 3 shows the implicit parameters of the female sharing rule, derived from the restricted parameters of the general collective model using equation (15), for Mexico and Colombia. Furthermore, Column 6 reports the partial derivatives of the sharing rule along with their standard errors. The partial derivatives represent the impact of marginal changes in one variable on the accumulated non-labor income of female workers after sharing. For Mexico (Table 2, column 6), an increase of $1.00 in the female wage rate ω^f, which would be equivalent to an approximate monthly increase of $160 a month, considering the average of hours worked, translates into the transfer of $130 of non-labor income to the female. This result shows an egoistic behavior on the part of females towards the males. On the other hand, an increase of $1.00 in the male's wage rate, ω^m, which would be equivalent to an approximate monthly increase of $215 a month, considering the average of hours worked, translates into the transfer of $42 of non-labor income to female workers. This result shows an altruistic behavior on the part of males towards the females. Regarding household non-labor income, an increase of $1.00 in this income is related to a decrease of $1.14 in the female´s non-labor income, indicating that non-labor income benefits males more than females. The reported values are statistically significant at standard levels. With respect to the impact of the distribution factor on the intra-household allocation of non-labor income, in the case of Mexico, the sex ratio is not significant.

For Colombia (Table 3, column 6), the coefficient for the female wage rate ω^f is not statistically significant, while an increase of $1.00 in the male wage rate, ω^m, which would be equivalent to an approximate monthly increase of $268 a month considering the average of hours worked, translates into the transfer of $260 of non-labor income to female workers. This result shows an altruistic behavior on the part of males towards females. Regarding household non-labor income, an increase of $1.00 in this income will increase the female non-labor income by $2.02. Finally, regarding the impact of the distribution factor, a one percentage point increase in the sex ratio will induce males to transfer an additional $44.43 of income to females. The reported values are statistically significant at the standard levels of significance.

Finally, Tables 4 and 5 show several elasticities of labor supply for Mexico and Colombia, respectively. For the computation of elasticities, we first estimate the unrestricted model to obtain the estimates of the parameters of the model, and we then evaluate each elasticity using the values of the parameter estimates and the mean values

of the variables. Similarly, to obtain the elasticities from the restricted model, the same steps are followed, although we impose the restrictions when we estimate the parameters of the model. For both Mexico and Colombia, the female wage rate is negatively related to the female labor supply, and positively related to the male labor supply, with these relations being statistically significant at standard levels in both the unrestricted and the general (e.g., restricted) collective models. The male wage rate for Mexico is positively related to the female labor supply and negatively related to the male labor supply, in both the unrestricted and the general collective models, while for Colombia, the male wage rate is negatively related to both male and female labor supply, and in both the unrestricted and the general collective models. Finally, regarding non-labor income, no statistically significant results are shown in the case of Mexico, and for Colombia non-labor income it is positively related to male labor supply in both the unrestricted and the general collective models.

6. Conclusions

In this paper, we analyze the provision of market work in couples of Latin American countries, within the framework of the collective model of labor supply proposed by Chiappori et al., (2002). Using time use data from Mexico (2009) and Colombia (2012) and the GMM estimator, we show that the collective rationality is not rejected in the two countries studied, which supports the existence of Pareto efficiency in the decisions couples make. Furthermore, we show that the salary of females is positively related to their labor supply. For Mexico, the salary of male and household non-labor income is positively related to male labor supply, and the presence of children is negatively related to the labor supply of female workers. Males from both countries show an altruistic behavior towards females with the increase of their labor income, and non-labor income benefits females in Colombia. The sex ratio, analyzed as a distribution factor, benefits females in Colombia, since an increase in this ratio is related to transfers from males to females. The empirical evidence provided in this work highlights the validity of the collective model for Mexico and Colombia, showing the existence of decision processes in the household that are Pareto efficient

