

Fertility patterns in the Roma population of Spain

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Abstract The Spanish Roma population have co-existed with the broader population of Spain, under the same laws and regulations for more than 500 years, but they exhibit very different fertility patterns. The aim of this paper is to determine whether there are factors other than income or education that can explain the larger number of children in Spanish Roma families. Our analysis reveals that the existence of a family business, which is highly labor-demanding, appears to be associated with parental decisions concerning the number of children. Since parental authority, in Roma families, holds sway over children even after their own marriage, the future labor contributions of children are particularly beneficial to the family business.

Keywords Roma Spanish population · Fertility · Bargaining power

JEL Classification C78 · D13 · J11

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 now have below replacement-level fertility rates (Feyrer et al. 2008). The pattern

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revealed by macroeconomic indicators tends to obscure the differences in fertility levels across minority ethnic populations in developed countries,¹ with Spain being a good example. Spanish Roma families have more children than do families in the majority Spanish population, despite the more than 500 years of co-existence. In this paper, we analyze the factors that are related to these higher fertility rates.

This analysis takes us into the long debate among demographers and economists about the explanatory factors of fertility patterns, most notably, the Demographic Transition. According to Oppenheim (1997), the “granddaddy” of fertility, transition theory, for most demographers, was formulated by Thompson (1930) and Notestein (1953),² who attribute fertility declines over time to changes in social life, accompanied by industrialization and urbanization. However, for most economists, the seminal work of Becker (1960) is the starting point. Becker’s fertility theory considers children to be consumer durables who provide utility to their parents, and introduces the concept of a quantity-versus-quality trade-off in fertility choice, which generates a mechanism to explain the observed mostly-negative relationship between income and fertility. This mechanism was linked to the theory of economic growth in Barro and Becker (1988), which led to the publication of several papers³ focused on explaining the evolution from pre-industrial, Malthusian economies (characterized by economic stagnation, high mortality rates, and high birth rates) to industrial economies (characterized by positive economic growth, low mortality rates, and low birth rates).

Both points of departure have been criticized and contradicted. A leading detractor of those views that overemphasize economic factors as an explanation of fertility patterns is Coale (1986), who provides evidence that the correlations among the indicators of urbanization and industrialization, and the timing of fertility declines, are weak and inconsistent. In 1960, this author had already stated “If depression and recovery do not explain the fertility reversal in the 1930s and the sustained rise since, how can we account for them? The explanation is necessarily noneconomic in part”.⁴ Coale argues that fertility patterns are determined by the diffusion of norms. Becker’s fertility theory ruled out shifts in tastes as a factor affecting fertility, although there are certain studies establishing that the shift toward individualism and self-fulfillment accounts for fertility decline (Lesthaeghe and Neidert 2006). However, other studies look in the opposite direction: the maintenance of traditional family values, especially those with rigid norms, may be the cause of low fertility levels (McDonald 2000; Caldwell and Schindlmayr 2003). Recently, Fernández and Fogli (2009) find a positive impact of culture on the fertility behavior of second-generation American women, who interact with the same markets and institutions, but differ in their cultural heritage.

Economists continue to hold that different time-opportunity costs may explain different fertility patterns per se; more educated and/or wealthier parents decide to

¹ For a review of the minority ethnic literature see, for instance, Poston et al. (2006) and Chabé-Ferret and Melindi (2013).

² Notestein (1945) is the pioneer of a common point of view about mortality decline as explanation for fertility transition. A decline in infant mortality makes it unnecessary to have many children to ensure the desired family size.

³ See, among others, Becker et al. (1990) and Galor and Weil (2000).

⁴ See pages 6–7 of “Introduction to Demographic and Economic Change in Developed countries”.

have fewer children, due to the greater time-opportunity cost of child-rearing (De la Croix and Doepke 2003; Jones et al. 2008). A more reasonable and balanced position is to assume that fertility patterns share economic and non-economic causes (Oppenheim 1997; Guinnane 2011). We consider both of these notions to explain why the Spanish Roma population fertility rate is higher than that of the majority Spanish population. Both benefit from a welfare system that guarantees universal, free access to health and education, which tends to make the explicit costs of raising children a non-significant factor. However, Spanish Roma income and education levels are significantly lower, which leads us to consider the lower time-opportunity cost of childbearing as a probable factor of influence. On the other hand, traditions and values are very important for Roma communities. Two facts are worth noting. First, the family is the core of the Roma social organization; family members usually live very close to each other, family ties are very strong, and family traditions appear to matter much more than the market and institutions. Second, the family is at the core of Roma economic activity. More than 25 % of the Roma population in Spain is involved in a family or own business, compared to less than 8 % of the total Spanish population⁵ and, more precisely, most Spanish Roma family businesses are oriented towards street or market sale.

