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The Determinants of Household Labor Supply in Georgia, France and Romania: A Comparative Study [1]

George BERULAVA[*], George CHIKAVA[**]

Abstract

This paper aims to shed light on the determinants of household labor supply by conducting comparative study and by applying the collective labor supply model. On the basis of data from Generations and Gender Survey (GGS) we tested parametric restrictions imposed by two alternative (unitary and collective) household labor supply models on Georgian, French and Romanian data sets. Our comparison of household labor supply behavior and patterns reveals some similarities, but also several differences across countries. First, the study results suggest that own and partner's wages, and distribution factors are important determinants of household labor supply in all countries in this study. Second, we found some similarities in the preference structures and in the impact of personal and demographic characteristics on the household behavioral patterns across countries. Third, the study results show that the household labor supply patterns across countries differ substantially. Fourth, we found that collective model is not equally applicable for describing household labor supply in different labor market regimes. For France and Romania, the evidence supports appropriateness of the collective household labor supply model, while in Georgia household labor supply behavior cannot be adequately described by either unitary or collective model.

Keywords: *Georgia, Collective model, France, Household labor supply, Romania.*

JEL Code Classifications: *D11, D12, J22*

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[*] Professor, Department of Business and Economics, Sokhumi State University, Tbilisi, Georgia, E-mail: george.berulava@gmail.com

[**] Financial Monitoring Specialist, Transcaucasus Development Bank, Tbilisi Branch, Georgia, E-mail: georgechikava@yahoo.com

1. Introduction

This paper aims to shed light on the determinants of household labor supply decisions by applying the collective household labor supply model and by conducting a comparative study. Application of the collective labor supply theoretical framework, allows us to examine the impact of individual preferences and the intra-household bargaining process on the household labor behavior outcomes. In a number of empirical studies, this approach proved to be superior over the neoclassical framework, where the household behavior is modeled by a single utility function (Fortin and Lacroix, 1997; Vermeulen, 2002, 2005, 2006; Blundell et al., 2007; Beninger et al., 2007).

In this paper, we use the collective model (Chiappori, 1992; Chiappori, 2002) to study household labor supply decisions in Georgia, France and Romania. Comparative study helps us to identify international differences and commonalities in the household labor supply decisions and thus it improves our understanding of this issue. Also due to the lack of cross-country comparisons of the performance of the collective household labor supply model, this study affords an opportunity to explore the relevance of this model in describing household behavior in different labor market conditions. The comparative study is performed with the use of Generations and Gender Survey (GGS) datasets[2].

The main research questions of the study are as follows:

- To what extent do individual preferences, characteristics and distribution factors affect household labor supply?
- To what extent the impact of these factors varies across countries and labor market regimes?
- Is the collective model equally applicable for the prediction of household labor supply choices in countries with different labor market regimes?

This paper aims at contributing to the existing literature in several ways. First, it presents a comparative micro-level analysis of collective household labor supply model for dissimilar labor market settings. To our knowledge, this is the first comparative study of the collective labor supply model conducted on three highly comparable samples drawn from the same dataset. This allows comparing the applicability and the efficiency of the collective labor supply model in different socio-economic and labor market conditions. Second, by applying the collective household model in a comparative context, we examine individual preferences and the intra-household allocation process between the household members in various labor market regimes. In particular, we find that dissimilarities in country contexts reveal interesting differences between Georgian, French and Romanian household behavior. Third, the study enhances our understanding of commonalities in household labor supply behavior across countries.

[2] Generations and Gender Programme. http://www.ggp-i.org/ (accessed September 30 2011)

The paper proceeds as follows: Section 2 provides a brief description of the labor market situations in Georgia, France and Romania. Section 3 reviews existing literature and theoretical frameworks in the household labor supply field of study. In Section 4, we turn to a discussion of research methodology, including description of the econometric model, variables, testable restrictions and estimation techniques. In Section 5, the data description is presented. The Section 6 provides the analysis of the study results. Final remarks are presented in Section 7.

2. Background for Georgia, France and Romania

This study compares the household labor supply behavior in Georgia, France, and Romania. The rationale of this choice is as follows. Georgia and France represent different economic and welfare regimes, providing dissimilar contexts for the comparison of household labor behavior. On the contrary, the labor market situation in Georgia and Romania is more or less similar (since both countries are transition economies), which allows to identify some commonalities in labor supply behavior of households across the countries. Below we briefly discuss the peculiarities of the labor market environments in these countries.

Georgia is a transition economy with weakly developed market institutions. The welfare regime can be described by a very low level of employment and social protection, serious drawbacks and deficiencies in labor market policies, such as non-systematic nature of ALMP[3] programs; insufficient and poorly targeted assistance for job seekers; and failure in providing skills and training necessary to obtain sustainable employment (Dourglishvili, 1997; Yemtsov, 2001; Bernabè, 2002; Bernabè and Stampini, 2008). Since Georgia is not covered by any of the existing studies of the labor market regime typologies, it's difficult to ascribe it precisely to any of the known welfare regimes. This task is also beyond the scope of the current study. However, tentatively, the Georgian labor market regime can be characterized as a very liberal and insecure. Among the existing typologies, this regime is more close to the Eastern European system (European Commission, 2006; European Commission, 2007).

On the contrary, France corresponds to a developed market economy with established labor, product and financial market institutions. France represents a conservative/continental welfare system (Esping-Andersen, 1990; Muffels et al., 2002; European Commission, 2006) with a very strict employment protection; high unemployment benefits; high social security contributions and taxes and non-wage labor costs; high minimum wages; low level of labor market adaptability and 'rigid' labor market legislation. This welfare regime is characterized by relatively low employment rates and relatively high unemployment rates as compared to liberal and socio-democratic welfare systems (Esping-Andersen, 1990; Muffels et al., 2002; European Commission, 2007).

[3] Active labor market policy.

Like Georgia, Romania is a post-communist country, but with more advanced market institutions. According to Ciuca et al (2009) study, Romania is a representative of the Eastern European welfare system, characterized by low internal flexibility, low security, and average external flexibility. Generally, the Romanian labor market is rigid and has a high long-term unemployment rate, low employment rate for the population aged 55 and over and low level of social protection.

According to Table 1, the employment rate in Georgia has a decreasing tendency both for males and females. Among countries in comparison, Georgia has the lowest and France the highest employment rates. At the same time, Georgia substantially surpasses both Romania and France with its unemployment rate. During the last decade, unemployment rate in Georgia increased significantly, while in Romania and France this indicator shows a decreasing tendency. In Georgia and Romania, the unemployment rate is generally higher among males than females.