Regarding direct recommendations in terms of public policies, we first observe that in Mexico the presence of children is negatively related to female labor supply, indicating that policy makers should make the necessary efforts to grant households

with young children access to formal childcare services. Authors such as Hallman et al., (2005), Contreras et al., (2012), and Mateo Díaz and Rodriguez-Chamussy, (2016) for Latin America countries show the benefits of formal childcare services and their positive effect on mothers' working hours. Furthermore, in both countries, male workers show an altruistic behavior, while women do not, which may indicate that income and/or subsidy programs will have different impacts on household inequality, depending on the recipient of the transfer. According to our results, transfers to males would be more helpful in reducing inequalities within the household, as a transfer from males to females occurs in such households. Public policies should consider our results when designing efficient policies aimed at reducing household inequalities.

One limitation of our analysis is that our data is a cross-section of individuals and does not allow us to identify differences in the time devoted to work, net of (permanent) individual heterogeneity in preferences and characteristics. At present, there are no panels of time-use surveys currently available, and we leave this issue for future research. Second, the analysis is limited to the labor supply of individuals, despite that the time individuals devote to unpaid activities, such as adult/child care, or housework, is an important source of inequality within households (Campaña el al., 2018). The logical way to extend our analysis would be the inclusion of unpaid work time, in which Rapoport et al. (2011) could be used as a theoretical framework. With the data at hand, information on unpaid work time can be obtained from the same couples as analyzed in this paper, and we leave this issue also for future research.

REFERENCES

Agarwal, B. (1997). Bargaining and gender relations: Within and beyond the household. Feminist Economics, 3(1), 1-51.

Aguiar, M. and Hurst, E. (2007) Measuring trends in leisure: the allocation of time over five decades, Quarterly Journal of Economics, 115, 969–1006.

Apps, P. F., and Rees, R. (1988). Taxation and the Household. Journal of Public Economics, 35(3), 355-369.

Attanasio, O., and Lechene, V. (2002). Tests of income pooling in household decisions. Review of Economic Dynamics, 5(4), 720-748.

Attanasio, O. P., and Lechene, V. (2014). Efficient responses to targeted cash transfers. Journal of Political Economy, 122(1), 178-222.

Bargain, O., Donni, O., and Kwenda, P. (2014). Intrahousehold distribution and poverty: Evidence from Cote d'Ivoire. Journal of Development Economics, 107, 262-276.

Barmby, T., and Smith, N. (2001). Household labour supply in Britain and Denmark: some interpretations using a model of Pareto optimal behaviour. Applied Economics, 33(9), 1109-1116.

Becker, G.S (1973). A Theory of Marriage: Part I. Journal of Political Economy, 81, 813-846.

Blau, D. M., and Goodstein, R. M. (2016). Commitment in the household: Evidence from the effect of inheritances on the labor supply of older married couples. Labour Economics, 42, 123-137.

Blundell, R., Chiappori, P. A., Magnac, T., and Meghir, C. (2007). Collective labour supply: Heterogeneity and non-participation. The Review of Economic Studies, 74(2), 417-445.

Browning, M., and Chiappori, P.A. (1998). Efficient Intra-Household Allocations: A General Characterization and Empirical Tests. Econometrica, 66(6), 1241–1278.

Browning, M., Bourguignon, F., Chiappori, P. A., and Lechene, V. (1994). Income and outcomes: A structural model of intrahousehold allocation. Journal of political Economy, 102(6), 1067-1096.

Calero, A., Dellavalle, R., & Zanino, C. (2016). Care Economy in Argentina: Some Results Based on the Time Use Survey. MPRA Paper No. 72820, Munich Personal RePEc Archive, Munich, Germany.

Campaña, J. C., Giménez-Nadal, J. I., and Molina, J. A. (2018). Gender norms and the gendered distribution of total work in Latin American households. Feminist Economics, 24(1), 35-62.

Canelas, C., and Salazar, S. (2014). Gender and ethnic inequalities in LAC countries. IZA Journal of Labor and Development, 3(1), 18.

Chau, T. W., Hongbin, L., Liu, P. W., and Zhang, J. (2007). Testing the collective model of household labor supply: Evidence from China. China Economic Review, 18(4), 389-402.