The crux of this paper is the consideration that the over-representation of this type of family business, linked to street or market sale, among the Spanish Roma population may be associated with this higher fertility rate. Consider a market vendor who offers goods, say clothing, in a public square or street. The business does not require a high-level education, or a considerable money investment, but it does require a significant amount of labor to set up the stall every day, to organize the products on display in order to attract customers, and to dismantle the stall at the end of the trading day. Since the vendor assures the economic viability of the business by selling goods at cheaper prices than stores in shopping centers, success relies on involving the whole family in the selling process. Our hypothesis is that Spanish Roma parents decide to have more children to benefit their family business. We are not referring to child labor,⁶ but to young adults able to work and take decisions. Because Spanish Roma children are subject to parental authority even after their own marriage, parents take into account the future participation of their children, i.e. the future labor contributions of their children, which, as a consequence, is related to the demand for children. Our paper is in the line with the work of Broussard et al. (2015), who provide empirical evidence supporting the importance of the family business in higher rates of fertility. These authors claim that a head of household prefers to sell the business to an insider, i.e. a child, which, in turn, encourages fertility. However, our hypothesis is quite different. Our theoretical and empirical analysis confirms a positive association between the fact that Spanish Roma families' main activity relies on highly labor-demanding family businesses, i.e. market or street-selling activities, and a larger number of children.

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

⁶ In many economies, children are an important economic asset with a high contribution to the family economy (Guinnane, 2011).

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

2 The Roma population in Spain

The Spanish Roma first arrived in Spain in the fifteenth century, and they have shown strong group cohesion and maintained their distinctive characteristics over time.⁷ The estimated number of Roma living in Spain is around 700,000 (Council of Europe,⁸ 2007), a figure similar to that of Russia. Only Turkey and Romania (with 1.9 million and 1.85 million, respectively) have larger Roma populations. Following the categorization proposed by Alesina and Giulano (2013), the Spanish Roma family could be categorized as communitarian, in that children are subject to parental authority, even after their own marriage, and are treated equally. Focusing on the majority ethnic group in the country, these authors classify the Spanish population as *egalitarian nuclear families*, characterized by independent living arrangements and egalitarian inheritance rules. The average Spanish Roma household has 4.7 individuals, compared to the general average of 2.8 individuals in Spanish households.⁹

There are three characteristics of the Spanish Roma population that should be emphasized. First, their fertility patterns differ from the Spanish population in that, on average, they have more children. Second, the Spanish Roma population is a deprived ethnic minority, with low education and income levels. Third, the main economic activity of a high percentage of the Spanish Roma is running a family or own business, mostly as street or market vendors.

2.1 Database

Spanish laws covering the protection of data¹⁰ 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 Gitano¹¹ (FSG) has allowed us access to the microdata of a transnational survey, carried out jointly

⁷ 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.

⁸ See http://web.archive.org/web/20090221234346/http://www.coe.int/t/dg3/romatravellers/documentation/strategies/statistiques_en.asp.

⁹ See *Diagnóstico social de la comunidad gitana en España* (2011), page 226 Spanish Ministry of Health, Social Policy and Equality. http://www.msssi.gob.es/politicaSocial/inclusionSocial/poblacionGitana/docs/diagnosticosocial_autores.pdf.

¹⁰ 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).

¹¹ For more details, see http://www.gitanos.org/quienes_somos/mision_estrategia.html.en.

by the Soros Foundation and the Open Society Institute, in 2011.¹² This database considers the labor situation of the Spanish Roma population and comprises, apart from income and education, other demographic, sociological, and economic characteristics, making it possible to advance our knowledge of other aspects of this minority ethnic group, e.g. its fertility patterns. The Spanish Roma Population Survey (SRPS) survey is based on the same indicators and methodology as Spain's Economically Active Population Survey (EAPS),¹³ which includes the Spanish Roma population residing in the national territory, aged 16 and over (16 being the minimum legal age of employment in Spain). Our sample size is 1,497 interviews of Spanish Roma residents, which allows us to infer results with a 2.53 % margin of error. The field work carried out a single interview per household, incorporating questions about gender, age, and employment variables for all members of the household. The final exploitation of the data applies the appropriate weighting factors to balance the interviewee sample.¹⁴

2.2 Some stylized facts

The data 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. We observe a significant gap between the Spanish Roma fertility patterns and those of the Spanish population at large. It is necessary to point out that, since the last fertility survey of the general Spanish population occurred in 1999, a perfect comparison is not possible. An alternative approach, using 2011 as the 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*, which revealed that the proportion of individuals aged 14 and under was 26.3 % of the Roma population, compared to 14.75 % of the general Spanish population. The care of Spanish Roma children is the responsibility of the whole household unit, and children may be in the care of their mother and/or their father and/or other adults who are not their parents but are members of the family (grandparents, uncles, aunts...)¹⁵

