Ranking fertility predictors in Spain: A Multicriteria Decision Approach

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Abstract

Fertility is highly determined by previous fertility intentions. Spain has one of the lowest levels of fertility in Europe. This work presents an analysis of fertility intentions in Spain based on data from the 2018 Fertility Survey conducted by the Spanish National Institute of Statistics. This survey identifies the key factors influencing recent and current fertility levels as well as the fertility intentions of its participants.

Using the theoretical framework of the theory of planned behaviour and via multinomial logistic regression, the main social, economic and demographic factors that drive or inhibit desired fertility are determined and analysed. Traditional approaches rank the contribution of these factors or predictors to the dependent variable using a single criterion. In this work, several decision criteria will be simultaneously considered in the ranking of fertility intention's predictors.

The obtained results show how the costs of progression to paternity and the perceived benefits of having a child significantly impact decisions regarding first maternity. The demographic background factors that are related to age and the number of children are the determinants that most influence the second and subsequent maternities. The factors that are related to the labour market, gender roles and the negative effect of the current Spanish real estate market are also identified as determinants of desired fertility.

Keywords

Desired fertility, theory of planned behaviour, logistic regression, MCDM, TOPSIS.

1. Introduction

Throughout the last forty years, Spain has undergone an important demographic transformation. For a long time, new patterns and behaviours have been identified relatively frequently when examining the most recent trends in demographic evolution in industrialized countries. The demographic system has been profoundly transformed due to three factors: fertility decline, lengthening of life expectancy and a notable increase in migratory flows. These changes have been so rapid and intense in most societies that they have become of political concern, mainly due to their social and economic consequences. This phenomenon, coined by Ron Lesthaeghe and D.J. Van de Kaa (1986) as the second demographic transition, has been observed in all European countries with various intensities and speeds (Delgado 2000). In Spain, the decline in birth rates dates back to the mid-seventies and has been substantially more pronounced than in surrounding countries. Far from the average levels of the seventies of 665,000 children per year, with a total fertility rate (TF) in 1975 equal to 2.77 children per woman, the number of children per woman has been deteriorating, unprecedentedly in celerity and intensity in various periods. Currently, Spain is among the countries with the lowest levels of fertility, in both the European and global contexts, with an average number of children per woman that is estimated at 1.3, which is far from the threshold for generational replacement (2.1 children per woman).

Several studies have analysed the uniqueness of the Spanish fertility context and the socioeconomic factors that underlie its behaviour to try to better understand how it has reached the current levels (Castro-Martín and Martín-García 2013, Seiz 2013, Castro-Martín and Seiz-Puyuelo 2014, Devolder 2015, and Esteve et al. 2016, among others). According to Devolder (2015), the reasons that explain the current fertility levels are diverse, and it is not always possible to determine their relevance. The Spanish families have undergone profound transformations, both in their structure

and in their internal relations, which have modified fertility patterns (Castro-Martín and Seiz-Puyuelo 2014). One of the key reasons why Spanish women say they have not got intention to have children is the perception of the incompatibility of motherhood with a professional career (Seiz 2013). Another reason is given by the low rates of transition to the second child as a result of postponement in maternity (Castro-Martín and Martín-García 2013). The reasons behind fertility intentions are therefore multiple. The delay in the age of first maternity and the material and conjugal conditions surrounding the decision to have a child are probably the main reasons explaining the Spanish reductions on fertility levels.

As far as the authors of this work know, fertility intentions have not been previously analysed as a key determinant of fertility in Spain. Our analysis is framed within the Theory of Planned Behaviour (TPB) and to the best of our knowledge, it is the first empirical study to analyse the process of decision-making regarding desired fertility in Spain using the TPB.

In particular, we aim at ranking fertility predictors in Spain using a Multiple Criteria Decision Making (MCDM) approach. Traditional approaches rank the contribution of factors or predictors to the dependent variable using a single criterion. In this work, several decision criteria will be simultaneously considered in the ranking of fertility intention's predictors.