Chiappori, P.A., (1988). Nash-Bargained Household Decisions: A comment. International Economic Review, 29(4), 791-796.

Chiappori, P.A., (1991). Nash-bargained household decisions: a rejoinder. International Economic Review, 32(3), 761-762.

Chiappori, P.A., (1992). Collective labor supply and welfare. Journal of Political Economy, 100(3), 437-467.

Chiappori, P. A., Fortin, B., and Lacroix, G. (2002). Marriage market, divorce legislation, and household labor supply. Journal of political Economy, 110(1), 37-72.

Chiappori, P.A., and Mazzocco, M. (2018). Static and Intertemporal Household Decisions. Journal of Economic Literature, forthcoming.

CEPAL. (2014). http://repositorio.cepal.org/bitstream/11362/37626/5/anexo_estadistico2014_es.zip (access September 2017).

Contreras, D., E. Puentes, and D. Bravo. 2012. Female Labor Supply and Child Care Supply in Chile.Working Paper SDT 370, Department of Economics, University of Chile, Santiago.

Crespo, L. (2009). Estimation and testing of household labour suply models: evidence from Spain. Investigaciones Económicas, 33(2).

DANE. (2014). Encuesta Nacional de Uso del Tiempo - ENUT- 2012 – 2013. https://formularios.dane.gov.co/Anda_4_1/index.php/catalog/214 (Access, January 2018)

DANE (2010). Proyecciones nacionales y departamentales de población 2005-2020. http://www.dane.gov.co/files/investigaciones/poblacion/proyepobla06_20/7Proyecciones_poblacion.pdf (Access, January 2018)

Donni, O. (2007). Collective female labour supply: theory and application. The Economic Journal, 117(516), 94-119.

Donni, O., and Chiappori, P. A. (2011). Nonunitary models of household behavior: a survey of the literature. In Household economic behaviors (pp. 1-40). Springer, New York, NY.

Duflo, E. (2000). Grandmothers and Granddaughters: Old Age Pension and Intra household Allocation in South Africa. Manuscript. Cambridge: Massachusetts Inst. Tech.

Esplen, E. (2009). Gender and Care: Overview Report. Brighton: Institute of Development Studies: Overview Report. Brighton: Institute of Development Studies.

Gammage, S. (2010). Time pressed and time poor: unpaid household work in Guatemala. Feminist Economics, 16(3), 79-112.

Gershuny, J. (2000) Changing Times: Work and Leisure in post-industrial Society. Oxford: Oxford University Press.

Gimenez-Nadal, J. I. and Sevilla, A. (2012) Trends in time allocation: a cross-country analysis, European Economic Review, 56(6), 1338–59.

Haddad, L., and Hoddinott, J. (1994). Women's income and boy-girl anthropometric status in the Côte d'Ivoire. World Development, 22(4), 543-553.

Hallman, K., Quisumbing, A. R., Ruel, M., and de la Briere, B. (2005). Mothers' work and child care: findings from the urban slums of Guatemala City. Economic Development and Cultural Change, 53(4), 855-885.

INEGI (2009). Encuesta Nacional sobre Uso del Tiempo: Síntesis metodológica http://internet.contenidos.inegi.org.mx/contenidos/Productos/prod_serv/contenidos/espanol/bvinegi/productos/metodologias/est/sm_ENUT2009.pdf (Access, January 2018)

INEGI (2010) Censo de Población y Vivienda 2010. http://www.beta.inegi.org.mx/proyectos/ccpv/2010/ (Access, January 2018)

Kalugina, E., Sofer, C., and Radtchenko, N. (2009). Intra-household inequality in transitional Russia. Review of Economics of the Household, 7(4), 447.

LaFave, D., and Thomas, D. (2017). Extended families and child well-being. Journal of Development Economics, 126(1), 52-65.

Lyssiotou, P. (2017). The impact of targeting policy on spouses' demand for public goods, labor supplies and sharing rule. Empirical Economics, 53(2), 853-878.