A common stereotype of the Spanish Roma population is that this minority ethnic group does not recognize the value of work. Laparra (2007) provides evidence against this assertion, finding that, in fact, the Spanish Roma enter the labor market at an earlier age and have higher activity rates than the general Spanish population, particularly in family economic activities. Table 2 presents the percentage of the population by occupation, for both groups. The greatest difference between the Spanish Roma and the average Spanish population is the lower percentage of

¹² 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.

¹³ http://www.ine.es/en/inebmenu/mnu_mercalab_en.htm.

¹⁴ 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.

¹⁵ Factsheets on Roma Population. Council of Europe. <http://romafacts.uni-graz.at/>.

Table 1 Average number of children

	Age range	Spanish Roma population	Spanish population
	15–19 ^a	0.14	0.02
	20–24	0.55	0.06
	25–29	1.37	0.42
	30–34	1.79	1.23
	35–39	2.14	1.74
	40–44	2.27	2.00
	45–49	2.39	2.36
	Total	1.41	1.07

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

^a For Spanish Roma population the range is 16–19

Spanish Roma employees, which is compensated for by the higher percentage in the category of family or own business. Interestingly, 46.1 %¹⁶ of the working Roma population is employed in one particular type of commercial activity, i.e. itinerant trade or street markets, and 94 % of the latter run a family or own business, rather than being employees.

The SRPS also provides information 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. The Spanish Roma population is at the bottom of the income distribution, and the picture is more dramatic still in terms of education (see Fig. 1).

There remains a very high drop-out rate before the end of compulsory secondary education among the Spanish Roma population. 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. That it is to say, the Spanish Roma are also at the bottom of the education distribution.

3 A theoretical framework

In this section, we develop a model to show the interrelation between the parents' decisions about labor contributions to the family business, the desired number of children, and the children's future decisions about labor contributions to the family business. Basically, the model builds on assumptions that the greater the future productivity of children, the more valuable their future contributions to the family business and, hence, the greater the incentives of parents to have more children. This analytical framework is original in combining a bargaining model with a unitary model. Parents, and children in their adulthood, bargain their contribution to the family business. This bargaining mechanism between parents and adult children is unusual, and prior literature often implicitly assumes that within multi-member

¹⁶ Only 649 respondents report their main occupation.

Table 2 Percentage of population by occupation, 2011

	Spanish Roma population	Spanish population
Employee	16.40	38.81
Family or own business	25.61	7.77
Looking for a job	27.20	14.19
Student	4.06	6.75
Retired	5.56	14.49
Another pension	4.01	1.09
Disability	2.51	1.58
Housewife	14.64	15.31
No. observations survey	1497	139,689

Source: Own elaboration from SRPS and EAPS

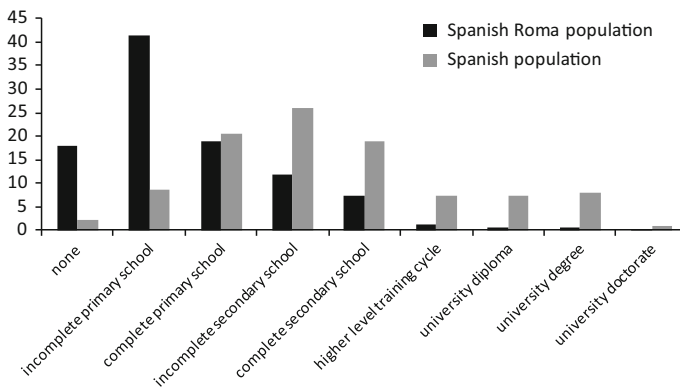


Fig. 1 Percentage of population in all levels of education, 2011. Source: Own elaboration from SRPS and EAPS

households, the only bargaining is between the husband and wife, with other members being assumed to be passive or unimportant in the bargaining process (Doss 2013). Note that this bargaining process is feasible in our context because of the idiosyncratic characteristics of the Spanish Roma family, i.e. the children are subject to parental authority even after their own marriage. Parents anticipate these future labor contributions of their children in such a way that they are taken into account in deciding, jointly, the number of children desired. The Spanish Roma parents' behavior is close to that of agricultural families, as both consider children to be investment goods, useful in the market-selling business, and on the farm. However, in agricultural household models, production decisions are independent of preference decisions (LaFave and Thomas 2014) and parents and adult children do not bargain to decide the allocation of resources within the household. Udry (1996) considers a Nash-bargaining model in which husband and wives allocate labor to their own and each other's plots, but the relationship between land production and family size is not introduced.