Table 1: Labor Market Indicators for Georgia, France and Romania

Indicator			Years				
			2000	2003	2006	2008	2009
Employment rate (%)	Georgia	Male	66.2	67.5	61.2	61.1	61.1
		Female	49.9	51.0	47.4	44.9	45.9
	France	Male	69.2	69.9	68.9	69.6	68.4
		Female	55.2	58.2	58.6	60.4	60.0
	Romania	Male	68.6	63.8	64.6	65.7	65.2
		Female	57.5	51.5	53.0	52.5	52.0
Unemployment rate (%)	Georgia	Male	12.6	11.5	15.2	16.8	18.1
		Female	12.2	11.5	11.7	16.1	15.4
	France	Male	7.5	8.1	8.4	7.3	9.2
		Female	10.8	9.9	10.1	8.4	9.8
	Romania	Male	8.0	7.6	8.2	6.7	7.7
		Female	6.5	6.4	6.1	4.7	5.8

3. Literature Review and Theoretical Framework

In this section we discuss alternative theoretical approaches in studies of labor supply behavior: the unitary and collective labor supply models.

3.1. The Unitary Model

The traditional approach of household labor supply decision-making (known also as "unitary" model) treats households as basic decision units, assuming that each of household members maximizes his/her unique utility function under a budget constraint.

In particular, within the unitary household labor supply model, household preferences are described by unique, well-behaved utility function U (Fortin and Lacroix, 1997):

$$\max_{[c^1, c^2, h^1, h^2]} U = \tilde{U}(c^1, c^2, h^1, h^2) \quad (1)$$

subject to

$$w_1 h^1 + w_2 h^2 + y_1 + y_2 \geq c^1 + c^2,$$

In this framework, for the individual household member I (i=1,2): c^i - reflects consumption of a private Hicksian good whose price is set to unity; and h^i – denotes individual i's labor supply. Household member i's wage rate and non-labor income are defined respectively by w_i and y_i. The utility function $\tilde{U}$ is increasing in consumption (c^1 and c^2), decreasing in hours of work supplied to the labor market (h^1 and h^2), strictly quasi-concave and twice differentiable in its arguments. Applying Hicks' composite good theorem and assuming that household's utility function depends on aggregate consumption ($c = c^1 + c^2$), the household behavior can be represented as a result of the following maximization problem subject to the household budget constraint:

$$\max_{[c, h^1, h^2]} U = U(c, h^1, h^2) \quad (2)$$

subject to

$$w_1 h^1 + w_2 h^2 + y_1 + y_2 \geq c,$$

The solutions of the problem (2) for h^1 and h^2, can take the form of the following labor supply functions:

$$h^1(w_1, w_2, y_1, y_2) = H^1(w_1, w_2, y) \quad (3)$$

and

$$h^2(w_1, w_2, y_1, y_2) = H^2(w_1, w_2, y) \quad (4)$$

where y is a total non-labor income ($y=y_1+y_2$). However, to be the interior solution of (2) h^1 and h^2 must satisfy two sets of restrictions: distribution factor independence (income pooling) and symmetry and positive definiteness of Slutsky matrix restrictions.

The unitary model requires that labor supplies are independent from any distribution factor (DFI). That is, the labor supply decisions depend only on individual preference factors, prices and total expenditure; and no distribution factor influences the outcome. A particular variant of DFI is income pooling restriction. According to income pooling restriction, only the level of total household non-labor income (y) affects the labor supply decisions, while its distribution across household members doesn't matter:

$$h^1_{y1} = h^1_{y2} \qquad and \qquad h^2_{y2} = h^2_{y1} \quad (5)$$

The Slutsky matrix restrictions are given by the following expressions:

Symmetry restriction:

$$S_{12} = S_{21} \quad (6)$$

Positive semi-definiteness:

$$S_{ii} \geq 0, \qquad i = 1,2$$
$$S_{11} S_{22} - S_{12}^2 \geq 0, \qquad \text{(7a, b)}$$

where $S_{ij} = h^i_{w_j} - h^j h^i_y (i = 1,2;\ j = 1,2),$ is the compensated wage effect on hours of labor supply. In the empirical part of this study, the consistency of the unitary model will be checked by testing DFI hypotheses[4].

However, the "unitary" model of household behavior has been criticized on several grounds. In particular, in a number of empirical studies, the main theoretical implications and restrictions of the "unitary" model such as homogeneity, symmetry and negative semi-definiteness of the Slutsky matrix as well as 'income pooling hypothesis' have been rejected on the basis of the empirical data (Blundell and Meghir, 1986; Blundell and Walker, 1986; Lundberg, 1988; Fortin and Lacroix, 1997).

3.2. The Collective Labor Supply Model

An important alternative to the unitary approach is the collective model of household labor supply (Apps and Rees, 1988; Chiappori, 1988; Chiappori, 1992; Chiappori, 1997). The collective household behavior model proposed by Chiappori (1988, 1992, 1997) is based on two fundamental assumptions: each member of the household is characterized by specific preferences and decisions result in Pareto-efficient outcomes. These theoretical assumptions provide a sufficient basis for the elaboration of testable assumptions on household members' labor behavior. A number of empirical tests based on the empirical data from developed countries have proved the advantage of collective models over unitary models in describing household labor supply decisions (Fortin and Lacroix, 1997; Vermeulen, 2002, 2005, 2006; Donni and Moreau, 2007; Blundell et al. 2007; Beninger et al., 2007).

For instance, Fortin and Lacroix (1997) tested simultaneously the unitary and collective household labor supply models within a structural framework. The results of this study reject the income pooling hypothesis of the unitary model and provide support for the collective labor supply model for all age groups excluding pre-school children. Similarly, Vermeulen (2005) empirically evaluated two competing labor supply models based on Dutch microdata. According to his results, the unitary model cannot be rejected for male and female singles, while it is rejected for a sample of couples. At the same time, the alternative collective model cannot be rejected for the same sample. The latter allows for the identification of individual preferences and an intra-household sharing rule, which in turn, can be used as a basis for welfare economic policy evaluations.

[4] The system of equations employed in the empirical part of this study, however, doesn't allow testing Slutsky matrix restrictions. These restrictions impose severe unrealistic constraints on behavior (Chiappori, Fortin and Lacroix, 2002). In particular, the symmetry of the Slutsky matrix requires that each labor supply depend only on own wage rate and on preference factors.

Chiappori, Fortin and Lacroix (2002) extended the collective household model by introducing 'distribution factors' (such as the sex ratio in the marriage market and the rules governing divorce). They found that 'Pareto-efficiency' and 'cross-derivative' restrictions implied by the collective model are not rejected. Donni (2003) generalized the main assumptions of the Chiappori (1988, 1992) model by taking into account participatory decisions and considering nonlinear budget constraints. In this approach, the labor supply functions based on virtual wages and non-labor income were used to recover the parameters of the sharing rule. Recently, the problem of non-participants in collective labor supply models has been addressed in a number of other studies (Donni, 2003; Vermeulen, 2006; Vermeulen et al, 2006; Blundell et al., 2007; Bloemen, 2004; Bloemen, 2010).