The desired fertility operates as a key immediate variable for predicting the future behaviour of fertility and is considered a fundamental predictor of subsequent fertility (Ajzen 1991; Schoen et al. 1999). Our work intends to provide quantitative support for public decision makers in the formulation of public policies in order to reduce the gap between desired and actual fertilities in Spain.

Based on the 2018 Fertility Survey published by the Spanish National Institute of Statistics (INE) which identifies the key factors influencing recent and current fertility levels as well as the fertility intentions of its participants and, by means of econometric techniques, we will first determine the relevant factors or predictors of fertility intentions in Spain. Then, once these factors have been identified we will rank them in order to determine their relative impact on fertility decisions.

In what follows we will describe and analyse the Spanish situation in terms of fertility comparing this situation with the one in other European countries. All the data used for this analysis have been provided by the Spanish National Institute of Statistics (INE 2019) and by Eurostat (Eurostat 2019).

2. Fertility in contemporary Spain

Spain, together with Italy, has the lowest fertility in contemporary Europe. After decreasing until 1996, which is the year in which the lowest number of births was reached, namely, 362,626 births with a TF of 1.16, and subsequently increasing until the economic crisis, the average number of births in the first decade of the 21st century is estimated at 457,000 births, with a maximum of 519,779 births in 2008. As a direct consequence of the economic crisis, a new decline in fertility occurred in Spain and in the year 2017, according to the latest data published by the Spanish INE, there were a total of 391,930 births, with a TF of 1.31 children per woman. Currently, Spain belongs to the group of very low fertility countries, along with Greece, Italy, Portugal and various countries of Eastern Europe, and the future prospects do not seem encouraging. According to the population projections that are currently available and have been prepared by the Spanish INE for the horizon of the year 2060, in the decade 2020-2030 the average number of births will be 344,406 and from the year 2056 the annual number of births will be less than 300,000.

Considering the maternity calendar, the average age of maternity of Spanish women is one of the highest in the international context. Although in all advanced societies there is a delay in the age of family formation and birth of the first child (Billari et al. 2006), Spain, Ireland and Greece are the European countries with the highest first maternity age. In the year 2017, the average age of first birth in Spain was 30.9 years, which is the highest in the European Union, which has an average of 29.1 years, and is very far from those of France (28.7 years), Finland (29.1) years), the United Kingdom (28.9 years), and Sweden (29.3).

During the period 1975-2017, the postponement of the transition to fatherhood in Spain increased on average by 5 years for women and by 3 years for men; hence, it is one of the European territories where the transition to a second or later birth is less likely (Castro- Martín and Martín-García 2013). In addition, the percentage of

women who are mothers of a single child after their reproductive stage has increased substantially and reaches 24% among those who were born in 1970, which contrasts with the trends that are observed in other European countries.

Figure 1 shows the age-specific fertility rates in Spain for the period 1990-2017. The age-specific fertility rate measures the annual number of a specified age or age group per 1,000 women in that age group. The age-specific fertility rate is computed as a ratio. The numerator is the number of live births to women in a particular age group during a period of time, and the denominator an estimate of the number of person-years lived by women in that same age group during the same period of time. It is expressed as births per 1,000 women (United Nations 2013). The horizontal axis in Figure 1 shows the age groups: 15 to 19; 20 to 24; 25 to 29; 30 to 34; 35 to 39; 40 to 44; and 45 to 49. The vertical axis shows the rate.

As shown in Figure 1, the evolution of the fertility calendar progressively moves to more advanced ages. The age range in which the largest number of births are concentrated increased from 25 to 29 years in 1990 to between 30 and 34 years; adolescent fertility is marginal and the cohort of 25 to 29 years of age decreases in prominence over time.

