Fertility Patterns in the Roma Population of Spain

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Abstract

The aim of this paper is to determine the significant variables in the fertility patterns of the Roma population in Spain. Family and home production are two of the idiosyncratic features of this minority group, and our theoretical and empirical analyses take account of both, as well as other variables that appear in the existing literature. Our main insights are that a greater bargaining power of parents, with respect to their adult children, and a greater involvement of adult children in the production of the family good, are major contributory factors in increasing the number of children.

Keywords: Roma Spanish population, fertility, bargaining power.

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1. Introduction

Countries with high and growing per capita income have, in recent years, experienced significant declines in fertility, to the extent that most of those countries are now below replacement-level fertility. This phenomenon has no precedent in recorded history (Feyrer et al., 2008). The pattern shown by macroeconomic indicators tends to obscure the differences in fertility levels across minority ethnic populations in developed countries. Since the presence of minority ethnic groups is rather the rule than the exception (Berritella, 2012), it is no surprise that there exists an extensive literature on why ethnic minority groups have different levels of fertility[1]. Education and income appear to be the main factors influencing fertility decisions; more educated and/or wealthier parents decide to have fewer children, due to the greater time-opportunity cost of child-rearing (De la Croix and Doepke, 2003). Thus, if education and income explain fertility behavior, differences in fertility between minorities and majorities should disappear once these variables are controlled for (the assimilation hypothesis: Gordon, 1964). The minority group status hypothesis rejects assimilation theory, establishing that the minority characteristic exerts an independent effect on fertility due to *the insecurities and marginality associated with minority group status* (Goldscheider and Uhlenberg, 1969).

In this paper, we analyze the fertility patterns of a particular minority ethnic group, the Roma population of Spain. Spanish laws covering the protection of data[2] prohibit the incorporation of ethnic variables in the census, making the study of ethnic groups in Spain problematic. The intercultural social non-profit organization Fundación Secretariado Gitano[3] (FSG) has allowed us to access the microdata of a transnational survey, carried out jointly by the Soros Foundation and the Open Society Institute in 2011[4]. This database considers the labor situation of the Spanish Roma population and comprises, apart from income and education, other demographic, sociological, and

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[1] For a revision of the literature see, for instance, Poston et al. (2006) and Chabé-Ferret and Ghidi (2013)

[2] Ley Orgánica 15/1999, de 13 de diciembre de Protección de Datos de Carácter Personal. See Appendix III of the report "Ethnic statistics and data protection in the Council of Europe countries" elaborated by Simon (2007)

[3] For more details, see http://www.gitanos.org/quienes_somos/mision_estrategia.html.en

[4] See Spanish and Migrant Roma Population In Spain: Employment And Social Inclusion – 2011- A Comparative study, page 203, http://www.gitanos.org/upload/14/10/Situatia_romilor_-_english.pdf

economic characteristics, making it possible to advance our knowledge of other aspects of this minority ethnic group, e.g. its fertility patterns.

Family ties and home production are two idiosyncratic features of this minority ethnic group. The family is the core of the Spanish Roma social organization; family members usually live very close to each other, so that family ties are very strong; family beliefs and preferences matter much more than the market and institutions; and members of Spanish Roma families have a high level of involvement in family businesses. More than 11% of the Roma population in Spain is involved in a family business, compared to only 3% of the total Spanish population[5].

In our analysis, family ties and home production (i.e. family business and housework) are considered to play an important role in determining the fertility patterns of the Spanish Roma population. Both factors are present in the study by Alesina and Giulano (2010), who establish that strong family relationships are associated with larger families, and that strong family ties are linked to more time spent in home production (in the form of housework). In a more recent working paper published in 2013, the same authors claim that beliefs in the importance of the family may cause a specialization in family- based businesses, which in turn reinforces the attachment to the family. We consider both housework and family business to be what the economic literature refers to as the family good[6].

We first build a family bargaining framework that allows us to analyze the intra-family allocation of effort from parents and their young adult children to the production of a family good[7] (adult children living with their parents are rarely included as decision makers in theoretical models; Doss, 2013). Specifically, we present a family model where a parent and their adult children play a two-stage game. In the first stage, the parent unilaterally decides the number of children, and in the second stage, the effort devoted to the family public good by each family member is deduced. That it is to say, while the number of children is an individual parent's decision, the amount of family public good is a bargaining decision, given that both decisions are interconnected. Solving the game, the parent's bargaining power, together with the family members'

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[5]Source: own elaboration using the 2011 Spanish Roma Population Survey (SRPS) provided by FSG and the Spain Economically Active Population Survey (Statistical Spanish Office: http://www.ine.es/en/inebmenu/mnu_mercalab_en.htm)

[6] In the family economics literature, the family good is also referred to as a household public good.

[7] See McElroy and Horney, 1981; Manser and Brown, 1980 and Lundberg and Pollak, 1993, among others.

productivity for the family good, emerge as factors influencing the parental decision on the optimal number of children.

The second step in our analysis is empirical. Using the 2011 Spanish Roma Population Survey (SRPS) elaborated by FSG, and introducing education, income, labor status, gender, age - and certain idiosyncratic cultural aspects of the Spanish Roma population as control variables - we find support for our theoretical thinking: those Spanish Roma families in which the head of the family presents a greater bargaining power are those with more children. Furthermore, the young adult children's degree of contribution to the family good, as an approach to their level of productivity in this family good, affects positively the number of children.

The structure of the paper is as follows. Section 2 presents a descriptive analysis of the Roma population in Spain. Section 3 sets up the model and derives the basic theoretical findings. Our empirical study is presented in Section 4, and Section 5 outlines our conclusions.