Manser, M., and Brown, M. (1980). Marriage and household decision-making: A bargaining analysis. International Economic Review, 21(1), 31-44.

Mateo Díaz, M., and Rodriguez-Chamussy, L. (2016). Cashing in on Education: Women, Childcare, and Prosperity in Latin America and the Caribbean. World Bank Publications.

McElroy, M. B., and Horney, M. J. (1981). Nash-bargained household decisions: Toward a generalization of the theory of demand. International Economic Review, 22(2), 333-349.

Medeiros, M., Osório, R. G., and Costa, J. (2010). Gender inequalities in allocating time to paid and unpaid work: evidence from Bolivia. In Unpaid Work and the Economy (pp. 58-75). Palgrave Macmillan, London.

Milosavljevic, V. (2007). Estadísticas para la equidad de género: Magnitudes y tendencias en América Latina [Statistics for gender equity: Magnitudes and trends in Latin America]. Santiago, Chile: Naciones Unidas.

Montaño S (2010). El cuidado en acción. En: El cuidado en acción: entre el derecho y el trabajo. Santiago: CEPAL, 2010. LC/G. 2454-P. p. 13-61.

Molina, J. A., Gimenez-Nadal, J. I., and Velilla, J. (2018). Intertemporal Labor Supply: A Household Collective Approach. IZA DP No. 11276.

Newman, C. (2002). Gender, time use, and change: the impact of the cut flower industry in Ecuador. The World Bank Economic Review, 16(3), 375-395.

Quisumbing, A. R., and Maluccio, J. A. (2003). Resources at marriage and intrahousehold allocation: Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa. Oxford Bulletin of Economics and Statistics, 65(3), 283-327.

Ramey, G., and Ramey, V.A. (2010). The Rug Rat Race. Brookings Papers on Economic Activity, spring, 129-176

Reggio, I. (2011). The influence of the mother's power on her child's labor in Mexico. Journal of Development Economics, 96(1), 95-105.

Rapoport, B., Sofer, C., and Solaz, A. (2011). Household production in a collective model: some new results. Journal of Population Economics, 24(1), 23-45.

Samuelson, P. (1956), "Social Indiffence Curves", The Quarterly Journal of Economics, 70(1), 1-22.

Tiefenthaler, J. (1999). The sectoral labor supply of married couples in Brazil: Testing the unitary model of household behavior. Journal of Population Economics, 12(4), 591-606.

Vermeulen, F. (2002). Collective household models: principles and main results. Journal of Economic Surveys, 16(4), 533-564.

Vermeulen, F. (2006). A collective model for female labour supply with non-participation and taxation. Journal of Population Economics, 19(1), 99-118.

World Bank. (2017). http://data.worldbank.org/indicator (access September 2017).

Table 1. Descriptive statistics of the data

	Mexico		Colombia	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Hours of work *				
Female	37.17	17.47	7.56	2.49
Male	50.18	15.16	8.89	2.20
Income**				
Female hourly wage (in $US)	1.91	1.81	2.19	2.35
Male hourly wage (in $US)	2.28	2.42	2.54	2.56
Monthly non-labor income (in $US)	23.46	112.13	31.71	153.72
Distributional factor				
Sex ratio (Masculinity index)	96.26	3.42	97.59	2.78
Household characteristics				
N. children 0-4	0.28	0.55	0.24	0.49
N. children 5-12	0.71	0.86	0.57	0.76
N. children 13-17	0.48	0.70	0.39	0.64
N. other household members	0.61	0.96	0.59	0.89
Wash machine (dummy)	0.81	0.39	0.71	0.45
Car (dummy)	0.62	0.49	0.20	0.40
House (dummy)	-	-	0.54	0.50
Home natural gas (dummy)	-	-	0.69	0.46
Years of education				
Female	9.92	4.59	11.10	4.51
Male	9.99	4.65	10.47	4.63
Age				
Female	39.08	8.98	39.21	9.74
Male	41.86	9.59	42.46	10.10
Ethnic characeristics				
Female indigenous	0.06	0.23	0.05	0.21
Male indigenous	0.06	0.25	0.05	0.21
Regional and área dummies				
Urban area***	0.85	0.36	0.88	0.33
Region 1	0.29	0.45	0.25	0.43
Region 2	0.28	0.45	0.44	0.50
Region 3	0.23	0.42	0.17	0.37
Region 4	0.20	0.40	0.14	0.35
Occupational category (included in instruments)				
Female employed	0.63	0.48	-	-
Male employed	0.64	0.48	-	-
Female employed (public sector)	-	-	0.08	0.27
Male employed (public sector)	-	-	0.06	0.24
Female employed (private sector)	-	-	0.44	0.50
Male employed (private sector)	-	-	0.46	0.50