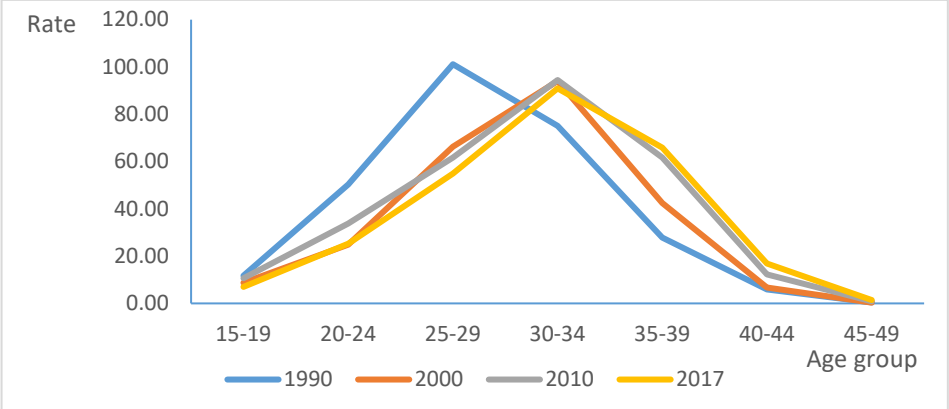
Currently, the levels of this age group are lower than those of the age group from 35 to 39 years. The cohort between 40 and 44 years of age has exhibited an increase in fertility and in 2017, its levels were three times higher than in 1990.

This delay in maternity age occurs in all European countries, although in Spain it is longer. The consequences at the individual level on fertility occur through biological, social and lifestyle mechanisms (Sobotka 2004) that ultimately lead to a reduction in fertility. However, at an aggregate level, there are differences among countries and there are territories where the delay in maternity is compensated over time (Sánchez-Barricarte and Fernández-Carro 2007).

Subnational differences in fertility in Spain have been observed since the beginning of the last century (Delgado 2009). The territories in the south of Spain have shown higher fertility levels than those in the north of the country, and although there were sharp declines in fertility in both regions, they differ in terms of intensity and calendar. The persistence of these patterns has contributed substantially to the

existence of a dynamic coastal, insular and urban Spain with a growing population, compared to an interior and rural Spain that has suffered a process of ageing and has lost demographic weight.

Figure 1. Age-specific fertility rates in Spain for the period 1990-2017



Source: Our elaboration based on the Spanish INE.

Figure 2 shows the distribution of the Total Fertility Rate (TF) in 2017 for the autonomous communities (CCAAs) of Spain. Total fertility is the mean number of children a woman would have by age 50 if she survived to age 50 and were subject, throughout her life, to the age-specific fertility rates observed in a given year. The total fertility is expressed as the number of children per woman. Total fertility is computed as the sum of age-specific fertility rates weighted by the number of years in each age group, divided by 1,000 (United Nations 2013).

We can differentiate the regions of the northwest of Spain, which are characterized by lower levels of this indicator, from those in the peninsular centre, to the south and near the Spanish Mediterranean. The CCAAs of Galicia, Principality of Asturias, Castilla-León and Cantabria constitute the northwest area, which, together with the Canary Islands, exhibits a TF that ranges between 1 and 1.2; the centre area is formed by the CCAAs of the Basque Country, Navarra, La Rioja, Madrid, Castilla la Mancha, Aragón and Extremadura, which exhibits a TF that exceeds 1.32 and is lower than 1.35; Andalusia and Murcia form the southern area and are the territories with the highest fertility, with indicators that exceed 1.35; and, finally, the CCAAs of Catalonia, the Balearic Islands and Valencia form the Mediterranean axis, for which the TF is lower than 1.32 and higher than 1.2.

Figure 2. Total Fertility Rate (TF) in Spain in 2017

Source: Our elaboration based on the Spanish INE.

Spain is a unique country in terms of its fertility behaviour (Esping-Andersen 2017). It stands out as one of the countries where the incidence of infertility is relatively low and most of the women have offspring, but only one child. The delay in the first maternity occurs both in educated and uneducated women. In addition, since cohabitation has become a form of generalized coexistence, the percentage of children who are born out of wedlock already exceeds 30%, compared to 11% in 1995. All these factors render Spain one of the countries with the "lowest-low fertility", with indicators that have not surpassed 1.4 children per woman since the beginning of the current economic crisis, namely, the year 2008, in contrast to the United States, Sweden, Norway and France, in which fertility has recovered and rates that are close to the level of generational replacement have been attained.