2. The Roma population in Spain

The Spanish Roma population is formed by the groups who first arrived in Spain in the 15th Century. They have shown strong group cohesion, and maintained their distinctive characteristics over time[8]. The estimated number of Roma living in Spain is around 700,000 (Council of Europe[9], 2007), a figure similar to that of Russia. Only Turkey and Romania (with 1.9 million and 1.85 million, respectively) have higher Roma populations. These populations are not homogeneous groups; depending on their geographical spread, five Roma categories are distinguished[10]. These are the Kalderaši (the most numerous), in the Balkans, many of whom migrated to Central Europe and North America; the Gitanos[11] (or Calé) in the Iberian Peninsula, Northern Africa and Southern France; the Manush (or Sinti) in Alsace and other regions of France and

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[8] See Action Plan for the development of the Roma Population, Spanish Ministry of Health, Social Policy, and Equality.
http://www.msssi.gob.es/politicaSocial/inclusionSocial/poblacionGitana/docs/INGLES_ACCESIBLE.pdf
[9] See
http://web.archive.org/web/20090221234346/http://www.coe.int/t/dg3/romatravellers/documentation/strategies/statistiques_en.asp
[10] See Romaninet- A Multimedia Romani Course for Promoting Linguistic Diversity and Improving Social Dialogue: Report On Roma People (2009).
http://eacea.ec.europa.eu/llp/projects/public_parts/documents/languages/lan_MP_505602_romanin.pdf
[11] Although the word Gitanos is not an ethnic slur, its utilization is sometimes controversial.

Germany; the Romnichal (or Romany) in the UK and North America; and the Erlides (or Yerlii) in South-Eastern Europe and Turkey.

As mentioned in the introduction, one of the distinguishing features of the Spanish Roma group is the family structure. Following the criteria of Alesina and Giulano (2013)[12], the Spanish Roma family could be described as a *communitarian family* since, first, children are subject to parental authority even after marriage and, second, siblings are treated equally. The same authors, focusing on the majority ethnic group in the country, classify the Spanish population as *egalitarian nuclear families*, characterized by independent living arrangements, together with egalitarian inheritance rules. In figures, there are 4.7 individuals living in the average Spanish Roma household, compared to the general average of 2.8 individuals in Spanish households[13].

Focusing on Spanish Roma fertility behavior, we analyze the data provided by SRPS. This survey is based on the same indicators and methodology used by Spain's Economically Active Population Survey (EAPS)[14]. The survey universe includes the Spanish Roma population residing in the national territory, of 16 years old and over (16 being the minimum legal age of employment in Spain). The sample size was established at 1,497 interviews, which allows us to infer results with a +2.53% margin of error. The field work included carrying out a single interview per household, incorporating questions about gender, age, and employment variables for all the members of the household and, hence, obtaining this information on 5,879 individuals of all ages, and on 4,218 individuals of 16 years old and over. The final exploitation of the data applied the corresponding weighting factors to balance the interviewee sample[15]. SRPS covers a large number of variables that can be grouped into socio-demographic, economic and labor, and cultural characteristics.

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12 From the combination of the authoritarian/liberal vertical relationship with the equal/unequal horizontal relationship, these authors propose two additional categories: *absolute nuclear family* and *stem or authoritarian family*.

13 See Diagnóstico social de la comunidad gitana en España del 2011, page 226 Spanish Ministry of Health, Social Policy and Equality.
http://www.msssi.gob.es/politicaSocial/inclusionSocial/poblacionGitana/docs/diagnosticosocial_autores.pdf.

14 http://www.ine.es/en/inebmenu/mnu_mercalab_en.htm

15 For more details about methodology see Spanish and Migrant Roma Population In Spain: Employment And Social Inclusion – 2011- A Comparative study, pages 205, 212 and 213.
http://www.gitanos.org/upload/14/10/Situatia_romilor_-_english.pdf

This survey reveals that Spanish Roma Fertility patterns differ from those of the majority Spanish population. Table 1 shows the average number of children per individual, comparing the Spanish Roma population and the population as a whole.

Table 1: Average number of children.

Age range	Spanish Roma population	Spanish population
15-19*	0.24	0.02
20-24	0.62	0.06
25-29	1.52	0.42
30-34	1.81	1.23
35-39	2.12	1.74
40-44	2.27	2.00
45-49	2.37	2.36
Total	1.48	1.07

* For Spanish Roma Population the range is 16-19

Source: Own elaboration from SRPS and 1999 Fertility Survey (Statistical Spanish Office).

Table 1 shows a significant gap between the Spanish Roma population fertility patterns and those of the Spanish population at large. To clarify that, since the last fertility survey of the general Spanish population was done in 1999, it is not possible to make a perfect comparison. An alternative approach, using 2011 as reference year, is possible using data included in the study *Spanish and migrant Roma population in Spain: employment and social inclusion – 2011- a comparative study*. Whereas the portion of individuals 14 years old and under was 26.3% in the Roma population, this portion was 14.75% in the general Spanish population. Moreover, the study also points to the fact that the birth rate of the Spanish Roma population is increasing.

Focusing on income, the Survey of Income and Labor Conditions (SILC) indicates a total disposable monthly household income of close to €2,400 for the general Spanish population, whereas SRPS shows that this average for the Roma population is around €522. More differences arise in terms of education (see Figure 1). Around 50% of the Spanish Roma population did not complete primary school, compared to 10% for the average Spanish population. At the upper levels of education, almost 24% of the general population attained a level higher than secondary school, while this number is less than 3% for the Spanish Roma population. Although things are improving, thanks

to active campaigns promoted by FSG such as *Roma with Studies, Roma with a Future*[16], there is still a very high school drop-out rate before the end of compulsory secondary education.

Figure 1. Percentage of population in all levels of education, 2011.
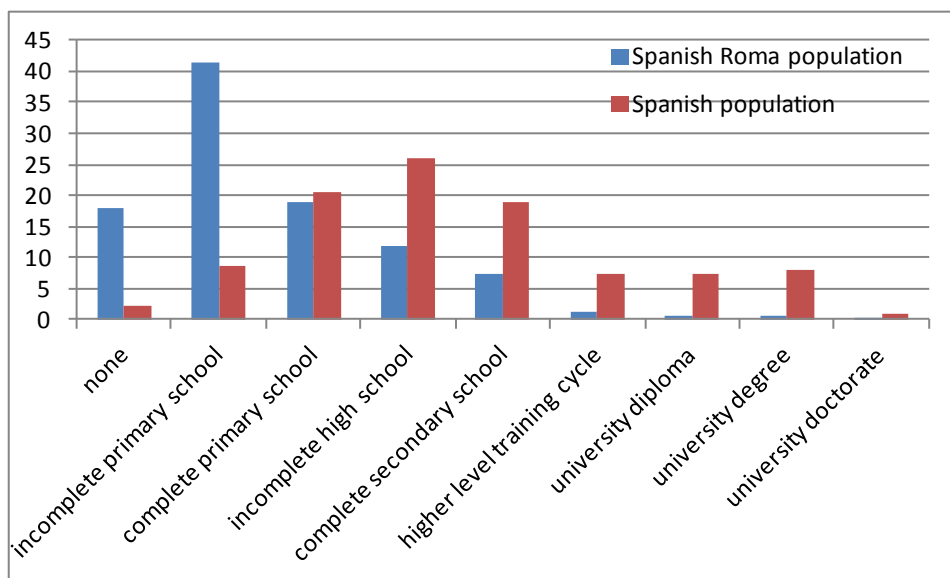
Among the stereotypes of Spanish Roma population, the more common is that the Spanish Roma do not recognize the value of work. Laparra (2007) provides evidence against this assertion; in fact, the Spanish Roma enter the labor market at an earlier age and have higher activity rates than the general Spanish population. This author highlights the importance of collaboration in family economic activities. Table 2 presents the percentage of the population by occupation, for both groups.