In this paper, the basic Chiappori, Fortin and Lacroix (2002) approach is applied for comparative study of household labor supply in Georgia, France and Romania. Below, for the sake of our study, we summarize the main aspects of this theoretical framework.

In particular, within this theoretical approach, preferences of individual household member I (i=1,2) are represented by the following direct utility function: U^i ($1-h^1$, c^1,$1-h^2$, c^2, z). Here, h^i is individual i's labor supply (with $0 \leq h^i \leq 1$); c^i denotes consumption of a private Hicksian good, whose price is set to unity; and z represents a K-vector of preference factors (age, education, number of children and etc.). Let's denote wage rates of household members, household non-labor income and the vector of distribution factors by w_1, w_2, y and s respectively. Assuming that allocation of consumption and leisure under collective framework are Pareto-efficient, the collective household model can be described as follows. For any given (w_1, w_2, y, z, s) there is a welfare weight μ (w_1, w_2, y, z, s), with μ belonging to [0, 1], such that (h^i, c^i) is a solution to the program (Chiappori, Fortin and Lacroix, 2002):

$$\max_{[h^1, h^2, c^1, c^2]} \mu U^1 + (1-\mu)U^2 \qquad (8)$$

subject to

$$w_1 h^1 + w_2 h^2 + y \geq c^1 + c^2,$$
$$0 \leq h^i \leq 1,\ i = 1,2$$

It is assumed that function μ is continuously differentiable in its arguments. The general preferences are usually restricted to be egoistic or caring (Becker, 1991). When these preference restrictions are imposed, the Pareto-efficient household allocation program (8) is equivalent to the existence of a function ϕ (w_1, w_2, y, z, s) so that (h^i, c^i) is a solution to the following program (i=1,2):

$$\max_{[h^i,\ c^i]} U^i(1-h^i, c^i, z)^2 \qquad (9)$$

subject to

$$w_i h^i + \phi^i \geq c^i,$$
$$0 \leq h^i \leq 1,$$

where, $\phi^1 = \phi \quad and \quad \phi^2 = y - \phi$. The function ϕ called the sharing rule, describes the way in which non-labor income is allocated among family members. Under the given assumptions, the household allocation problem is considered as a two-stage process: first, non-labor income is allocated between household members according to the sharing rule, and then each member separately chooses a labor supply (and private consumption) in a way that maximizes his/her individual welfare, subject to the corresponding budget constraint.
Consequently labor supply equations can be defined as follows:

$$h^1 = H^1(w_1, \phi(w_1, w_2, y, s, z), z) \quad (10)$$

and

$$h^2 = H^2(w_2, y - \phi(w_1, w_2, y, s, z), z) \quad (11)$$

Chiappori, Fortin and Lacroix (2002) proved that the particular structure of above equations imposes testable restrictions of the collective model on observed labor supply behavior, which allows recovering the sharing rule ϕ up to additional constant.

Before moving to the next section, it is important to note that, though the validity of collective labor supply framework in determining the household behavior in developed countries has been proved many times, there is only a small number of papers on the efficiency of this model in transition economies (Bielenka, 2008; Haan and Myck, 2008). Moreover, to our best knowledge, no comparative study of the performance of the collective model of labor supply in different settings (developed country and transition economy) was conducted to the moment.

In this paper, we try to fill this gap by performing a comparative study of the collective labor supply framework in different market environments on the basis of GGS dataset. In particular, using collective labor supply approach, this study compares and contrasts household labor behavior in Georgia, France and Romania. One of the research questions of the paper is whether the collective labor supply model is equally applicable for study of household behavior in the contexts of a developed market economy (France) and a country in transition (Georgia and Romania). This study also provides comparative evidence on the effects of own and partner wages, household income, distribution factors, individual and the household characteristics on the household labor supply in different labor markets regimes. The comparative study facilitates identifying commonalities and international differences in the household labor supply decisions, improving in this way our understanding of this issue.

4. Research Methodology

Econometric model specifications, hypothesis testing and estimation issues are discussed in this section.

4.1. Econometric Model

In order to estimate and test the collective model discussed in the previous section (equations 10 and 11), we follow the Chiappori, Fortin and Lacroix (2002) approach and use the semilog functional form to define the labor supply equations:

$$h^1 = a_0 + a_1 \log w_1 + a_2 \log w_2 + a_3 y + a_4 \log w_1 \log w_2 + a_5^{'} s + a_6^{'} z \quad (12)$$

and

$$h^2 = b_0 + b_1 \log w_1 + b_2 \log w_2 + b_3 y + b_4 \log w_1 \log w_2 + b_5^{'} s + b_6^{'} z \quad (13)$$

where, ai and b i's are parameters to be estimated;

h^i, w_i and y are working hours, hourly wages for respondent and his/her partner (i=1,2), and non-labor income respectively. The GGS questionnaire[5] contains relevant questions that allow us to construct these variables. In particular, working hours are measured as a number of hours per week that an individual normally works including overtime. Hourly wage is calculated as the ratio of monthly net wages and four times weekly working hours, including overtime. It should be mentioned that in this study, we use the approximate range of payments as the measure of monthly net wages[6]. In particular, the respondents were asked to give the approximate range of the amount they received from the payment. Further the median of the range is used as a proxy for wage. Non-labor income is calculated as a difference between the total household income and the sum of wage incomes of both spouses. Total household income is also measured by the approximate range of the payments.

In this study, vector of distribution factor s- comprises three variables that reflect the decision-making process within the household. These are: the difference in education; male's wage rate as a fraction of the sum of the wage rates of both spouses; and a dummy variable indicating whether the individuals are legally married (Crespo, 2005; Vermeulen, 2005; Bloemen, 2010). It should be mentioned that constructing the difference in the education variable is based on the Crespo (2005) approach. In particular, we distinguish between three levels of education: Edu-1 – primary and lower secondary education; Edu-2 – secondary education; Edu-3 – tertiary education. Further we construct nine-point categorical variable, which reflects differences in the level of education between spouses (DE). In particular this variable is defined as follows:

DE equals to

1 if F=Edu-3 and M=Edu-1	4 if F=Edu-3 and M=Edu-3	7 if F=Edu-2 and M=Edu-1
2 if F=Edu-3 and M=Edu-2	5 if F=Edu-2 and M=Edu-2	8 if F=Edu-1 and M=Edu-2
3 if F=Edu-2 and M=Edu-1	6 if F=Edu-1 and M=Edu-1	9 if F=Edu-1 and M=Edu-3

[5] http://www.unece.org/pau/_docs/ggp/GGP_QuestW1Core.pdf

[6] The ranged estimates of wage payments and non-labor incomes are used in the study instead of their direct estimates in order to abate the missing data problem.