3. Literature review and theoretical framework

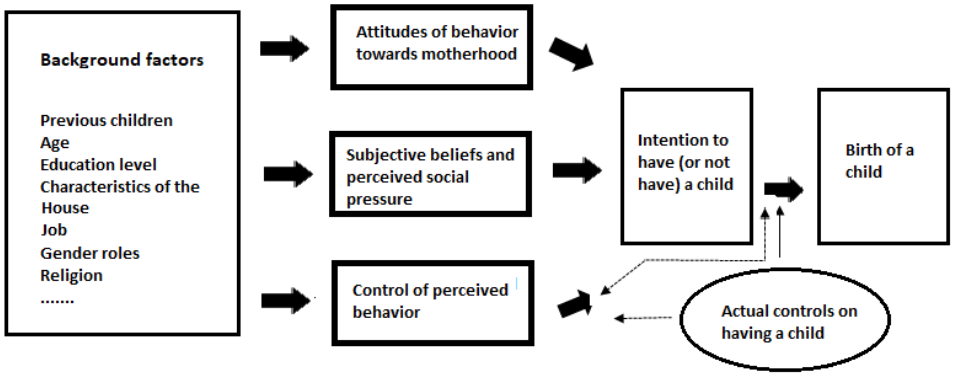
Fertility intentions have been studied as an immediate determinant of fertility behaviour and the factors that drive or inhibit it have been examined by a large number of authors (Pritchett 1994, Berrington 2004, Liefbroer 2009, Billari et al. 2009, Morgan and Rackin 2010, Iacovou and Tavares 2011, Dommermuth et al. 2011, Ajzen and Klobas 2013).

Other studies have focused on the existing gap between desired and real fertilities and the differences in this gap among regions (Pritchett 1994, Bongaarts 1994, 2010, 2011, Joshi and Schultz 2007, 2013, Miller 2011, Molyneaux and Gertler 2000, Castro-Martín 1995, Kravdal 2002). All these studies emphasize the couple's fertility

desires and identify the sociodemographic factors that determine the desired number of children and the gap between desired and actual fertilities.

Many of these studies are based on the socio-psychological literature of the Theory of Planned Behaviour (TPB) (Ajzen 1991, 2005, 2011, 2012). The formation of fertility intentions is based on reflective decisions that are characterized as intentions and are made based on three factors or determinants: (i) attitudes towards maternity behaviour, which are considered in evaluating the costs and benefits of having a child; (ii) subjective beliefs and perceived social pressure, which are understood as the perception of psychological support or the pressure that is exerted by other people to perform the behaviour; the higher the percentage of referents is that approve of a behaviour or the higher the percentage that perform it, the stronger the perceived social pressure to perform it will be; and (iii) behaviour control beliefs or the capacity to perform the behaviour (Figure 3).

Figure 3. Theory of Planned Behaviour for Fertility



Source: Adapted from Ajzen and Klobas (2013).

The relevance of a large variety of proximal determinants of fertility intentions, which are immediate determinants of motherhood, is highlighted. Female sociodemographic characteristics such as education, female labour participation and income for explaining variations in fertility are considered variables that are "external" to the cognitive structure (Ajzen 2005, Billari et al. 2009, Dommermuth et al. 2011). There are two types of external variables: *control variables of current behaviour* and *environmental factors*. The abilities of the individual and the factors that can interfere with performing the behaviour as expected are the variables of

current behaviour control: size of the home, employment status, income, health conditions, etc. Environmental factors are grouped into individual, social and informative categories and influence the beliefs of individuals and the proximal determinants of the theory. Sociodemographic variables such as sex, age, marital status, educational level and residential area are environmental factors, to which we must add contextual factors that are related to institutional support for fertility.

The empirical studies that have been conducted under the TPB analysis structure demonstrate the effects of the demographic and socioeconomic characteristics of the individuals on their fertility intentions (Billari et al. 2009, Dommermuth et al. 2011). Among the purely demographic factors that are considered essential to the definition of fertility intentions are the motherhood status, the cohabitation status and the age of the woman. Education, the type of residence, and rural versus urban location are social factors that are considered, while economic determinants include the level of income of the family unit and female participation in the labour market (Bongaarts 2001, Berrington 2004, Liefbroer 2009; Rinesi et al. 2011, Caplescu 2014).