Table 2. Percentage of population by occupation, 2011.

	Spanish Roma population	General Spanish population
Employee	16.40	38.81
Self-employee	14.47	7.43
Assists the family business	11.14	0.34
Looking for a job	27.20	14.19
Student	4.06	6.75

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[16] http://www.gitanos.org/campannas/roma_with_studies__roma_with_a_future.html.en

Retired	5.56	14.49
Another pension	4.01	1.09
Disability	2.51	1.58
House keeper	14.64	15.31
No. observations survey	1,497	139,689

<center>Source: Source: Own elaboration from SRPS and EAPS</center>

The greatest difference between the Spanish Roma population and the average Spanish population is the lower percentage of Spanish Roma employees, compensated for by the higher percentage in the category of self-employee, and in the category of assistant to the family business. This difference could be explained by the fact that 46.1% of the working Roma population is employed in one particular type of commercial activity, i.e. itinerant trade or street markets.

The question is whether education, income, and occupation are the only factors that determine the fertility patterns of this minority ethnic group. The following two sections will establish the theoretical and empirical framework to examine this question.

3. A theoretical framework

We build a simple model of intra-household bargaining over a public family good production. The level of the public family good produced will be the result of a bargaining process among parents and their young adult children. Additionally, parents also individually decide the desired number of children.

Let us consider a parent (father or mother) whose preferences are given by the following utility function[17]:

$$U_P(Q, C_P, t_P) = \ln Q + C_P - B(t_P),\qquad(1)$$

where Q is the level of a family public good produced by the family members and consumed by the family, C_P is the parent private good consumption level, and t_P is the time devoted by the parent to the production of the family public good. This time implies a cost in utility terms, $B(.)$ that takes the following functional form:

$$B(t_P) = t_P^2 \ .$$

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[17] This functional form is based on Suen et al (2003)

This utility cost encompasses individual tastes for work outside the home, and monetary opportunity costs of working for the family rather than for others. Note that the family public good is not a perfect substitute for market private goods. The utility function of a representative young adult child is given by:

$$U_y(Q, C_y, t_y) = \ln Q + C_y - t_y^2, \tag{2}$$

with t_y being the time devoted by each young adult child to the production of the family public good. The interrelationship between parents and young adult children is channeled primarily through the family good. The functional forms considered guarantee strictly quasi-concave and increasing utility functions of the parent and each young adult child.

We assume that the public good produced by the family members takes a Cobb-Douglas form:

$$Q = (t_P)^{1-\alpha}(nt_y)^{\alpha}, \, 0 < \alpha < 1, \tag{3}$$

with n being the number of young adult children in the household.

Focusing now on the budget restrictions of each family member, we denote the parent income as M_P, devoted to the parent's own consumption and also to a monetary transfer to each young adult children, T. Transfers within families are common (Cox and Fafchamps, 2008). To maintain the tractability of the problem, we assume that the young adult children do not work outside the family, in such a way that the transfer from the parent is devoted to private good consumption.

We solve a two-stage sequential game under perfect information. In the first stage, the parent individually decides the number of children, n, and in the second stage, the effort devoted to the family public good by each family member is the result of a bilateral bargaining process among the parent and the young adult children.

Applying backward induction, we begin to solve the second stage of the game. Following Lundberg and Pollak (1993) and Chen and Wolley (2001), the non-cooperative setting - in which the parent and each young adult child individually decide their contribution to the public good production (Cournot-Nash) - is used as a threat point for the cooperative Nash-bargaining problem.

Therefore, the parent problem is given by:

$$Max_{t_P} \; U_P(t_P, t_y, n) = (1-\alpha)\ln(t_P) + \alpha\ln(nt_Y) + C_P - t_P^2 \quad,$$

subject to $C_P = M_P - nT$,

(4)

and the problem of a representative young adult is given by:

$$Max_{t_y} \; U_Y(t_P, t_y, n) = (1-\alpha)\ln(t_A) + \alpha\ln(nt_Y) + C_y - t_Y^2 \quad,$$

subject to $C_Y = T$.

(5)

This leads to the following first order optimal conditions for t_A and t_Y, respectively:

$$\frac{(1-\alpha)}{t_P} - 2t_P = 0,$$

$$\frac{\alpha}{t_Y} - 2t_Y = 0,$$

(6)

in such a way that the contribution level of the parent to the family good in the non-cooperative setting amounts to $\overline{t_P} = \left(\frac{1-\alpha}{2}\right)^{\frac{1}{2}}$, whereas the effort devoted by each young adult child to the family good amounts to $\overline{t_y} = \left(\frac{\alpha}{2}\right)^{\frac{1}{2}}$. Notice that, at the threat point, the optimum contribution of each young adult child to the family good does not depend on the number of siblings. Introducing these levels into the utility functions, we obtain the optimum utility levels under a non-cooperative setting:

$$\overline{U}_P = \frac{(1-\alpha)\ln\left(\frac{1-\alpha}{2}\right) + \alpha\ln\left(\frac{\alpha}{2}\right)}{2} + \alpha\ln n + M_P - nT - \frac{1-\alpha}{2}$$

(7)

$$\overline{U}_Y = \frac{(1-\alpha)\ln\left(\frac{1-\alpha}{2}\right) + \alpha\ln\left(\frac{\alpha}{2}\right)}{2} + \alpha\ln n + T - \frac{\alpha}{2}$$

(8)