All three distribution factors reflect the role of relative bargaining power of men and women within the household and have relative marginal effects on income distribution and working hours supply.

z – is a vector of socio-demographic variables, including age, age square, number of children less than 6 years old, number of children 7-14 years old.

4.2. Hypotheses Testing

To test the validity of the unitary and collective labor supply models, following Chiappori, Fortin and Lacroix (2002), we derive a set of restrictions from system (12) and (13). In particular, to check the adequacy of the unitary model, we test the null hypothesis on non-existence of distribution factors (DFI):

$$a_5 = b_5 = 0 \qquad (14a)$$

The appropriateness of the collective model is checked, by testing the validity of Pareto efficiency restriction and cross-derivative condition:

$$\frac{b_{51}}{a_{51}} = \frac{b_{52}}{a_{52}} = \frac{b_{53}}{a_{53}} \qquad (14b)$$

and

$$\frac{b_4}{a_4} = \frac{b_{51}}{a_{51}} \qquad (14c)$$

According to these restrictions, the ratio of the marginal effects of the cross-term is equal to the corresponding ratio of the marginal effects of each distribution factor on labor supplies (Chiappori, Fortin and Lacroix, 2002). These restrictions are based on the assumption that the cross-term and the distribution factors enter the labor supply function only through the same sharing rule function.

4.3. Estimation

The continuously-updated generalized method of moments estimator (GMM-CUE) (Hansen et al., 1996) and three-stage least squares version of seemingly unrelated regression estimation (3SLS) (Johnston and DiNardo, 1997) are used to estimate labor supply equations (12) and (13). Generally, the GMM is an efficient estimation method under the presence of heteroskedasticity of unknown form in the errors (Davidson and MacKinnon, 1993; Chiappori, Fortin and Lacroix, 2002). The GMM-CUE, in particular, generates efficient coefficient estimates in the presence of the deviations from i.i.d.[7] disturbances and performs better than other GMM estimators in the presence of weak instruments (Baum et al., 2007; Hahn et al., 2004). The 3SLS model, in turn, takes into account potential disturbance correlations between partner equations and allows for asymptotically efficient estimates (Johnston and DiNardo, 1997; Greene, 2003).

[7] Independent and identically distributed

The important econometric problem in this study is the potential endogeneity of wages. This problem could arise due to the so-called division bias issue (since in this study, wages are calculated as the ratio of monthly labor income and monthly hours of work) and possible errors in the computation of hourly wage rates. To deal with this issue, the wages are instrumented on the basis of the following instrumental variables: education level, size of settlement, regional wage and unemployment rates, regional dummy[8], and interaction of educational level with regional wage and unemployment rates. We assume that education level is not correlated with error term in labor supply equations. This assumption was regarded as valid in other similar studies (Bourguignon and Magnac, 1990; Blundell et al., 1998; Chiappori, Fortin and Lacroix, 2002; Vermeulen, 2005; Donni and Moreau, 2007). Since the growth of wage rates along the life cycle is a function of education, education is an appropriate instrument for wages (Donni and Moreau, 2007). We also think that such variables as size of settlement, regional wage and unemployment rates have influence on the wage earnings and the same time they are not correlated with the error term in structural equations. Additionally, cross-terms of education with regional wage and unemployment rates are used as excluded instruments in the study. The validity of these instruments is tested with the Hansen-Sargan test of overidentifying restrictions. Unfortunately, due to the limitation of the GGS data set, we cannot employ in this study such important wage instruments as working experience, tenure and parents' education level.

5. Data Description

The main source of the data for the research is the unique micro-data obtained as a result of nationally representative Generations and Gender Survey (GGS). In Georgia, this survey was conducted by the Georgian Centre of Population Research in 2006 in the framework of international "Generations and Gender Program" coordinated by UNECE[9]. The data was collected by means of personal interviewing. The sample was drawn on the basis of a micro-census of population specially organized in 2005 in 425 randomly chosen census units of Georgian population census of 2002. The survey employed the two-stage cluster design of sampling, in which clusters were chosen at the first stage of the sampling procedure and individuals for interview at the second stage (see Badurashvili et al., 2008 for more detailed description of the sampling procedure). The sample size comprises 10,000 respondents aged from 18 to 79 years, of which 64% had partners in the household. The key advantage of the GGS database for our research is that it contains exhaustive information on partners, including information on their demographics, labor market behavior, incomes and etc. Moreover, the GGS surveys were conducted jointly by the respective institutions in a number of countries using the same instruments and sampling procedures. This provides a good opportunity for a comparative study across countries with different socioeconomic contexts.

[8] This instrument was used only for Romanian sample.
[9] Generations and Gender Programme. http://www.ggp-i.org/ (accessed September 30 2011)

In this paper, we use the GGS data for France and Romania along with the Georgian database to compare the efficiency of the collective labor supply model in different contexts (developed country and transition economies). Since our study focuses on collective household labor supply decisions, we limit the sample to couples living together with both spouses working. All samples are further restricted to eliminate the missing-variable observation. This gives us the final sample sizes of 846 households for Georgia, 1,720 households for Romania and 2,590 households for France. Table 2, presents a description of the variables used in the study for Georgia, Romania and France respectively.

Table 2: Descriptive Statistics for Georgia and France (Mean (Std.Dev))

Variable	Georgia		France		Romania	
	Men	***Women***	***Men***	***Women***	***Men***	***Women***
Individual Characteristics						
Age	46.2(9.8)	42.6(9.7)	41.22(9.27)	39.11(9.17)	41.60(8.45)	38.86(8.22)
Hours of work	45.9(18.8)	35.8(17.6)	41.47(10.73)	33.95(10.24)	43.47(6.56)	42.08(5.65)
Hourly wage*	1.52 (2. 2)	0.88 (1.13)	11.99 (8.12)	10.36 (7.73)	1.20(.91)	.99(.82)
Household Characteristics						
Non-labor income*	1,122.7 (2,061.2)		4,592.9 (8,425.1)		1,235.03 (1,417.7)	
Number of children	1.64 (0.96)		1.28 (1.04)		1.13 (0.88)	
Presence of children less than 6 years old	0.31 (0.59)		0.49 (0.74)		0.19 (0.43)	
Presence of children of 7-14 years old	0.59 (0.80)		0.52 (0.76)		0.42 (0.63)	
Distribution factors						
Fraction of males wage rate	.55 (0.21)		.52 (0.083)		.54 (0.13)	
Difference in education level	4.49 (1.29)		4.64 (1.8)		5.08 (1.34)	
Married	0.87 (0.33)		0.74 (0.44)		0.96 (0.18)	
Sample size (couples)	***846***		***2,590***		***1,720***	

*For Georgia, the hourly wage rate and non-labor income are measured in GEL, while for France and Romania in EURO. In 2006 the average GEL/Euro exchange rate was 2.26.[10]

According to Table 2, the number of couples with two income earners in Georgia is almost three times less than in France, and more than two times less than in Romania. Men and women in the Georgian sample are on average older than those in French and Romanian samples. In all three samples, men are older than women. The age differences between men and women are 3.5, 3 and 2 years for Georgia, Romania and France respectively. In this study, the hours of work reflect weekly working hours of individuals. In each sample men on average work more and are paid higher than women. The difference in hours of work between men and women is highest in Georgia, and lowest in Romania. In Georgia, men earn on average almost twice than women. The difference in hourly wages between men and women is substantially lower in Romania and France. Generally, the French sample substantially surpasses the Georgian and Romanian samples by hourly wages and non-labor income.