The effect of maternity status is a decisive factor in the intentions of fertility (Yamaguchi and Ferguson 1995, Dommermuth et al. 2011). In addition, fertility intentions differ qualitatively between the first motherhood and the transition to subsequent births since the decision to have a first child decisively marks the step to fatherhood (Billari et al. 2009; Philipov et al. 2006). Age positively affects the fertility intentions in their linear form as a consequence of biological and social patterns that are related to the maternity calendar and an inverted U-shaped relationship between age and fertility intentions is expected (Billari et al. 2010, Mencarini et al. 2015, Ciritel et al. 2019). Traditionally, marriage was considered a step prior to motherhood. At present, the temporal dissociation between marriage and paternity is evident, although there persists a strong link between both demographic phenomena, which varies among countries (Hiekel and Castro-Martín, 2014). For Italy, Liefbroer (2009) and Régnier-Loilier and Vignoli (2011) showed that fertility intentions are higher in married couples than in those who do not have a partner or who live together and Mencarini et al. (2015) demonstrated the positive influence of the duration of the relationship. In France, Régnier-Loilier and Vignoli (2011) did not observe these effects.

Education plays a prominent role as a determinant of fertility intentions (Heiland et al. 2008). Currently, in the northern European countries, various analyses demonstrate that more educated women have higher average fertility intentions than their less educated counterparts (Heiland et al. 2005, Mills et al. 2008, Testa 2012). In contrast to the economic theory of fertility (Becker 1960), according to which higher educational levels of women correspond to lower levels of fertility, studies have shown for countries such as France (Toulemon and Testa 2005) and Bulgaria and Hungary (Philipov et al. 2006) a positive correlation between educational level and fertility intentions. Higher educational levels induce higher availability of economic resources, greater negotiation powers within the family unit and a more equitable division of domestic work that would favour fertility intentions (Gauthier 2007, Mills et al. 2008, Hiekel and Castro-Martín 2014). Similarly, female labour participation is regarded as an opportunity for realizing maternity aspirations and a more equitable distribution of work tasks at home and, therefore, for increasing the likelihood of family formation (Kalmijn 2011; Thornton et al. 2008) and intentions of motherhood, whereas the lack of consolidation in the labour market leads to a decrease in these values (Blossfeld and Huinink 1991, Clarkberg et al. 1995, Hiekel and Castro-Martín 2014, Ciritel et al. 2019). The reconciliation of work and family life emerges as a key aspect in the realization of fertility desires in a country such as Spain, where there is a lack of institutional support for working mothers. In this regard, in Spain, it is evident that low levels of fertility are largely a consequence of the difficult transition to second and later births (Castro-Martín and Martín-García 2013). This transition to second and subsequent maternity is highly costly in a context that is characterized by precariousness, uncertainty and rigidity of the labour market, limited institutional support for families and few active policies for reconciling family and work life. Effects of other covariates such as housing (Vignoli et al. 2013), religion and gender relations (Symeonidou 2000) are examined.

Numerous studies that investigated the relationship between births and housing identified a clear association between difficulties in accessing the residential market and the reproductive behaviour of the household (Ström 2011, Kulu and Steele 2013, Vignoli et al. 2013). This fact explains why Western European countries with high property ownership rates have low fertility rates (Mulder 2006). Ström (2011)

synthesizes three determinant residential aspects, namely, the property and type and size of the house, and identifies a strong association between the size of the house and the propensity for birth.

With regard to religious practice, studies have analysed the effect of religion on fertility and identify a positive influence on fertility patterns. In the European and US contexts, Frejka and Westoff (2008) found that women who identify as Protestants or Catholics have higher fertility rates than those who declared themselves non-religious. In Spain, Adsera (2006) observed a decrease in fertility among non-practising Catholic women relative to female practitioners.