In a cooperative equilibrium, the contributions to the family good are Pareto efficient. Therefore, the utility possibilities frontier is characterized by the following conditioned optimization problem:

$$\underset{t_P,t_Y}{\text{Max}}\ U_P(t_P,t_y,n) = (1-\alpha)\ln t_p + \alpha \ln(nt_Y) + M_p - nT - t_p^2,$$

$$s.t.\ U_Y(t_P,t_y,n) = (1-\alpha)\ln t_p + \alpha Log(nt_Y) + T - t_Y^2. \tag{9}$$

The first order conditions are given by:

$$\frac{(1+n)(1-\alpha)}{t_A} - 2t_A = 0,$$

$$\frac{(1+n)\alpha}{t_Y} - 2nt_Y = 0, \tag{10}$$

and hence, we obtain that the Pareto-efficient level of contribution to the family good by

the parent is $\tilde{t}_P = \left[\dfrac{(1+n)(1-\alpha)}{2}\right]^{\frac{1}{2}}$ whereas that of each young adult child

is $\tilde{t}_Y = \left[\dfrac{(1+n)\alpha}{2}\right]^{\frac{1}{2}}$. The difference in the non-cooperative solution is the effect of the

number of siblings in the level of family good of parent and children.

Therefore, the utility possibilities frontier obtained is:

$$U_P^{UPF}(\alpha,n,U_y) =$$

$$= \frac{(1+n)}{2}\left[(1-\alpha)\ln(1-\alpha) + \alpha \ln(\alpha) + \ln\left(\frac{1+n}{2}\right) + \alpha \ln(n) - 1\right] + M_P - nU_Y. \tag{11}$$

Moreover, the slope of the utility possibility curve is $\dfrac{dU_A^{UPF}}{dU_Y} = -n$.

As we have previously mentioned, the allocation of welfare among the family members is the result of the Nash bargaining solution corresponding to the following maximization problem:

$$\underset{U_Y}{\text{Max.}}\ N = \left(U_P^{UPF} - \overline{U}_P\right)^{\beta}\left(U_Y - \overline{U}_Y\right)^{n(1-\beta)}, 0 \le \beta \le 1, \tag{12}$$

where β and $(1-\beta)$ denote parent and young adult child bargaining power, respectively,

and $\overline{U}_P$, $\overline{U}_Y$, denote the parent and young adult child levels of utility obtained at the

threat point, respectively. For simplicity, we assume that parents treat all children

equally and hence, no different bargaining powers among siblings emerge.

From the first order condition of this problem:

$$-\beta(U_Y - \overline{U}_Y) + (1-\beta)(U_A^{UPF} - \overline{U}_A) = 0,$$ (13)

we are able to obtain the optimum levels of utility in the Nash bargaining setting:

$$\tilde{U}_P(\alpha,\beta,n,M_P,T) =$$
$$= \frac{(1-\alpha)\ln(1-\alpha)+\alpha\ln(\alpha)-Ln2}{2} + M_P - nT +$$ (14)
$$+\frac{\beta(1+n)\ln(1+n)+\alpha[\beta+(2-3\beta)n]\ln(n)-(1+n)\beta-(1-\alpha-\beta)n}{2[\beta+(1-\beta)n]},$$

$$\tilde{U}_Y(\alpha,\beta,n,T) =$$
$$= \frac{(1-\alpha)\ln(1-\alpha)+\alpha\ln(\alpha)-Log2}{2} + T +$$ (15)
$$+\frac{(1-\beta)(1+n)[\ln(1+n)-1]+\alpha[3\beta-1+(1-\beta)n]\ln(n)+1-\alpha-\beta}{2[\beta+(1-\beta)n]}.$$

Taking into account the optimum level of parent utility in the Nash bargaining, in the first stage of the game, the optimal number of children verifies that: $\frac{\partial \tilde{U}_P}{\partial n} = 0$ and therefore, an implicit function that relates n, α, β, M and T emerges. Thus, the optimal number of children has a relationship with the child marginal productivity, as well as the parent bargaining power. This relationship can only be determined through a simulation giving values to the parameters. Figure 3 shows the relationship *ceteris paribus* between parent utility and number of children in the Nash solution for different values of parent bargaining power. We observe a positive relationship between the optimum number of children and the parent bargaining power, $\frac{\partial n^*}{\partial \beta} > 0$.

Figure 3. Parent utility and optimum number of children in the Nash solution for different values of parent bargaining power*
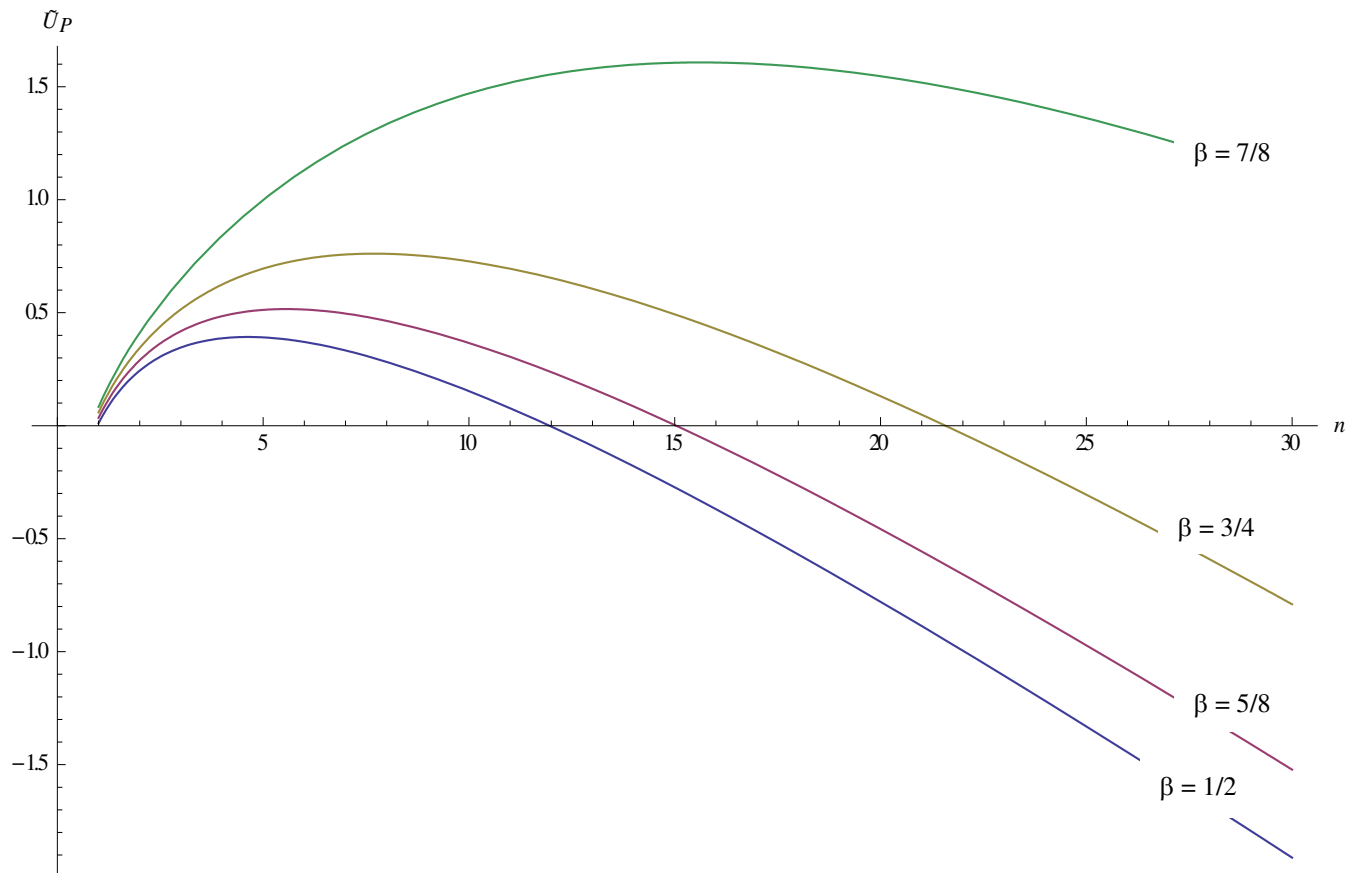
*Parameters of the model have been fitted to $M_P = 1$, $T = 1/7$, $\alpha = 1/2$