[10] National Bank of Georgia. www.nbg.gov.ge (accessed January 15 2011)

About 31% of Georgian couples have small children; while 59% of the sample has children of seven to 14 years old. For the French sample, these figures are respectively 49% and 52%. The same figures are much lower for the Romanian sample. In Georgia, 87% of couples are legally married, while in France and Romania this figure is 74% and 96% respectively. The Georgian sample is characterized on average by a higher fraction of males wage rate and lower differences in the education level.

6. Empirical Results

In this section, we describe the empirical results of the study. The problem of the quality of instruments is the first to be analyzed. Further, we discuss the results of the estimation of labor supply equations for Georgia, France and Romania. Finally, tests of restrictions imposed by unitary and collective supply models are performed.

6.1. Analysis of the quality of the instruments

Analysis of the quality of instruments involves testing of their relevancy and validity (Baum et al., 2003). The relevant instruments must be highly correlated with the endogenous variables, while valid instruments must be orthogonal to the errors. In this study, the Sargan-Hansen test of overidentifying restrictions is used to test the validity of instruments. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. According to Table 3, the Sargan-J statistic does not reject the overidentifying restrictions at any standard significance level in all six equations. This condition confirms the validity of instruments and the consistency of parameter estimates.

The instruments' relevancy is checked using the First –Stage F-statistic test of weak instruments and Shea's partial R2 statistic (Shea, 1997). The First –Stage F-statistic tests the joint significance of instruments in the first-stage regressions. The values of this statistic presented in Table 4 show that jointly instruments are statistically significant for all equations. This means that instruments are correlated with endogenous variables. However, the weak instrument problem can arise even when the correlations between endogenous and instrumental variables are statistically significant (Bound et al., 1995; Staiger and Stock, 1997; Baum et al., 2007). According to the 'rule of thumb', the F-statistic of the first-stage regressions should be at least 10 for "weak instrument" not to be considered as a problem (Staiger and Stock, 1997). In our case, for the most of estimated equations the F-statistic is below this benchmark.

Table 3: Test statistics for instrumental variables

Test Statistics	Georgia		France		Romania	
	Men	Women	Men	Women	Men	Women
Hansen/Sargan-J statistics (p-value)	5.35 (0.91)	6.18 (0.86)	14.01 (0.30)	17.88 (0.12)	11.68 (0.387)	10.89 (0.452)
First-Stage F-statistic (p-value)						
Log_wage_male	5.43(0.00)	5.32 (0.00)	9.24 (0.00)	9.61(0.00)	12.69(0.00)	10.50(0.00)
Log_wage_female	3.67 (0.00)	3.94 (0.00)	7.57 (0.00)	7.88 (0.00)	8.99 (0.00)	8.77 (0.00)
*Log_wage_male*Log_wage_female*	2.72 (0.00)	2.80 (0.00)	8.02 (0.00)	8.39 (0.00)	5.16 (0.00)	5.35 (0.00)
Shea's partial R^2 statistic						
Log_wage_male	0.0251	0.0254	0.0162	0.0164	0.0169	0.0168
Log_wage_female	0.0146	0.0165	0.0130	0.0131	0.0234	0.0230
*Log_wage_male*Log_wage_female*	0.0239	0.0274	0.0162	0.0165	0.0244	0.0249
Partial R^2 statistic						
Log_wage_male	0.0750	0.0744	0.0444	0.0457	0.0485	0.0477
Log_wage_female	0.0520	0.0561	0.0404	0.0412	0.0602	0.0590
*Log_wage_male*Log_wage_female*	0.0391	0.0406	0.0456	0.0463	0.0264	0.0268
Anderson-Rubin Wald test F (p-value)	2.38 (0.0029)	3.26 (0.0000)	1.94 (0.0160)	3.57 (0.0000)	1.81 (0.0325)	1.83 (0.0295)
Anderson-Rubin Wald test Chi-sq (p-value)	34.34 (0.0018)	47.00 (0.0000)	29.45 (0.0141)	54.10 (0.0000)	25.70 (0.0283)	26.05 (0.0255)
Stock-Wright S statistic Chi-sq (p-value)	33.16 (0.0027)	44.79 (0.0000)	23. 92 (0.0664)	43. 42 (0.0001)	23. 53 (0.0521)	24.81 (0.0365)

Table 4: Estimation Results for Unrestricted Household Labor Supply model for Georgia

Variable	GMM-CUE		3SLS	
	Men	Women	Men	Women
Dependent variable*: *Weekly working hours.				
Log_wage_male	19.48**(9.136)	-22.46** (8.90)	11.06***(.8716)	-12.70*** (.8298)
Log_wage_female	-36.95***(11.87)	26.03** (11.23)	-16.63***(.8698)	8.743*** (.8266)
Log_wage_male* Log_wage_female	-13.42**(6.591)	-9.493 (6.175)	1.433***(.4441)	.2911 (.42559)
Non-Labor Income	-.0004 (.0004)	-.0002 (.0004)	.00012 (.00025)	.0001 (.0002)
Age	.9861 (.9744)	.9225 .9739)	1.194***(.3804)	.9931***(.3453)
Age Square	-.0086 (.0099)	-.0073 (.0108)	-.0137*** (.0039)	-.0120*** (.0039)
Number of children less than 6 years old	4.519** (2.164)	-1.824 (2.103)	3.376*** (.9267)	-1.528* (.8849)
Number of children of 7-14 years old	-2.591 (1.725)	-1.587 (1.725)	-1.013 (.6861)	-.6228 (.6547)
Fraction of males wage rate	-.2035 (.4148)	-.4596 (.4079)	-54.12***(3.845)	59.35*** (3.656)
Married	.7690 (3.872)	.2366 (3.831)	3.296**(1.632)	1.959 (1.566)
Difference in Education level_1 (basis for comparison)	-	-	-	-
Difference in Education level_2	27.50 (38. 69)	29.21 (37.96)	8.560(15. 36)	4.965 (14.59)
Difference in Education level_3	52.69 (52.86)	9.398 (52.12)	46.68**(21.56)	.1352 (20.50)
Difference in Education level_4	25.76 (38.54)	24.01 (37.83)	6.883(15.31)	3.665 (14.55)
Difference in Education level_5	22.78 (38.09)	35.08 (37.42)	6.699(15.31)	5.811 (14.55)
Difference in Education level_6	Dropped	Dropped	Dropped	dropped
Difference in Education level_7	20.24 (38.27)	26.77 (37.60)	8.548 (15.36)	4.052 (14.60)
Difference in Education level_8	Dropped	Dropped	Dropped	dropped
Difference in Education level_9	Dropped	Dropped	Dropped	dropped
F-statistic (p-value)	*1.51 (.0955)*	*1.80 (.0298)*	-	-
R-square	-	-	*.3449*	*.3224*
Chi-sq (p value)	-	-	*443.632 (.0000)*	*398.90 (.0000)*
Sample size	*846*	*846*	*846*	*846*

Standard errors in brackets; *** -significant at the 1%; **-significant at the 5%; * -significant at the 10%.