In relation to gender roles, a more equal distribution of tasks in the home will contribute to an increase in fertility intentions, especially for women with higher education, as they also include different studies carried out from the STD or the analysis of fertility (Brodmann et al. 2007, Craig and Siminski 2011, Myrskylä et al. 2011).

4. Estimation and ranking of predictors of fertility intentions: Data and Methodology

In what follows we will describe our database and our proposed methodological approach. Our ultimate goal is to rank a set of different variables or predictors of the intention to have a child. With this aim, departing from the sample we will estimate the regression coefficients of each of the explicative or independent variables in our regression model. Given the different units in which the independent variables are expressed, in some situations it is not possible to compare the obtained estimated coefficients in order to determine the relative importance of the explicative variables with regards to the dependent variable. Several methods exist which allow us to standardize those coefficients and therefore, to determine the relative importance of the explicative variables. The application of these methods gives rise to different rankings of the independent variables. However, these rankings are obtained based on a single criterion or method (Thompson 2009, Johnson 2001, Estrella 1998, Green et. al 1978). The selection of the most appropriate method for the ranking of the predictors or explicative variables has been widely discussed in the literature and there is no consensus about which is the most suitable one (Tonadandel and LeBreton

2010). In this work, we will address this problem, simultaneously considering the most popular methods for the ranking of predictors.

Our methodological approach will have two phases. We will firstly propose a binary multinomial logit regression in order to estimate the regression coefficients reflecting the individual contributions of the independent variables or predictors to the dependent variable. Afterwards, a multicriteria ranking method, TOPSIS, will be proposed in order to simultaneously consider different criteria for the measurement of the relative impact of those predictors on the dependent variable.

4.1 Database description

To analyse the factors that determine the intentions of fertility in Spain, we use as a source of information the 2018 Fertility Survey published by the Spanish National Institute of Statistics (INE). This survey is based on information provided by interviews that are conducted throughout the Spanish territory. For the 2018 survey a total of 17,037 people aged 18 to 55 in the year 2018 were surveyed in order to identify the determinants of current, recent and expected future fertility levels. This survey provides information about factors such as labour participation, housing, reconciliation between family and work life, the existence of aids and life as a couple.

The survey is our main source of information and from it we will extract all the relevant variables and factors that will be considered in our analysis. However, the survey published by the Spanish INE includes more than 300 variables. In this work, and based on the previously performed literature review, we have selected only the most relevant variables. Twenty-five variables have been taken from the questionnaire classified in different dimensions: demographical, social, economic, TPB factors and geographical areas.

The dimension related to the TPB factors includes 10 different variables which are collected in the Spanish INE Fertility Survey 2018 through a block of questions that are only posed to the interviewees who do not have children and refer to whether having a child at this time is perceived as positive or negative in terms of various aspects of life.

In a similar manner to what Billari et al. 2009 and Dommermuth et al. 2011 previously proposed, a factor analysis was performed for this group of factors

included in the TPB dimension. The principal components method identified, for the subsample “Childless”, two main factors, namely, 'Benefits' and 'Costs'. There are no data on these variables for the subsample "With children" (see Table 1). After this dimension reduction we obtained a total of 18 final variables (see columns 1 and 2 in Table 3).

Since the intention to have a first child differs qualitatively from the decision to have subsequent children (Billari et al. 2009; Philipov et al. 2006), we have considered two different scenarios corresponding to two sub-samples: those who already have children (scenario 1) and those who do not yet have offspring (scenario 2).

This approach enables the identification of differences in the effects of attitudes and, potentially, of subjective norms and perceived control on the intentions of being parents of those who are already parents and who can draw on their experiences, compared to those who are making the decision for the first time without being able to consider past experiences. Let us notice that the number of independent variables in both scenarios will vary as a result of their characteristics (see Table 3).