Figure 4 combines the optimum number of children with different values of parameter α, measuring the child marginal productivity. As expected, the greater the child marginal productivity, the higher the optimum number of children, $\dfrac{\partial n^*}{\partial \alpha} > 0$.

Our theoretical framework is related to the explanation proposed by Salcedo et al. (2012), who build a model where living with others is beneficial because the costs of household public goods can be shared. Since the income elasticity of household public

goods is lower than that of private goods, then public household goods become relatively less important as incomes rise, which would cause a decline in optimum household size. However, these authors model the household as a group of roommates abstracting from intra-household bargaining, and also identify public household goods with food consumed at home, housing, and household appliances, abstracting from family-based business.

Figure 4. Child utility and number of children in the Nash solution for different values of parent productivity
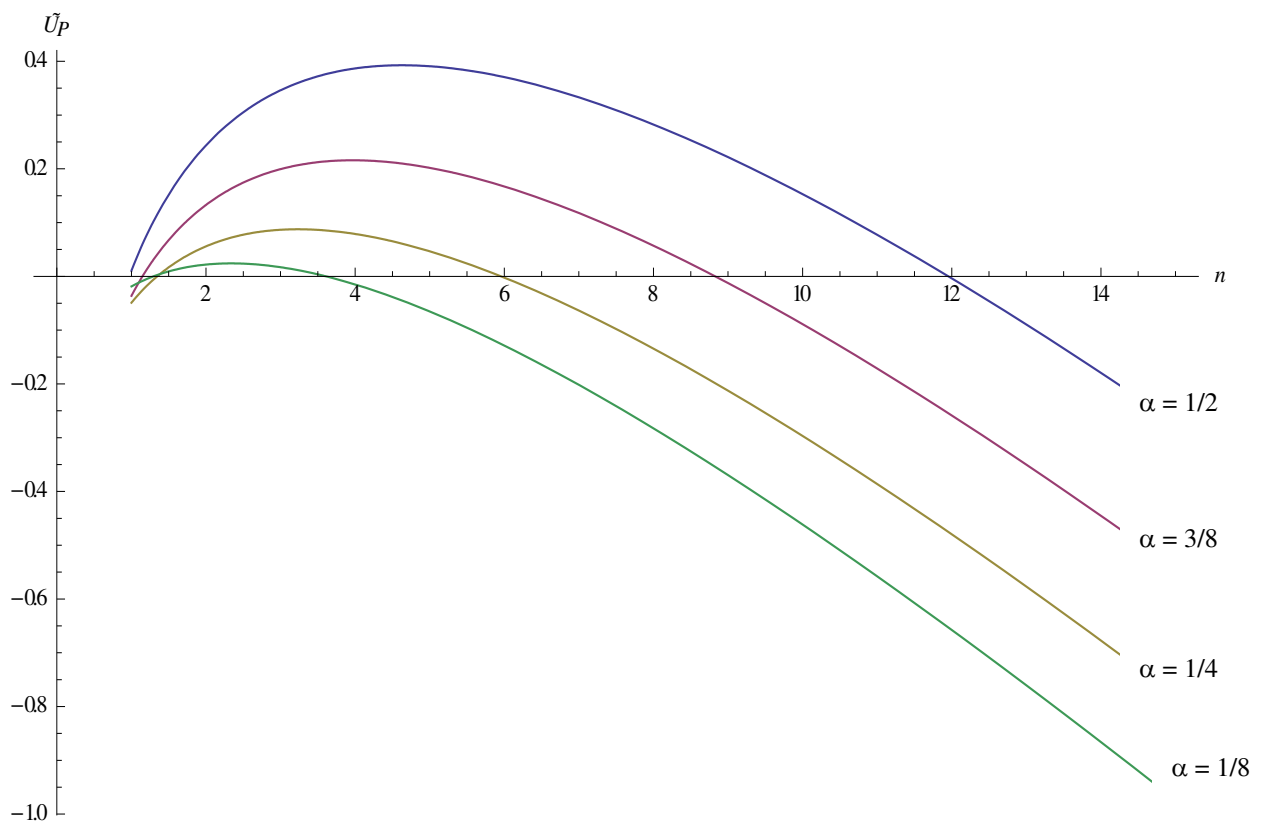
*Other parameters of the model have been fitted to $M_P = 1$, $T = 1/7$, $\beta = 1/2$

The next and last step is to check whether our theoretical findings are supported by empirical evidence.