Table 1. Continued

	Mexico		Colombia	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Female peon or farmer	0.02	0.15	0.01	0.09
Male peon or farmer	0.08	0.27	0.03	0.16
Female self-employed	0.32	0.47	0.38	0.49
Male self-employed	0.24	0.43	0.39	0.49
Female employer or business owner	0.02	0.14	0.03	0.17
Male employer or business owner	0.04	0.19	0.06	0.23
Female domestic employed	-	-	0.07	0.25
Male domestic employed	-	-	0.003	0.05
Number of observations	2,418		4,921	

Notes: The sample is restricted to heterosexual couples aged 21–65 (inclusive) who are not students or retired. *Weekly hours of work are considered for México, while daily hours of work are considered for Colombia. **For Mexico 1 US dollar is equivalent to 13.18 Mexican pesos and for Colombia 1 US dollar is equivalent to 1824.19 Colombian pesos. ***Urban area is considered in Mexico while municipality is considered for Colombia. For Mexico, region 1 represents the Centre region, region 2 represents the West-centre region, region 3 represents the North region and region 4 represents the South-southeast region. For Colombia, region 1 represents the Atlantic region and San Andres, region 2 represents the Central region and Bogota, region 3 represents the Eastern region and region 4 represents the Pacific region.

Table 2. GMM Parameter Estimates and Sharing Rule Estimates for Mexico (2009)

	Unrestricted Model		General Collective Model		Sharing rule	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Female	Male	Female	Male	Coeficients	Derivatives
Log-wage rate (female)	19.81***	-3.678	19.97***	-3.986	133.1***	129.7***
	(4.474)	(2.942)	(4.482)	(2.681)	(9.05e-07)	(9.188)
Log-wage rate (male)	-4.850	10.73**	-4.853	10.80**	95.21***	42.20***
	(3.717)	(5.297)	(3.756)	(5.164)	(8.58e-07)	(9.852)
Cross log-wages	-9.754**	-6.798	-9.956**	-5.849*	195.3***	-
	(4.461)	(4.561)	(4.452)	(3.368)	(8.17e-07)	-
Non-labor income	0.0538	0.0657*	0.0553	0.0625**	-1.086***	-1.138***
	(0.0362)	(0.0337)	(0.0363)	(0.0314)	(3.85e-09)	(0.0529)
Sex ratio (Masculinity index)	0.472	-1.461	0.0396	0.0233	-0.777***	0.274
	(3.839)	(5.170)	(3.643)	(2.141)	(8.20e-08)	(4.045)
N. children 0-4	-2.286*	0.117	-2.337*	0.332	-	-
	(1.223)	(1.114)	(1.221)	(0.876)	-	-
N. children 5-12	-1.773*	0.840	-1.811*	0.945	-	-
	(0.938)	(0.761)	(0.943)	(0.646)	-	-
N. children 13-17	0.545	0.439	0.561	0.366	-	-
	(1.086)	(0.849)	(1.097)	(0.780)	-	-
N. other household members	-0.808	0.274	-0.843	0.330	-	-
	(0.804)	(0.578)	(0.804)	(0.536)	-	-
Years of education	-1.104***	-0.892**	-1.126***	-0.930***	-	-
	(0.419)	(0.347)	(0.418)	(0.321)	-	-
Age	-0.177	-0.331***	-0.187	-0.312***	-	-
	(0.140)	(0.0953)	(0.139)	(0.0734)	-	-
Indigenous	6.882	4.364	7.057*	3.361	-	-
	(4.247)	(4.114)	(4.235)	(2.566)	-	-
Region 1	1.822	-4.515	0.249	1.037	-	-
	(14.69)	(19.49)	(14.01)	(8.247)	-	-
Region 2	-3.213	-7.140	-3.806	-5.159	-	-
	(5.946)	(7.225)	(5.718)	(3.482)	-	-
Region 3	-6.158	-1.056	-4.866	-5.734	-	-
	(11.90)	(16.53)	(11.34)	(7.301)	-	-
Urban area	1.543	1.322	1.602	0.816	-	-
	(2.408)	(2.501)	(2.415)	(1.844)	-	-
Wash machine	-7.630	4.127	-7.958	6.211	-	-
	(13.87)	(12.10)	(13.97)	(9.784)	-	-
Car	16.48	9.806	17.11	8.053	-	-
	(10.77)	(9.533)	(10.73)	(7.441)	-	-
Constant	8.483	202.9	50.93	58.02	-	-
	(376.4)	(504.8)	(357.1)	(209.0)	-	-
Observations	2,418	2,418	2,418	2,418	2,418	2,418