In this line, we build a theoretical family model where the optimum number of children is obtained as the solution of a two-stage game, played among parents and adult children. In the first stage, father (mother) unilaterally decides the size of the family, and in the second stage, the level of family business is the result of a bargaining process among parents and their young adult children. Although the family size is unilaterally decided, the dynamic nature of the game implies that the bargaining solution is linked to the optimum number of children, by means of the level of the family business run by the family members.

Let us consider a representative family that runs a business. Parent's (father or mother) preferences are given by the following utility function:¹⁷

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

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

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

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

$$U_Y(Q, C_Y, t_Y) = \ln(Q) + C_Y - t_Y^2, \quad (2)$$

with t_Y being the time devoted by each adult child to the production of the family business. The interrelationship between parents and adult children is channeled primarily through the family business. The only utility that parents obtain from having children comes from the children's contribution to the family business. The functional forms considered guarantee strictly quasi-concave and increasing utility functions of the parent and each adult child.

We assume that the family business takes a Cobb-Douglas form:

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

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

Focusing now on the budget restrictions of each family member, we denote the parent income as M_p ,¹⁸ devoted to the parent's own consumption, and also to an explicit monetary transfer to each adult child, T . Transfers within families are common (Cox and Fafchamps 2008). To maintain the tractability of the problem, we assume that the adult children do not work outside the family, in such a way that the transfer from the parent is devoted to private good consumption. A shortcoming of this framework is that the time opportunity costs of raising children are not

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

¹⁸ For the sake of simplicity, we consider parent income as exogenous. Results are not affected if we assume that the parent income is a function of the number of children $M_p(n)$ such that, $M'_p > 0$, $M''_p < 0$.

considered. This is because, while this trade-off between time cost of children and their number is the norm in the economic literature, we wish to draw attention to the connection between the costs of raising children and the contribution to the family business through a bargaining process.

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 business by each family member is the result of a bilateral bargaining process among the parent and the adult children. Applying backward induction, we begin to solve the second stage of the game. Following Lundberg and Pollak (1993) and Chen and Woolley (2001), the non-cooperative setting (Cournot–Nash) in which the parent and each young adult child individually decide their contribution to the business production is used as a threat point for the cooperative Nash-bargaining problem. Therefore, the parent problem is given by:

$$\begin{aligned} \underset{t_P}{\text{Max}} \quad U_P(t_P, t_Y, n) &= (1 - \alpha) \ln(t_P) + \alpha \ln(nt_Y) + C_P - t_P^2, \\ \text{subject to } C_P &= M_P - nT, \end{aligned} \tag{4}$$

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

$$\begin{aligned} \underset{t_Y}{\text{Max}} \quad U_Y(t_P, t_Y, n) &= (1 - \alpha) \ln(t_P) + \alpha \ln(nt_Y) + C_Y - t_Y^2, \\ \text{subject to } C_Y &= T. \end{aligned} \tag{5}$$

Solving these problems, we obtain that the contribution level of the parent to the family good in the non-cooperative setting amounts to $\bar{t}_P = (\frac{1-\alpha}{2})^{\frac{1}{2}}$, whereas the effort devoted by each young adult child to the family good amounts to $\bar{t}_Y = (\frac{\alpha}{2})^{\frac{1}{2}}$. Notice that, at the threat point, the optimum contribution of each adult child to the family business 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:

$$\bar{U}_P = \frac{(1 - \alpha) \ln(\frac{1-\alpha}{2}) + \alpha \ln(\frac{\alpha}{2})}{2} + \alpha \ln(n) + M_P - nT - \frac{1 - \alpha}{2}, \tag{6}$$

$$\bar{U}_Y = \frac{(1 - \alpha) \ln(\frac{1-\alpha}{2}) + \alpha \ln(\frac{\alpha}{2})}{2} + \alpha \ln(n) + T - \frac{\alpha}{2}. \tag{7}$$

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:

$$\begin{aligned} \underset{t_P, t_Y}{\text{Max}} \quad U_P(t_P, t_Y, n) &= (1 - \alpha) \ln(t_P) + \alpha \ln(nt_Y) + M_P - nT - t_P^2, \\ \text{s.t. } U_Y(t_P, t_Y, n) &= (1 - \alpha) \ln(t_P) + \alpha \ln(nt_Y) + T - t_Y^2. \end{aligned} \tag{8}$$

obtaining that the Pareto-efficient level of contribution to the family business by the

parent is $\tilde{t}_P = \left[\frac{(1+n)(1-\alpha)}{2}\right]^{\frac{1}{2}}$ whereas that of each adult child is $\tilde{t}_Y = \left[\frac{(1+n)\alpha}{2n}\right]^{\frac{1}{2}}$ giving rise to the family business: $\tilde{Q}(n, \alpha) = \frac{[(1-\alpha)^{1-\alpha}\alpha^\alpha]^{\frac{1}{2}}(1+n)^{\frac{1}{2}}n^\alpha}{2^{\frac{1}{2}}}$.