4. Empirical evidence

In our estimations, the dependent variable is the number of children. However, since certain factors affecting the likelihood of having children, and those affecting the number of children, are linked, we have estimated the model using Heckman's sample selection, in order to obtain unbiased estimations. Implementing the Heckman model requires the selection of variables that have an effect on the discrete choice of whether or not to have children, but not on the amount of children. We have considered the status 'married' as the selection variable.

In order to introduce the bargaining power of parents β as an independent variable, we choose two alternative proxies to measure it. The first is a variable that counts, apart from the head of the family (the reference person of the interview), those members who have a link of brother, sister, brother in-law, sister-in-law, mother, father, father in-law or mother in- law, with the head of the family. This number measures the magnitude of those who play the role of parent in our theoretical framework, and it seems plausible to us that, the higher the number of those who play the role of parent within the family unit, the greater the bargaining power of the "parents" dealing with young adult children. This variable has been normalized to values between 0 and 1 to fit the empirical estimation to the theoretical model. The second is the health of the head of the family. This variable has been built through the answer given by the head of the family about his/her health, the answers can be: very bad, bad, regular, well, and very well, and the given weights are 0, 0.2, 0.5, 0.7, and 1, respectively. The hypothesis considered is that better perceived health of the head of the family will be associated with greater bargaining power of the parent. According to the theoretical model, the expected sign should be positive.

The second independent variable that emerges from our theoretical model is the productivity of the children for the family public good α. We build a proxy of the latter by counting those children over 16 who help with the housework and/or assist in the family business, and we normalize to values between 0 and 1. In the first estimation, we consider both tasks, housework and family business, to capture family good productivity, and in the second estimation, we separate them in order to check the robustness of the results. According to the theoretical model, the expected sign should be positive.

We introduce an extensive number of variables as control variables. Obviously, education, income, and occupation are present. Following Sanromá et al. (2009), we have assigned 0 years of schooling to those with no formal studies; 3 years of schooling to those with incomplete primary education; 6 years for complete primary education; 8 years for incomplete high school; 10 years for complete secondary education; 14 years for a higher level training cycle; 15 years for incomplete tertiary education, 17 years for complete tertiary education, and 19 for a doctoral degree.

Additionally, we consider gender, the age of the head of the household, and whether the family resides in a rural or urban area. Cultural and social characteristics are also taken into account by way of religion variables and the degree of friendship with other ethnic groups. Descriptive statistics are presented in Appendix A.

Table 3 presents the Heckman selection model estimations for different proxies of the bargaining power, considering the family public good in its broadest sense, including the family business and housekeeping.

Table 3. Empirical estimations. Dependent variable number of children.

	Beta proxied as adults				Beta proxied as health			
Socio-demographic characteristics								
Female	-0.07701		-0.07125		-0.07198		-0.06600	
Age	0.04799	***	0.04807	***	0.04795	***	0.04773	***
Education	-0.00041		-0.00452		0.00140		-0.00305	
Education squared	-0.00047		-0.00024		-0.00066		-0.00037	
Urban	0.06924		0.04779		0.06920		0.04679	
Economic and labor characteristics								
Individual income	-0.00708	***	-0.00720	***	-0.00751	***	-0.00762	***
Individual income squared	0.00001	***	0.00001	***	0.00001	***	0.00001	***
Permanent employee	-0.18229		-0.16672		-0.13931		-0.12595	
Temporary employee	-0.07713		-0.08617		-0.02416		-0.03476	
Self employed	-0.23584		-0.22484		-0.19103		-0.17878	
Assists the family business	-0.01084		0.00330		0.09097		0.10746	
Unemployed previously worked	-0.05940		-0.07488		-0.01240		-0.02639	
Unemployed looking first job	-0.19318		-0.22366		0.01200		-0.01398	
Student-worker	-0.23219		1.58376	***	-0.25370		1.51879	***
Student	0.36301		0.27792		0.45102		0.36480	
Retired	0.04223		0.05893		0.22343		0.24337	
Other benefits	0.26894		0.27284		0.37515		0.38041	
Permanent disability	-0.32521		-0.33666		-0.07358		-0.08825	
House keeper	0.04337		0.04617		0.11190		0.11447	

	(1)		(2)		(3)		(4)	
α	1.10151	**	1.12050	**	1.04597	**	1.06745	**
Cultural characteristics								
Friends from my ethnic group	0.17345		0.26725		0.21547		0.31354	
Friends predominantly from my ethnic group	0.24175		0.31700		0.24220		0.32076	
No matter ethnic group	0.05712		0.11140		0.05594		0.11047	
Orthodox			-1.74916	***			-1.75613	***
Catholic			-0.20801				-0.20600	
Protestant			-0.65493	*			-0.65507	*
Evangelist			-0.24686	*			-0.25984	*
Other			-0.06813				-0.05088	
β	2.05619	**	1.98241	**	0.41325	*	0.40764	*
_cons	1.12206	**	1.30526	**	1.19067	**	1.38357	**

SELECTED MODEL

	(1)		(2)		(3)		(4)	
Socio-demographic characteristics								
Married	0.83192	***	0.82986	***	1.09648	***	1.09285	***
Female	-0.01802		-0.00847		0.15342		0.15772	
Age	0.04034	***	0.04018	***	0.05521	***	0.05524	***
Education	0.03624		0.03110		0.03686		-0.00308	
Education squared	-0.00320		-0.00267		-0.00335		-0.00308	
Urban	-0.28382	***	-0.30769	***	-0.25149	***	-0.27145	***
Economic and labor characteristics								
Individual income	-0.00720	***	-0.00764	***	-0.00423	***	-0.00457	***
Individual income squared	0.00000		0.00000		0.00000		0.00000	
Permanent employee	-0.24186		-0.24299		-0.54985	**	-0.54687	**
Temporary employee	-0.12318		-0.12413		-0.46780	*	-0.45995	*
Self employed	0.04633		0.06004		-0.12375		-0.11258	
Assists the family business	-0.10453		-0.07723		-0.63735	**	-0.61810	**
Unemployed previously worked	-0.19798		-0.19794		-0.41552	*	-0.41319	*
Unemployed looking first job	-0.48161		-0.48035		-0.82638	***	-0.81202	***
Student-worker	-1.73435	***	-1.44113	**	-1.82306	***	-1.64065	***
Student	-0.77429	*	-0.80385	*	-1.26465	***	-1.27267	***
Retired	0.11839		0.11513		-0.54515		-0.53923	
Other benefits	0.11697		0.11158		-0.10545		-0.10866	
Permanent disability	0.15068		0.17167		-0.06725		-0.05848	
House keeper	0.21085		0.20947		-0.20775		-0.19774	
α	3.18780	**	3.16324	**	5.19507	***	5.12864	***
Cultural characteristics								
Friends from my ethnic group	-0.24933		-0.24869		-0.32616		-0.33941	
Friends predominantly from my ethnic group	-0.17929		-0.19343		-0.18799		-0.20809	
No matter ethnic group	-0.11890		-0.15461		-0.14504		-0.18195	
Orthodox			-0.88066	*			-0.62885	*
Catholic			0.19749				0.17616	