Notes: Robust standard error in parentheses. Hours of work are measured as weekly hours of work. Instruments: N. children 0-4, N. children 5-12, N. children 13-17, N. other household members, second order polynomial on age and years of education (f-m), years of education (f-m), age (f-m), female employed, male employed, female peon or farmer, male peon or farmer, female self-employed, male self-employed, indigenous female, indigenous male, urban area, region 1, region 2, region 3. The derivatives are computed to respect wage rates (f-m), not with respect to log-wage rates (w-h) *** p<0.01, ** p<0.05, * p<0.1

Table 3. GMM Parameter Estimates and Sharing Rule Estimates for Colombia (2012)

	Unrestricted Model		General Collective Model		Sharing rule	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Female	Male	Female	Male	Coeficients	Derivatives
Log-wage rate (female)	1.335**	-0.0127	1.519***	-0.0330	35.80***	-20.99
	(0.586)	(0.239)	(0.469)	(0.233)	(2.42e-06)	(27.36)
Log-wage rate (male)	-0.834	0.668*	-0.822	0.541	640.2***	259.5***
	(0.630)	(0.374)	(0.517)	(0.355)	(1.84e-06)	(21.76)
Cross log-wages	-0.436*	-0.245*	-0.355**	-0.254*	276.3***	-
	(0.226)	(0.143)	(0.175)	(0.138)	(1.20e-06)	-
Non-labor income	-0.0103	0.000562	-0.00266	-0.000987	2.072***	2.017***
	(0.0127)	(0.00639)	(0.00901)	(0.00603)	(2.53e-08)	(0.192)
Sex ratio (Masculinity index)	1.437	-0.313	-0.0923	-0.0663	71.95***	44.43***
	(1.397)	(0.465)	(0.558)	(0.401)	(1.10e-06)	(11.65)
N. children 0-4	-0.220	0.0394	-0.305	0.0534	-	-
	(0.262)	(0.127)	(0.198)	(0.124)	-	-
N. children 5-12	0.407*	-0.0886	0.256	-0.0779	-	-
	(0.237)	(0.111)	(0.171)	(0.107)	-	-
N. children 13-17	0.443*	-0.0822	0.227	-0.0477	-	-
	(0.266)	(0.129)	(0.172)	(0.124)	-	-
N. other household members	0.567*	-0.178	0.489**	-0.172	-	-
	(0.303)	(0.181)	(0.246)	(0.175)	-	-
Years of education	-0.0488	-0.0930***	-0.0480	-0.0874***	-	-
	(0.0672)	(0.0307)	(0.0543)	(0.0296)	-	-
Age	0.0430	-0.0179*	0.0144	-0.0176*	-	-
	(0.0344)	(0.00981)	(0.0216)	(0.00930)	-	-
Indigenous	-1.378*	-0.0753	-0.912	-0.115	-	-
	(0.785)	(0.411)	(0.570)	(0.396)	-	-
Region 1	-1.483	-1.145**	-0.572	-1.258***	-	-
	(1.030)	(0.445)	(0.584)	(0.409)	-	-
Region 2	4.189	-1.754	-0.871	-0.850	-	-
	(4.670)	(1.666)	(1.946)	(1.448)	-	-
Region 3	0.105	-0.641	0.404	-0.671	-	-
	(0.923)	(0.548)	(0.727)	(0.528)	-	-
Urban area	1.996	-1.261	2.775	-1.220	-	-
	(2.422)	(1.305)	(1.913)	(1.256)	-	-
Wash machine	-0.589	2.500*	1.171	2.263*	-	-
	(2.793)	(1.401)	(2.049)	(1.323)	-	-
Car	3.240	-0.321	0.979	0.122	-	-
	(2.951)	(1.610)	(1.877)	(1.525)	-	-
House	-8.409**	0.928	-5.140**	0.730	-	-
	(3.811)	(1.369)	(2.255)	(1.316)	-	-
Home natural gas	-2.307	1.492	-5.061	1.921	-	-
	(4.766)	(2.574)	(3.495)	(2.429)	-	-
Constant	-130.9	40.34	19.86	15.83	-	-
	(137.7)	(46.16)	(55.14)	(39.71)	-	-
Observations	4,921	4,921	4,921	4,921	4,921	4,921