Table 1. Factors regarding attitudes towards the possibility of having a child

Variable	*Factor 1* *Positive attitudes: benefits*	*Factor 2* *Negative attitudes: costs*
Personal time	0.720	0.616
Employment opportunities	0.765	0.580
Professional realization	0.752	0.642
Economic situation	0.749	0.592
Sex life	0.750	0.637
Personal fulfilment	0.585	0.705
The couple's relationship	0.627	0.668
Security for old age	0.479	0.551
Improved relationships with your parents	0.500	0.590
Housing conditions	0.661	0.563
Cronbach Alfa	0.849	0.849
KMO	0.879	0.879

Note: KMO: measure of the suitability of the Kaiser-Meyer-Olkin sampling; values that exceed 0.7 suggest that the sample size and data are appropriate for factor analysis

4.2 Binary Multinomial Logit Regression

A variable is collected from the questionnaire via the following question: Do you intend to have one or more children in the next 3 years? Two categories of responses,

namely, "Yes" and "No", are possible. This variable constitutes the dependent variable of our model. Since it is a binary or dichotomous variable, we estimate a binary multinomial logit regression model as follows:

$$P\left(Y=1\middle|X\right)=\frac{\exp\left\{\beta X'\right\}}{1+\exp\left\{\beta X'\right\}}$$

which considers attitudes, subjective norms and control variables of perceived behaviour and socioeconomic and demographic covariates.

For both analyses, we consider as behavioural control variables the economic characteristics that are related to the size and the ownership regime of housing and the participation in the labour market (Dommermuth et al. 2011). The *size of the housing* is an indicator of the state of the housing and is measured by the number of rooms per person in the housing of the respondent and the *property regime* is a binary variable with reference value "No property". The employment status of the interviewee and the *work situation of the couple* are considered as a dichotomous variable with value "employee".

As background factors of a demographic nature, we consider *age* and its square, which incorporates its effect over time on fertility; *marital status*, with reference value "unmarried"; and the duration in *years of the current relationship*. For the subsample "with children", the *number of children in the family unit* is considered. Finally, *immigrant* status is considered. The considered social factors correspond to the *level of education*, with reference value "primary studies" and two categories: "secondary studies" and "higher education"; the zone of rural or urban *residence*, for which a value of 0 corresponds to "rural" and 1 to "urban"; r*eligious practice*, for which a value of 1 corresponds to "religious practitioner" and 0 to otherwise; and *aid perception of state institutions*, which has reference value "No". We also consider the variables that are related to *gender roles*. The degrees of perceived satisfaction in the distribution of domestic tasks for the subsample "Without children" and the distribution of domestic tasks and children for the subsample "With children" are posed as a single question with an answer that ranges from 0 to 10, where 0 corresponds to "Total dissatisfaction" and 10 to "Totally satisfaction". Finally, we

incorporate the four large *Geographical areas* that are specified above as dichotomous variables; the reference variable is the northwest area.

Once the parameters of the logistic regression have been estimated, we focus on determining the contribution of each independent variable to the dependent variable to assess which variables drive or inhibit desired fertility with higher relative impact. In the literature, several criteria aim at identifying those variables in the logistic regression which contribute more to the dependent variable giving rise to a ranking of independent variables or predictors for the dependent variable. However, this ranking of predictors is based on a single criterion and moreover, there is no consensus regarding which criterion is the best for this purpose (Tonadandel and LeBreton 2010). As far as the authors of this work know, the simultaneously consideration of all these criteria have not been previously considered being the common practice the selection of a single criterion for the ranking of predictors of the dependent variable.

In this paper, we propose a multiple criteria decision making approach which will allow us to simultaneously consider different decision criteria intended to measure the contribution of each independent variable to the dependent variable. That is, we will use a multiple criteria decision making framework to assess the contribution of each demographic, social, economic, TPF factor and geographical areas variable to the intention to have a child in the next 3 years (dependent variable).

4.3 Decision criteria for the ranking of predictors

In the logistic regression, the analysis of the appropriate methods for establishing the methods for the determination of the relative importance of the predictors in logit regressions of the predictors presents alternatives or criteria that could be applied that lead to various solutions. Methods that are related to the standardized odds ratios, semi-partial correlations, the likelihood ratio test (LR), statistical C-statistics and dominance analysis are the most frequently used (Thompson 2009, Johnson 2001, Estrella 1998, Green et. al 1978). Next, we describe the criteria that will be used in our analysis.