Protestant		0.69680				0.27527	
Evangelist		0.04812				0.05502	
Other		0.15301				0.07666	
β	-7.35034	***	-7.39463	***	0.18270	0.16871	
_cons	1.63680	***	1.66127	***	-0.89222	-0.88257	
Athrho	-0.60361	***	-0.60552	***	-0.55136 ***	-0.56479 ***	
Lnsigma	0.30636	***	0.30300	***	0.30163 ***	0.29958 ***	
Rho	-0.53961		-0.54097		-0.50154	-0.51152	
Sigma	1.35847		1.35391		1.35206	1.34929	
Lambda	-0.73305		-0.73242		-0.67810	-0.69020	
Wald test of indep. Eqns.	15.39	***	15.74	***	12.79 ***	14.32 ***	
R2	0.54		0.54		0.44	0.44	

*, **, *** means significance at 10%, 5% and 1% respectively.

Rho is negatively signed and different from 0, suggesting that the error term in the selection and primary equation is negatively correlated. Thus, unobserved factors that make having children more likely tend to be associated with a lower number of children.

Our results indicate that the bargaining power of parents plays an important role in determining the number of children in a family. The coefficient of the bargaining power variable is positive and statistically significant, indicating that the greater the parent bargaining power, the higher the number of children in the family. The estimation also shows a significant relationship between the child contributions to the family public good and the number of children in the family. Specifically, the coefficient of the parameter is positive and significant in both the determination of children and the selection model.

The age of the head of the family presents the expected sign; it is positively associated with the number of children. Paradoxically, education of the head of the family does not affect the number of children, probably because its effect is already captured by income and occupation. Income has a non-monotonic relationship, the higher the income, the lower the number of children, up to an income threshold that turns the relationship positive. Cultural differences also affect the number of children, while being Orthodox, Protestant or Evangelist decreases the number of children with respect to not reporting any religion.

The probability of having children is positively affected by the age of the head of the family and the child productivity for the family public good. However, the bargaining power of the father has a negative effect on the probability of having children. Other negative relationships on the likelihood of having children are individual income or being Orthodox. Being a student, employed, unemployed, or assisting with the family business, if beta is measured as health, decreases the probability of having children. Living in an urban area also decreases the likelihood of having children, but it has no effect on the number of children.

In Table 4, the family good is proxied by family business assistance or, alternatively, by housework collaboration. Whereas the bargaining power variable β remains statistically significant in all estimations, not to consider the family good in the widest sense leads to the variable α losing significance.

Table 4. Empirical estimations. Dependent variable number of children.

	Family public good as business		Family public good as housework	
	Beta (adults)		*Beta(health)*		*Beta (adults)*		*Beta(health)*	
Socio-demographic characteristics				
Female	-0.06917		-0.06394		-0.06671		-0.06051	
Age	0.05051 ***	0.04984 ***	0.05125 ***	0.04996 ***
Education	0.00017		0.00077		-0.00280		-0.00248	
Education squared	-0.00056		-0.00063		-0.00036		-0.00039	
Urban	0.06051		0.05959		0.06010		0.06327	
Economic and labor characteristics				
Individual income	-0.00753 ***	-0.00794 ***	-0.00764 ***	-0.00798 ***
Individual income squared	0.00001 ***	0.00001 ***	0.00001 ***	0.00001 ***
Permanent employee	-0.15389		-0.10841		-0.14696		-0.10484	
Temporary employee	-0.06297		-0.01091		-0.05659		-0.00513	
Self employed	-0.17151		-0.12598		-0.15789		-0.11764	
Assists the family business	0.06681		0.17614		0.08556		0.18981	
Unemployed previously worked	-0.06541		-0.01410		-0.06169		-0.00704	
Unemployed looking first job	-0.19565		0.02099		-0.22012		-0.02562	
Student-worker	1.63105 ***	1.59565 ***	1.65397 ***	1.61722 ***
Student	0.37858		0.47610		0.39708		0.51603	
Retired	0.01802		0.20991		0.03072		0.22723	
Other benefits	0.29624		0.40079		0.29408		0.40698	
Permanent disability	-0.33869		-0.09335		-0.34034		-0.09348	
House keeper	0.05348		0.12559		0.06826		0.13425	
α	0.95303		0.67858		-0.14696		-0.18113	
Cultural characteristics				
Friends from my ethnic group	0.28783		0.32405		0.22310		0.26080	

Friends predominantly from my ethnic group	0.34887		0.33830		0.27578		0.27183	
No matter ethnic group	0.14512		0.12956		0.06435		0.05727	
Orthodox	-1.77666	***	-1.79781	***	-1.80973	***	-1.81383	***
Catholic	-0.20561		-0.20370		-0.20531		-0.20810	
Protestant	-0.63875	*	-0.63216		-0.63662	*	-0.65223	
Evangelist	-0.22407		-0.23810	*	-0.22648		-0.24416	*
Other	0.02575		0.04610		0.02869		0.04609	
β	2.03077	**	0.39334	*	1.85567	*	0.39577	*
_cons	1.19409	**	1.31979	**	1.29207	**	1.40123	**

SELECTED MODEL

Socio-demographic characteristics

Married	0.82470	***	1.07964	***	0.83903	***	1.08545	***
Female	-0.00884		0.15937	*	-0.00631		0.16460	*
Age	0.04176	***	0.05702	***	0.04122	***	0.05674	***
Education	0.03203		0.03399		0.02835		0.02786	
Education squared	-0.00265		-0.00298		-0.00242		-0.00259	
Urban	-0.31389	***	-0.27843	***	-0.30663	***	-0.26661	***