Similarly, the comparisons of the Shea's partial R2 statistic with the relevant values of the standard partial R2 reveal that weak identification may represent an issue in our estimations.

To deal with this problem, we employ two statistics that provide weak-instrument robust inference for testing the significance of the endogenous regressors in the structural equation (Baum et al., 2007). These are the Anderson-Rubin (1949) test and closely related Stock-Wright (2000) S statistic. Both tests are robust to the presence of weak instruments. The null hypothesis of the zero value coefficients of endogenous regressors in the structural equation tested by Anderson-Rubin and Stock-Wright S statistic is rejected for male and female labor supply equations for all countries. Taking into account the fact that the over identifying restrictions are valid, these test statistics per se reject the null hypothesis that the coefficients of the excluded instruments are jointly equal to zero. This means that endogenous regressors are relevant. To summarize, both relevancy and validity of instruments are satisfied, and thus estimations of wage variables are consistent[11].

6.2. Results for Georgia

In this study, we apply two techniques to estimate household labor supply equations: the GMM-CUE and 3SLS estimation. The results of these estimations for the Georgian unrestricted household labor supply model are presented in Table 4.

First of all, it is worth mentioning that the effect of own and partners wage parameters are significant at the five percent level and have expected signs in all equations. According to our parameter estimates in GMM-CUE model, one percent increase in the own wage rate increases labor supply by 0.19 and 0.26 hours per week for men and women respectively. On the contrary, the one percent increase in the partner's wage reduces labor supply for men and women correspondingly by 0.37 and 0.22 hours per week. In the 3SLS model, the size of effects of these variables is generally smaller as compared to GMM-CUE model.

In GMM-CUE and 3SLS models, the parameters of cross-wage terms are of the same sign and are significant only in men equations correspondingly at five percent and one percent levels. Not like in other transition economy studies of the collective labor supply (Bielenka, 2008), the effect of cross-term for men is higher than for women, indicating that men's decision to supply labor is more strongly influenced by changes in partners wage income. In this study, we failed to find any significant effect of non-labor income on labor supply decisions for both partners.

The effect of the most individual characteristics on working hours is insignificant in the GMM-CUE model. Only the number of children less than six years old has a positive effect (significant at $p<0.05$ level) on men's working hours. In the 3SLS model, age and age square are significant at the one percent level and have proper

[11] The results of the estimation of wage equations are omitted in this paper. They are presented in the working paper (Berulava and Chikava, 2011).

signs in all equations, whereas the influence of the number of children less than six years old is significant only for men.

In contradiction to the theory in the GMM-CUE model, distribution factors have the same signs but none of these variables has statistically significant effect on labor supply. Moreover, some of the dummies reflecting educational differences between spouses are dropped out due to collinearities. In the 3SLS model, the fraction of males wage rate has very strong distributional impact (significant at $p<0.01$ level) on working hours of both men and women, whereas formal marriage is significant at the five percent level for men. All other distributional factors are statistically insignificant.

In general, the size of effects of explicative variables is higher in GMM-CUE equations as compared to the 3SLS model. However, for the 3SLS model, more estimated parameters are found to be significant. The better explanatory power of the 3SLS model as compared with the GMM-CUE approach in detecting the significance of the effect of independent variables can be explained by the better performance of the former model in the situation of unobserved heterogeneities between error terms in partner equations (Johnston and DiNardo, 1997).

6.3. Results for France

The results for French unrestricted household labor supply model are presented in Table 5. Unlike Georgia, own wages have a negative impact on supplied labor hours both for men and women (with the exception of the GMM-CUE women equation).

According to parameter estimates in the GMM-CUE model, one percent increase in the own wage rate reduces labor supply by 0.39 hours per week for men and increases by 0.33 for women. On the contrary, the one percent increase in the partner's wage reduces labor supply for men and women by 0.57 and 0.47 hours per week respectively. Like in Georgia, the 3SLS model shows a smaller size of effects of these variables as compared with the GMM-CUE model.

The effect of partner wages has a negative sign, but it is insignificant for women's equation (3SLS). Cross-term is significant almost for all equations (with the exception of the GMM-CUE women equation), thus indicating that in France dependence of labor supply decisions on changes in partners' wage incomes is stronger than in Georgia. Household non-labor income is significant only in GMM-CUE equations. For women equations, this parameter has a right sign and is significant at the $p<0.01$ level, while contrary to the research hypothesis, in men's labor supply equation, this effect is positive (significant at the ten percent level). Since individual characteristics have expected signs, we do not discuss them further.

Similarly to the Georgian sample, GMM-CUE is characterized by the higher size of effects of independent variables, while the 3SLS has a higher power. However, unlike Georgia, distributional factors have expected signs (except the education

level). Also for the French sample, the statistical significance and impact of distributional factors on labor supply decisions is much higher. For instance, an increase in fraction male's wage rate will lead to more working hours supplied by women and less hours supplied by men. According to our results, an increase in the male's fraction of wage rate by one percentage point implies an increase in women's labor supply by approximately three hours per week. Formal marriage decreases incentives to work for women and has a positive impact on hours supplied by men. Being officially married implies an increase in labor supply of 1.27 hours per week for men and decrease of hours supplied by women by 1.64 hours per week. These results suggest that in France, distributional factors, especially marriage, play a more important role in intra-household income distribution than in Georgia. Such a difference can be explained by the fact that in France, formal marriage and legislation governing divorce is more crucial and favorable for women than in Georgia.