Observe that the difference between the non-cooperative and cooperative solutions is the effect of the number of siblings in the contributions of parent and children to the family business, in the sense that an increase in the number of adult children increases the contribution of the parent to the family good in the cooperative solution.

Therefore, the utility possibilities frontier obtained is:

$$U_P^{UPF}(\alpha, n, U_Y) = \frac{(1+n)}{2} \left[(1-\alpha) \ln(1-\alpha) + \alpha \ln(\alpha) + \ln\left(\frac{1+n}{2}\right) + \alpha \ln(n) - 1 \right] + M_P - nU_Y. \tag{9}$$

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

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:¹⁹

$$Max_{U_Y} N = (U_P^{UPF} - \bar{U}_P)(U_Y - \bar{U}_Y)^n, \tag{10}$$

where \bar{U}_P, \bar{U}_Y , denote the parent and adult child levels of utility obtained at the threat point, respectively. For simplicity, we assume that parents treat all children equally and hence, no differential bargaining powers among siblings emerge.

From the first order condition of this problem:

$$-U_Y + \bar{U}_Y + U_P^{UPF} - \bar{U}_P = 0, \tag{11}$$

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

$$\tilde{U}_P(\alpha, T) = \frac{(1-\alpha) \ln(1-\alpha) + \alpha \ln \alpha + \ln(1+n) - \ln 2 + \alpha \ln(n) - 1}{2} + M_P - nT - \frac{(1-2\alpha)n}{2(1+n)}, \tag{12}$$

$$\tilde{U}_Y(\alpha, T) = \frac{(1-\alpha) \ln(1-\alpha) + \alpha \ln \alpha + \ln(1+n) - \ln 2 + \alpha \ln(n) - 1}{2} + T + \frac{(1-2\alpha)}{2(1+n)}. \tag{13}$$

¹⁹ Considering differential bargaining power between parents and children brings the same result for many bargaining power values, but makes it impossible to determine clear relationships between variables without using calibrations.

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, n^* , verifies that:

$$\frac{\partial \tilde{U}_P}{\partial n} = \frac{(1+n)[(1+\alpha)n+\alpha] - 2n(1+n)^2T - (1-2\alpha)n}{2n(1+n)^2} = 0. \quad (14)$$

Therefore, from (14), an implicit function that relates n , α , and T emerges. Using the implicit function theorem, it is possible to derive the sign of $\frac{\partial n^*}{\partial T}$, and $\frac{\partial n^*}{\partial \alpha}$. We observe a negative relationship between the optimum number of children and the transfer to the children, $\frac{\partial n^*}{\partial T} < 0$, and a positive relationship between the optimum number of children and the value of the productivity of young adult children in the family good, $\frac{\partial n^*}{\partial \alpha} > 0$. Note that the cost of raising children has two components: an exogenous component, which is the transfer from the parent to each young adult child T , and an endogenous component through the participation of adult children in the family business. An increase in T means an increase of the (exogenous) costs of raising children, while a higher value of the productivity of young adult children means a reduction of the (endogenous) costs of raising children. In other words, the presence of a family business within the household unit is associated with the costs of raising children, and hence the number of children.²⁰ This model is a simple illustration of the possible effect of the presence of a family business on fertility patterns, in isolation from other important factors in the decision about the number of children, such as income and/or education. The empirical section shows the overall picture by considering all potential factors that may be associated with the number of children.

4 Empirical evidence

The main result of this section is that being involved in a family business is positively associated with the demand for children in the Spanish Roma population, confirming our primary hypothesis. Cultural differences of the Roma population, measured as integration in Spanish society, also influences the fertility pattern, and the time opportunity costs (using income and education variables as proxies) have the expected effect. These results confirm to us that the more reasonable and balanced position is to assume that fertility patterns share economic and non-economic causes.

To discover whether individuals owning a family business have more children, Broussard et al. (2015) uses data from the US Census on self-employed married men. Our data allow us to broaden the concept of a family business to include those individuals who provide assistance in a family business (both categories imply involvement in a family business, managing or assisting). In parallel, our data provide us with information about the gender of the respondent. As the Council of

²⁰ As Broussard et al. (2015) note, one way in which risks to a family could be offset would be through procreation, with farming households as an example. Farmers view children as assets, who can continue to farm and produce agricultural output as the farmer ages.