Economic and labor characteristics

Individual income	-0.00782	***	-0.00474	***	-0.00780	***	-0.00467	***
Individual income squared	0.00000		0.000001		0.00000		0.00000	
Permanent employee	-0.23680		-0.53727	*	-0.24572		-0.55466	**
Temporary employee	-0.11229		-0.45935	*	-0.12586		-0.47426	*
Self employed	0.08191		-0.10177		0.07290		-0.10380	
Assists the family business	-0.04069		-0.57623	**	-0.05229		-0.58121	**
Unemployed previously worked	-0.19070		-0.40761	*	-0.20559		-0.42139	*
Unemployed looking first job	-0.47262		-0.80659	**	-0.57802	*	-0.92097	***
Student-worker	-1.43072	**	-1.62608	***	-1.44268	**	-1.65203	***
Student	-0.78602		-1.25859	***	-0.80575	*	-1.28245	***
Retired	0.08804		-0.57774		0.08495		-0.53698	
Other benefits	0.09763		-0.13499		0.09661		-0.11513	
Permanent disability	0.21173		-0.04932		0.20283		-0.04503	
House keeper	0.21804		-0.18135		0.19605		-0.21323	
Children productivity	11.50718	**	14.98257	***	5.56288	***	6.92741	***

Cultural characteristics

Friends from my ethnic group	-0.21795		-0.31522		-0.33818		-0.45870	
Friends predominantly from my ethnic group	-0.16470		-0.19814		-0.30190		-0.34473	
No matter ethnic group	-0.12284		-0.16394		-0.24196		-0.28876	
Orthodox	-0.89607	*	-0.65804	*	-0.89716	*	-0.63916	*
Catholic	0.20990		0.19031		0.20340		0.17898	
Protestant	0.70733		0.29117		0.68728		0.26658	
Evangelist	0.06287		0.07085		0.05703		0.05920	
Other	0.14485		0.08316		0.14546		0.06722	
β	-7.42672	***	0.13740		-7.34134	***	0.21549	

20

_cons	1.59958	***	-0.91012		1.73150		-0.81910	
Athrho	-0.62773	***	-0.58723	***	-0.62195	***	-0.61660	***
Lnsigma	0.30975	***	0.30664	***	0.30906	***	0.30924	***
Rho	-0.55649		-0.52790		-0.55248		-0.54875	
Sigma	1.36308		1.35886		1.36214		1.36238	
Lambda	-0.75854		-0.71734		-0.75256		-0.74761	
Wald test of indep. Eqns.	18.17	***	18.7	***	14.89	***	16.61	***
R2	0.54		0.44		0.54		0.44	

*, **, *** means significance at 10%, 5% and 1% , respectively.

5. Conclusions

Two conclusions arise from this straightforward study. Family and home production are two idiosyncratic features of the Roma population of Spain, and it is confirmed that both affect the fertility behavior of this minority ethnic group, once we control for other factors present in the fertility patterns of other minority ethnic groups: occupation, education, and income. The Spanish Roma family is characterized by authoritarian vertical relationships, and therefore the parent bargaining power has an influence on the number of children in the family unit that we have found to be positive. Furthermore, the high degree of assistance from the adult children to the family business and to housework (e.g. care of siblings) increases the number of children in the family.

Our second conclusion is the need for more data, in order to advance our knowledge of minority ethnic groups. The debate between personal data protection and the advance of knowledge is an open question in society, especially when taking discrimination into account. The efforts of intercultural, social non-profit organizations devoted to obtaining adequate information to ascertain the realities of this ethnic group, and to implementing actions to improving Spanish Roma living conditions, and to preventing or eliminating all forms of discrimination should, at the very least, be given serious consideration.

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Appendix A. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Number of children	1008	2.67	1.56	1	13
Socio-demographic characteristics					
Single	1497	0.27	0.45	0	1
Married	1497	0.58	0.49	0	1
Living Together	1497	0.06	0.23	0	1
Widow/-er	1497	0.05	0.21	0	1
Divorced	1497	0.02	0.14	0	1
Separated	1497	0.03	0.16	0	1
Male (Reference Category)	1497	0.48	0.50	0	1
Female	1497	0.52	0.50	0	1
Age	1497	36.28	14.79	16	91
Education	1497	4.45	3.39	0	19
Urban	1497	0.31	0.46	0	1
Rural (Reference Category)	1497	0.69	0.46	0	1
Economic and labor characteristics					

Individual Income	1466	159.25	105.06	3.12	700
Permanent Employee	1497	0.06	0.24	0	1
Temporary Employee	1497	0.07	0.25	0	1
Self Employed	1497	0.14	0.35	0	1
Assists The Family Business	1497	0.11	0.31	0	1
Unemployed Previously Worked	1497	0.23	0.42	0	1
Unemployed Looking First Job	1497	0.04	0.20	0	1
Student-Worker	1497	0.01	0.10	0	1
Student	1497	0.03	0.17	0	1
Retired	1497	0.06	0.23	0	1
Other Benefits	1497	0.04	0.20	0	1
Permanent Disability	1497	0.03	0.16	0	1
House Keeper	1497	0.15	0.35	0	1
Illegal Worker (Reference Category)	1497	0.04	0.19	0	1
α (family good production in widest sense)	1497	0.02	0.10	0	1
α (family business)	1497	0.004	0.05	0	1
α (housework)	1497	0.01	0.12	0	1
Cultural characteristics					
Friends from my ethnic group	1495	0.08	0.27	0	1
Friends predominantly from my ethnic group	1495	0.32	0.46	0	1
No matter ethnic group	1495	0.60	0.49	0	1
No friends (Reference Category)	1495	0.01	0.09	0	1
Orthodox	1497	0.01	0.08	0	1
Catholic	1497	0.22	0.42	0	1
Protestant	1497	0.00	0.04	0	1
Evangelist	1497	0.62	0.49	0	1
Other	1497	0.01	0.08	0	1
No religion (Reference Category)	1497	0.14	0.35	0	1
β (health)	1494	0.76	0.24	0	1
β (those with a" parent" role in the family unit)	1497	0.21	0.11	0.08	0.83

Source: SRPS