Notes: Robust standard error in parentheses. Hours Of work are measured as daily hours of work are considered Instruments: N. children 0-4, N. children 5-12, N. children 13-17, N. other household members, second order polynomial on age and years of education (f-m), years of education (f-m), age (f-m), female employed(public sector), male employed (public sector)Female employed (private sector), male employed (private sector), female peon or farmer, male peon or farmer, female self-employed, male self-employed, female employer or business owner, male employer or business owner, indigenous female, indigenous male, urban area, region 1, region 2, region 3. Urban area for Colombia it is considered to be a municipality. The derivatives are computed to respect wage rates (f-m), not with respect to log-wage rates (f-m) *** p<0.01, ** p<0.05, * p<0.1

Table 4. Elasticities (Mexico 2009)

	Unrestricted Model		General Collective Model	
	(1)	(2)	(3)	(4)
VARIABLES	Female	Male	Female	Male
Wage rate (f)	-1.647***	1.502***	-1.650***	1.570***
	(0.185)	(0.174)	(0.185)	(0.174)
Wage rate (m)	0.753***	-1.344***	0.751***	-1.313***
	(0.169)	(0.133)	(0.169)	(0.130)
Non-labor income	0.00248	-7.92e-05	0.00248	-5.99e-05
	(0.00283)	(0.00263)	(0.00283)	(0.00264)

Robust standard errors in parentheses. The elasticities are computed with respect to wage rates (f-m), not with respect to log-wage rates (f-m) *** p<0.01, ** p<0.05, * p<0.1

Table 5. Elasticities (Colombia 2012)

	Unrestricted Model		General Collective Model	
	(1)	(2)	(3)	(4)
VARIABLES	Female	Male	Female	Male
Wage rate (f)	-0.119***	0.0734***	-0.0784***	0.0604***
	(0.0246)	(0.0179)	(0.0237)	(0.0177)
Wage rate (m)	-0.0794***	-0.0978***	-0.0295	-0.113***
	(0.0199)	(0.0160)	(0.0191)	(0.0159)
Non-labor income	-0.000221	0.000443**	-0.000158	0.000423*
	(0.000320)	(0.000223)	(0.000310)	(0.000221)

Robust standard errors in parentheses. The elasticities are computed with respect to wage rates (f-m), not with respect to log-wage rates (f-m) *** p<0.01, ** p<0.05, * p<0.1