Table 3 Empirical estimations

	OLS model	Poisson model	Second step (Poisson)
	Number of children	Number of children	Number of children
<i>Economic and labour characteristics</i>			
Family or own business female	-0.1629	-0.1026	-0.2293*
Family or own business male	0.3939***	0.2065***	0.1056
Female inactive (reference)			
Female unemployed	-0.1485	-0.0699	-0.0737
Female employed	-0.4846***	-0.3218***	-0.3256***
Male inactive (reference)			
Male unemployed	0.2894***	0.1580***	0.1509**
Male employed	0.2596**	0.1252*	0.1113
Income per adult in household	-0.0060***	-0.0030***	-0.0029***
Income per adult in household square	0.0000**	0.0000	0.0000
<i>Socio-demographic variables</i>			
Age (reference equal or greater than 50)			
16–19	-3.7161***	-3.4943***	-3.4890***
20–24	-3.1887***	-2.0104***	-1.9906***
25–29	-2.3715***	-1.0785***	-1.0558***
30–34	-1.9641***	-0.8318***	-0.8060***
35–39	-1.5695***	-0.6242***	-0.5792***
40–44	-1.3451***	-0.5159***	-0.4889***
45–49	-1.3043***	-0.5015***	-0.4690***
Female education (reference > high school)			
Female no education	0.3072	0.1888	0.1595
Female incomplete primary education	0.4416*	0.2689**	0.2530**
Female complete primary education	0.1110	0.0755	0.0515
Female incomplete secondary education	0.4081	0.2370	0.2212
Female complete secondary education	0.0817	0.0545	0.0259
Male education (reference > high school)			
Male no education	-0.0193	-0.0009	-0.0295
Male incomplete primary education	-0.0301	0.0058	-0.0191
Male complete primary education	0.1319	0.1125	0.0941
Male incomplete secondary education	0.2162	0.1490	0.1241
Male complete secondary education	0.0438	0.0383	0.0349
Urban	-0.0772	-0.0496	-0.0616
<i>Cultural characteristics</i>			
Friends only from my ethnic group	0.2147	0.0853	0.0958
Friends predominantly from my ethnic group	0.0828	0.0472	0.0530
Any religion	0.0042	0.0021	0.0259
Other religion apart from orthodox, catholic, protestant or evangelist	-0.2172	-0.1689	-0.1578

Table 3 continued

	OLS model	Poisson model	Second step (Poisson)
	Number of children	Number of children	Number of children
<i>Discrimination</i>			
No personal discrimination	-0.0898	-0.0446	-0.0498
Less discrimination to Roma pop.	-0.1044	-0.0820*	-0.0776*
Family or own business female residual			0.0489
Family or own business male residual			0.0416
_cons	4.3345***	1.6671***	1.6906***
No. obs.	1340	1340	1340
R^2	0.45	0.24	
Pearson goodness of fit		1266.807	
Prob > χ^2 (1307)		0.783	
RESET test			
Prob > $F(3, 1304)$	32.46		
	0.000		

Dependent variable, number of children

* Indicates significance at 10 % level, ** indicates significance at 5 % level, *** indicates significance at 1 % level

Europe has pointed out, Spanish Roma men and women have different roles within the household, as well as in relations with outsiders. At home, women are responsible for meals and house-work, while men are usually in charge of making things, such as baskets or copperware that are sold to customers. Outside of the home, women tend to engage in economic activities that bring them in contact with the general public, while men engage in more specialized trade. Thus, to detect possible differential effects of gender on the demand for more children across respondents involved in a family business, we examine two dummy variables: females who run or assist in the family or own business, and males who run or assist in the family or own business. We assign value 1 to those who run or assist in their own or the family business, and 0 to all others.

In addition to regressing the number of children of the respondent on these two dummies, we add certain control variables, grouped in four categories: economic and labor, socio-demographic, cultural, and perceived discrimination. Among the economic and labor variables, we include labor market categories not linked to a family business, such as being unemployed or an employee, with being inactive in the labor market as the reference category. Labor market categories are mutually exclusive, i.e. those who claim to run or assist in their own or the family business do not declare themselves as unemployed, or employees, or inactive. We also consider gender asymmetries with respect to the variables reflecting these labor situations. Given the key role of income in the demand for children, especially in poorer communities, we add as an independent variable the income per adult in the household unit, and this variable squared, to capture a non-monotonic effect.