Table 5: Estimation Results for Unrestricted Household Labor Supply model in France

Variable	GMM-CUE		3SLS	
	Men	Women	Men	Women
Log_wage_male	-39.43***(18.20)	-47.01**(19.00)	-10.29***(1.597)	-2.308 (1.549)
Log_wage_female	-57.46***(17.60)	33.73*(19.10)	-7.566***(1.608)	-8.344***(1.553)
Log_wage_male*Log_wage_female	21.45***(6.203)	6.548 (6.548)	2.592***(.5309)	1. 458***(.5147)
Non-Labor Income	.00007*(.00004)	.00004 (.00003)	.000025(.00002)	.00001 (.00002)
Age	.9546***(.3066)	.4553 (.3680)	.6417***(.2022)	.7007***(.1919)
Age Square	-1.222***(.3844)	-.7869 (.4786)	-.6266**(.2432)	-.8687***(.2419)
Number of children less than 6 years old	.1867(.4393)	-2.302***(.5712)	.2626 (.3114)	-1.771***(.3063)
Number of children of 7-14 years old	.3627 (.4135)	-2.367***(.5179)	. 8963***(.2928)	-1.348***(.2920)
Fraction of males wage rate	-62.73 (76.04)	307.6***(83.13)	-10.06(7.216)	3.187 (6.975)
Married	1.271*(76.04)	-1.640** (.6878)	.8356*(.4965)	-1.221** (.4845)
Difference in Education level_1 (basis for comparison)	-	-	-	-
Difference in Education level_2	1.093(1.320)	-1.088 (1.536)	1.972 (1.410)	-.4188(1.363)
Difference in Education level_3	-.8652(1.384)	1.405 (1.600)	-.7933 (1.472)	-3.303**(1.425)
Difference in Education level_4	-.8081(1.410)	-4.512** (1.663)	4.938***(1.366)	-.7004 (1.320)
Difference in Education level_5	-.7072(1.142)	2.393* (1.276)	.3377 (1.346)	-2.813**(1.302)
Difference in Education level_6	-.5590(1.767)	.3401 (2.032)	-1.470 (1.510)	-4.781***(1.464)
Difference in Education level_7	Dropped	dropped	2.875* (1.535)	-3.025** (1.485)
Difference in Education level_8	-.7435 (1.378)	1.382 (1.743)	-.6771 (1.461)	-4.501*** (1.419)
Difference in Education level_9	1.071 (2.252)	2.343 (2.574)	2.542 (2.227)	-4.069* (2.161)
F-statistic (p-value)	*3.94 (.0000)*	*3.26 (.000)*	-	-
R-square	-	-	0.0945	0.0694
Chi-sq (p value)	-	-	271.39 *(.0000)*	193.63 *(.0000)*
Sample size	*2590*	*2590*	*2590*	*2590*

Standard errors in brackets; *** -significant at the 1%; **-significant at the 5%; * -significant at the 10%.

6.4. Results for Romania

The estimates of the unrestricted labor supply model for Romania are presented in Table 6. According to these results, the effects of own and partners' wages are statistically significant ($p<0.01$) and have expected signs. In particular, in GMM-CUE estimation one percent rise in own wage increases labor supply by 0.22 and 0.20 hours per week for males and females respectively, while one percent increase in partners wage decreases working hours per week for males and females by 0.20 and 0.24 respectively. The size of these coefficients is substantially smaller in the 3SLS model. Like in Georgia and France, we have not found a substantial difference between males and females in their labor supply responses to the changes in own and partners' wage rates. Moreover, compared to the findings of similar studies (Chiappori, Fortin and Lacroix, 2002), the effect of own wage on the hours of labor supply is not very large.

Table 6: Estimation Results for Unrestricted Household Labor Supply Model for Romania

Variable	GMM-CUE		3SLS	
	Men	Women	Men	Women
***Dependent variable*: *Weekly working hours*.**				
Log_wage_male	22.86***(6.361)	-24.10***(6.203)	2.417***(.5171)	-.3595 (.4419)
Log_wage_female	-21.24***(5.909)	20.83***(5.746)	-1.501***(.5620)	3.411*** (.4797)
Log_wage_male*Log_wage_female	1.090 (2.886)	-1.874 (2.674)	1.372***(.2893)	-1.535*** (.2474)
Non-Labor Income	-.00002 (.00006)	-.0001 (.00006)	-.0001***(.00002)	-.00005***(.00001)
Age	.0422 (.2624)	.3817 (.2491)	.0619 (.1699)	.0687 (.1422)
Age Square	-.0001 (.0030)	-.0048 (.0031)	-.0012 (.0020)	-.0009 (.0017)
Number of children less than 6 years old	.3153 (.2767)	-.2507 (.3041)	.0853 (.1845)	-.2499 (.1587)
Number of children of 7-14 years old	2.324 (3.382)	-3.7989 (2.666)	.6181 (1.074)	-.3916 (.8493)
Fraction of males wage rate	-83.11*** (20.34)	67.435*** (19.67)	-6.521*** (2.060)	3.333* (1.758)
Married	.1547 (1.261)	-.1193 (1.133)	.1267 (.8200)	-.4482 (.7028)
Difference in Education level_1 (basis for comparison)	-	-	-	-
Difference in Education level_2	1.879 (1.494)	-1.155 (1.475)	.1913 (1.129)	-1.607* (.9648)
Difference in Education level_3	2.308 (1.671)	-2.712 (1.620)	.2759 (.8213)	-.1560 (.7021)
Difference in Education level_4	-.1320 (.7453)	.2123 (.7408)	-.1537 (.7504)	.5285 (.6416)
Difference in Education level_5	-.5007 (38.09)	.5592 (1.155)	-1.194 (1.098)	2.030** (.9385)
Difference in Education level_6	-4.383***(1.571)	5.218*** (1.572)	-.1851 (.9406)	1.013 (.8035)
Difference in Education level_7	Dropped	Dropped	-.6971 (.8966)	1.935** (.7642)
F-statistic (p-value)	*2.89 (.0002)*	*2.64 (.0008)*	-	-
R-square	-	-	*.1022*	*.1173*
Chi-sq (p value)	-	-	*194.81(.0000)*	*228.83(.0000)*
Sample size	*1720*	*1720*	*1720*	*1720*

Standard errors in brackets; *** -significant at the 1%; **-significant at the 5%; * -significant at the 10%.

The effect of non-labor household income is significant and negative only in the 3SLS model. However, the size of the effect of this variable is very negligible.

Personal and household characteristics such as age and number of children are not significant for all models. With respect to distribution factors, the share of males wage rate is significant at one percent level and has expected signs both for men and women equations. In particular, one percent rise in the share discourages males' labor supply by 0.83 hours per week and increases females' weekly working hours by 0.67. Only some categories of the difference in education variable are statistically significant and have signs consistent with the theory, whereas marriage is not significant for all equations.

6.5. Test of the Unitary and Collective Models

Based on the empirical results reported in Tables 4, 5, and 6 for the Georgian, French and Romanian unrestricted household labor supply models, we perform the test of adequacy of the unitary and collective models in different labor market contexts.

To verify the validity of the unitary model, we test the null hypothesis that the impact of distribution factors is jointly equal to zero (14a). We also test two restrictions of the collective model: the Pareto-efficiency restriction (14b) and the equality of marginal effects of wage cross-term condition (14c). Under the null hypotheses, these restrictions are satisfied. The results of these tests are presented in Table 7.