Among the socio-demographic variables, we consider different age ranges of the respondent, a variable to capture those families who live in urban areas, and the education of the respondent divided in six education groups, with the reference category being those with education beyond high school. Among cultural variables, we consider two that reflect the degree of inter-relation with other cultures—whether the respondent’s friends are solely from the same ethnic group, and whether the friends are predominantly from the same ethnic group. We include two religion variables—whether the respondent is religious, and whether he/she belongs to a minority religion. To capture integration in Spanish society, we include a dummy with value 1 for those who had not felt personally discriminated against in the past year, and another dummy with value 1 for those who feel that the Roma community is less discriminated against than 10 years ago. (The descriptive statistics are provided in “Appendix 1”).

The number of children is examined using a count model, because count data are often incorrectly analyzed with OLS models. Table 3 presents the results of OLS and Poisson models using robust standard errors. The RESET test shows a specification error in the OLS model, while the Poisson model cannot reject the null hypothesis of goodness of fit. Up to this point, we have focused on the notion that being involved in a family business is associated with the number of children in Spanish Roma families, but it is also possible that those Roma Spanish families with more children see the benefits of establishing a family business. The last column of Table 3 shows the second step of a two-step estimation in order to test exogeneity of the variables. First, we have estimated the variables *family or own business female* and *family or own business male* to generate the Pearson residuals. As instrumental variables, we use two dummies to indicate whether the parents or parents-in-law of the respondent are involved in a family business, or not. We assume that these variables are not related to the decision about the number of children, a decision taken by the parents, but that they are correlated with the endogenous regressors, allowing us to consider these instruments as valid. Second, we have estimated the parameters of the Poisson model, including the first-step residual. “Appendix 2” presents the estimations of these first stage models. The coefficients of the residuals are not statistically significant, which leads to the non-rejection of the null hypothesis of exogeneity of the variables. Table 3 presents the estimations corresponding to the OLS model, the Poisson model, and the Poisson model with instrumental variables. The non-rejection of the null hypothesis of exogeneity of the variables leads us to consider the Poisson model as the more appropriate approach.

In Table 3, after controlling for a range of economic, socio-demographic, cultural, and discrimination variables, the estimated coefficient of the variable *family or own business male* is positive and statistically significant, supporting our hypothesis that being involved in a family business is positively associated with the demand for children in the Spanish Roma population. Interestingly, for females, the estimated coefficient is not statistically significant, suggesting that the role played by the male in the decision to have children is important, while that of the female is not, confirming the hypothesis of gender differences.

Table 3 also shows that female employees have fewer children than those females who are inactive, and male employees have no statistically significant

difference from those males who are inactive. This is an indication that the opportunity cost of having children is greater among female employees. Again, gender biases are detected: being male and unemployed increases the number of children, with respect to the reference category, while being female and unemployed has no statistically significant effect. Income has a negative and significant effect on the number of children and the effect is monotonic. Age presents the expected sign, and is positively associated with the number of children. The effect of education is only statistically significant for females with incomplete primary school, who have more children than highly-skilled women, and this too is likely due to different opportunity costs. The cultural variables do not present statistically significant coefficients, although those who think that the Roma community is currently less discriminated against than 10 years ago have fewer children, which could point to a greater degree of integration in Spanish society.

5 Conclusions

The study of the ethnic group of Spanish Roma allows us to test the importance of economic and cultural factors in explaining fertility patterns and, in particular, why individuals in this group have more children than those in the majority Spanish population. The Spanish Roma represent less than 2 % of the total Spanish population, and the fact that families in this ethnic minority have more children, on average, than the majority of Spanish families is not a concern for the financial sustainability of the Spanish welfare system. However, the members of this ethnic minority often show low levels of education and income which, in addition to a larger family size, could imply a poverty trap. The Spanish Roma are a deprived ethnic minority and, hence, income or educational levels may be sufficient to explain the differential fertility patterns detected.

We propose that the existence of a family business that is highly labor-demanding, i.e. market-selling activity, is related to parental decisions about the number of children. Since parental authority in Roma families holds sway over children, even after their own marriage, the future labor contributions of children are particularly helpful in the family business, which boosts fertility. This notion is supported by empirical analysis, although it also shows gender asymmetries. When we control for the usual opportunity costs of raising children, i.e. income, education, and other non-economic factors (such as perceived discrimination and religion, we find that those fathers who are involved in a family or own business have a greater number of children, whereas mothers involved in a family or own business do not exhibit the same characteristic.

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Conflict of interest No potential conflicts of interest.

Informed consent Research involving human participants with informed consent.

Appendix 1

See Table 4.