Table 7: Results of tests on Unitary and Collective Model Restrictions for Georgia, France and Romania

	Chi-sq.	Degrees of freedom	p-value
Georgia			
Test on unitary model (Wald test on distribution factors)	1164.12	14	0.0000
Test on collective model (Wald test on Pareto efficiency)	5.42	1	0.0199
Test on collective model (Wald test on cross-term conditions)	5.26	1	0.0218
France			
Test on unitary model (Wald test on distribution factors)	140.55	20	0.0000
Test on collective model (Wald test on Pareto efficiency)	0.30	1	0.5841
Test on collective model (Wald test on cross-term conditions)	0.04	1	0.8444
Romania			
Test on unitary model (Wald test on distribution factors)	39.18	16	0.001
Test on collective model (Wald test on Pareto efficiency)	0.32	1	0.570
Test on collective model (Wald test on cross-term conditions)	0.51	1	0.475

The Wald test rejects the null hypothesis of the non-existence of distribution factors at the 1% significance level for all three countries. This means that distribution factors affect significantly labor supplies of partners and that the unitary model does not adequately describe the household labor supply behavior both in developed countries and in transition economies.

The tests of the restrictions of the collective model, however, show different results for France and Romania on the one hand and for Georgia on the other. In

France and Romania, the tests for both Pareto efficiency and cross-term conditions cannot be rejected at any reasonable significance level. Thus, similar to the results of previous studies of the collective labor supply model, the use of this model is justified by the French and Romanian data.

In contrast to these results, the use of the collective model in the Georgia context cannot be supported by the data. The Pareto efficiency restriction and the cross-term condition are rejected at the five percent significance level.

To summarize, the study results don't provide strong evidence of the equal applicability of the collective labor supply model across countries. The collective model is a relevant framework for describing household labor supply behavior in France and Romania. Georgian household labor behavior can be adequately described neither by the unitary model nor by the collective model. Similar to the results of Crespo (2005) for Spain, Georgian household labor decisions are consistent with some kind of non-unitary model, in which distribution factors do matter. To say distinctly, according to the data, household outcomes for the Georgian sample are not Pareto efficient and thus the collective framework is no longer a relevant model for the description of household labor supply behavior. However, there are variables that have some impact on the power distribution between partners and they can influence household labor supply decisions.

7. Conclusions

In this study, we analyzed the household labor supply behavior in different labor market regimes, using the collective framework. On the basis of the data from Generations and Gender Survey (GGS) and theoretical framework developed by Chiappori et al. (2002), we tested parametric restrictions imposed by two alternative (unitary and collective) household labor supply models on Georgian, French and Romanian data sets. Our comparison of household labor supply behavior and patterns reveals some similarities, but also several differences across countries.

First, we find that own and partner's wages, cross-wage terms, and distribution factors are important determinants of household labor supply in all countries in this study. For Georgia and Romania, the effects of own wages are statistically significant and positive, while for France, the own wages have a negative impact (significant at $p<0.01$ level) on supplied labor hours. Moreover, we revealed some commonalities in household preference structures in Georgia and Romania: the sizes and signs of own and partner wage effects on hours of labor supply are very similar. Though in France the size of wage effect is a little bit higher, it is still comparable with that in Georgia and Romania.

Generally, the effects of distribution factors and cross-terms are stronger and more statistically significant in France and Romania. Thus, indicating that dependence of labor supply decisions on changes in partners wage income in these countries is

stronger than in Georgia. The effect of non-labor income on labor supply decision is not equal across countries. In Georgia, this effect is non-significant, while in Romania it is statistically significant (at $p < 0.01$) but the size of its impact is very negligible. In France, this parameter has a right sign and is significant at the one percent level in the women equation, while contrary to the research hypothesis, this effect is positive (significant at ten percent level) in men's labor supply equation. The effect of individual and household characteristics like age, age square, number of children on labor supplies in general do not differ substantially across the countries. However, in Romania these variables are not statistically significant.

Second, we find substantial differences in working patterns across the countries. In particular, in Georgia, the number of couples with two income earners is substantially lower than in France and Romania. Georgia is also characterized by the largest gender gap in supplied working hours. The results of the study suggest that these differences cannot be explained solely by the differences in preference structures across the countries. As it was mentioned above, the effects of wages are comparable across the countries. This means that if households have the same wages, their response in terms of working hours will also be the same. Thus, differences in factors those are outside households play an important role in the differences between working patterns across the countries. For instance, the gender pay gap may be considered as one of such factors. In Georgia this gap is substantially higher (males earn almost twice as much as females) than in France and Romania. But if the preference structures in these countries are more or less similar, it means that facing lower payments, females in Georgia (preferring to do housework), will supply less working hours than females in compared countries.

Another explanation of the differences in working patterns comes from the demand side of the labor market. The transformational recession of the Georgian economy in the 1990s and the beginning of the 2000s, as well as its undeveloped labor market institutions has made it difficult for many unemployed to find a job again. Romania facing the same problems has attained more progress in market reforms, making unemployment problems less acute than in Georgia. These problems were not an issue in France, as this country is a developed market economy and has more efficient labor market institutions in place as compared to transition economies. However, since we have not modeled demand-side factors in our study, this conclusion is rather tentative.

Third, in all three countries, the results of the study reject the restriction imposed by the unitary model of non-existence of distribution factors. This result is in line with the outcomes of other studies, which show that the unitary model is a worthless analytical device for describing the household labor supply behavior both in developed countries and in transition economies. For France and Romania, we find evidence supporting the appropriateness of the collective household labor supply model. The data for these countries do not reject Pareto efficiency

restriction and cross-term conditions imposed by the collective model at any reasonable significance level. In contrast to the French and Romanian results, the main restrictions of the collective model are rejected by Georgian data. Thus, the collective model should be used for the analysis of household labor behavior in France and Romania. Georgian household labor behavior cannot be appropriately described either by the unitary or collective model. Similar to the results of Crespo (2005), Georgian household labor decisions are consistent with some kind of the non-unitary model, in which distribution factors do matter.

On the whole, this result of the study contradicts the findings of previous studies of collective household frameworks in transition economies (Bielenka, 2008; Haan and Myck, 2008). We think that one of the reasons that we failed to prove the efficiency of the collective labor supply model for Georgia is a relatively small sample size. To test the restrictions of traditional collective frameworks, we had to reduce the size of samples to couples where both partners have jobs, to avoid the corner solution. This forced us to reduce the Georgian sample from 6,422 to 846 observations. Thus, consideration of non-participants for the collective labor supply model represents a promising way of improving the efficiency of the collective model. We think that further research should also take into account the issues that have not been considered in this research: fixed costs of working, home production and taxation issues.

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