Table 4 Descriptive statistics

Variable	Obs	Mean	SD	Min	Max
Number of children	1497	1.7809	1.781	0	13
<i>Economic and labour characteristics</i>					
Family or own business female	1497	0.1556	0.3626	0	1
Family or own business male	1497	0.2525	0.4346	0	1
Family or own business parent	1497	0.0962	0.2950	0	1
Family or own business parent spouse	1497	0.0247	0.1553	0	1
Female unemployed	1497	0.1550	0.3620	0	1
Female employed	1497	0.0955	0.2940	0	1
Male unemployed	1497	0.2685	0.4433	0	1
Male employed	1497	0.1069	0.3091	0	1
Income per adult in household	1466	158.9287	105.0713	3.13	700
Income per adult in household square	1466	36,290.8000	59,687.2300	9.77	490,000
<i>Socio-demographic variables</i>					
Age 16–19	1497	0.1202	0.3254	0	1
Age 20–24	1497	0.1463	0.3535	0	1
Age 25–29	1497	0.1503	0.3575	0	1
Age 30–34	1497	0.1323	0.3389	0	1
Age 35–39	1497	0.0955	0.2940	0	1
Age 40–44	1497	0.0855	0.2797	0	1
Age 45–49	1497	0.0882	0.2836	0	1
Female no education	1497	0.0982	0.2977	0	1
Female incomplete primary education	1497	0.2024	0.4019	0	1
Female complete primary education	1497	0.1075	0.3099	0	1
Female incomplete secondary education	1497	0.0528	0.2237	0	1
Female complete secondary education	1497	0.0434	0.2039	0	1
Male no education	1497	0.0815	0.2737	0	1
Male incomplete primary education	1497	0.2111	0.4082	0	1
Male complete primary education	1497	0.0808	0.2727	0	1
Male incomplete secondary education	1497	0.0668	0.2498	0	1
Male complete secondary education	1497	0.0307	0.1726	0	1
Urban	1497	0.3066	0.4612	0	1
<i>Cultural characteristics</i>					
Friends only from my ethnic group	1495	0.0783	0.2687	0	1
Friends predominantly from my ethnic group	1495	0.3151	0.4647	0	1
Any religion	1497	0.8544	0.3528	0	1
Other religion a part from orthodox, catholic, protestant or evangelist	1497	0.0060	0.0773	0	1

Table 4 continued

Variable	Obs	Mean	SD	Min	Max
<i>Discrimination</i>					
No personal discrimination	1427	0.6959	0.4602	0	1
Less discrimination to Roma pop.	1437	0.5741	0.4946	0	1

Source: SRPS

Appendix 2

See Table 5.

Table 5 Empirical estimations

	Family or own business female	Family or own business male
<i>Instrumental variables</i>		
Family or own business parent	0.6527**	0.3524
Family or own business parent spouse	0.5727	0.6854*
<i>Economic and labour characteristics</i>		
Income per adult in household	0.0009	0.0046**
Income per adult in household square	0.0000	0.0000**
<i>Socio-demographic variables</i>		
Age (reference equal or greater than 50)		
16–19	–0.6177	0.3002
20–24	0.0844	0.6264**
25–29	0.1687	0.8954***
30–34	0.5840*	0.9121***
35–39	1.0158***	1.2335***
40–44	0.7088**	0.7512**
45–49	1.0439***	0.7961***
Female education (reference > high school)		
Female no education	–0.3684	–1.2827***
Female incomplete primary education	–0.0148	–0.9420**
Female complete primary education	–0.3504	–0.9131**
Female incomplete secondary education	–0.0297	–0.7835
Female complete secondary education	–0.5838	–0.4814
Male education (reference > high school)		
Male no education	–1.1157**	–0.6463
Male incomplete primary education	–1.0239**	–0.4017
Male complete primary education	–0.8939*	–0.2159
Male incomplete secondary education	–0.8476	–0.4823
Male complete secondary education	–0.2937	0.3384
Urban	–0.6142***	–0.2162

Table 5 continued

	Family or own business female	Family or own business male
<i>Cultural characteristics</i>		
Friends only from my ethnic group	0.4115	0.1558
Any religion	0.9675***	0.8655***
Other religion apart from orthodox, catholic, protestant or evangelist	0.9357	-0.5855
<i>Discrimination</i>		
No personal discrimination	-0.0983	-0.2854
Less discrimination to Roma pop perceived	0.0272	0.1770
_cons	-2.4665***	-2.2160***
No. obs.	1340	1340
R^2	0.08	0.07
Pearson goodness of fit	1249.67	1247.43
Prob > χ^2 (1217)	0.252	0.266

Dependent variables: family or own business female and family or own business male (FIRST STEP)

* Indicates significance at 10 % level, ** indicates significance at 5 % level, *** indicates significance at 1 % level

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