1. Standardized odds ratios. The standardized odds ratios are the exponentials of the standardized parameters, which enable the measurement of the relevance of the

predictors and are interpreted without the scale and the units of the measure having a distorting effect. The range of variation of the odds ratio is between 0 and infinity; if the odds ratio is greater than 1, the predictor positively influences the dependent variable and if it is less than 1, the predictor is negatively related to the dependent variable. The larger the difference between the odds ratios, the stronger the relationship between the variables. To compare the intensities of the positive and negative effects, if the odds ratio is less than 1, we work with the inverse. To determine which variable has the strongest influence or is most strongly associated with the dependent variable, we order the variables from highest to lowest odd ratios.

2. Atkinson semi-partial correlations. The semi-partial correlations measure the absolute increase in the coefficient of determination that is due to the inclusion of an additional variable in the specification of a model that contains the remaining predictor variables, which enables us to evaluate the explanatory power that can be attributed to a single predictor. This indicator takes values between minus one and one. To compare the importance of each predictor for the dependent variable, we consider the absolute value of the indicator.

3. Test of the likelihood ratio (LR). The likelihood ratio is calculated as the Neperian logarithm of the quotient between two likelihoods. To implement this test, we begin with two models, namely, one complete and the other reduced. In our case, they differ only in one variable, whose effect we try to assess; the greater the contribution to the modelling of the variable under consideration, the higher the value of LR. The model that includes the variable under consideration is superior and corresponds to a higher LR value compared to the model without this variable.

4. C-statistic. The C-statistic indicates the ability of a model to differentiate between the two alternatives in which the dependent variable includes positive and negative cases. In our work, these cases are having a child in the next 3 years and not having a child in the next 3 years. A separate model is defined for each predictor; the larger the -statistic, the higher the performance of the model in differentiating cases from non-cases. A strategy for classifying the predictors is to calculate a separate model for each predictor, estimate the C-statistic for each model and classify the predictors in terms of these C-statistics. A larger C-statistic does not necessarily correspond to

a higher predictive value than a smaller C -statistic; the predictive value depends on how far the C-statistic is from 0.5. To order the predictors, we express the C-statistic in terms of the absolute value of its difference with 0.5. The larger the difference is, the higher the utility of a predictor for differentiating between the two categories that the dependent variable includes.

5. Standardized dominance statistics. Azen and Travel (2009) extend the analysis of dominance, which is widely used in least squares, to logistic regression, in which a set of predictors p and all the possible combinations of specifications in which they can intervene are considered. The predictors are ordered according to relative importance; a predictor is more important than another predictor if its contribution is larger in any scenario, regardless of whether we consider an individual predictor or the complete model or any subset of predictors.

4.4 TOPSIS

TOPSIS selects decision alternatives that simultaneously have the shortest distance from the positive ideal solution (PIS) and the farther distance from the negative-ideal solution (NIS). The positive ideal solution maximizes criteria of the type "the more, the better" and minimizes criteria of the type "the less, the better", whereas the negative ideal solution maximizes "the less, the better" criteria and minimizes "the more, the better" criteria.

A large number of Multiple Criteria Decision Making (MCDM) methods are available to help decision makers in the ranking of a set of discrete alternatives (Roy, 1985, Triantaphyllou, 2000). The Elimination et Choice Traduisant la Realité (ELECTRE) II and III methods (Roy, 1968), the Simple Additive Weighting (SAW) (Churchman and Ackoff, 1954), the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) (Hwang and Yoon, 1981), the Tomada de Decisão Interativa Multicritério (TODIM) (Gomes and Lima, 1992) or the Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE) II (Brans and Vincke, 1985) are only some examples of these methods.

The selection of the most appropriate method should take into account its simplicity, robustness, reliability and quality. However, the determination of the most

appropriate method for a specific type of problem and the discussion of the advantages and disadvantages of using one method rather than another is, however, a difficult question (Zanakis et al. 1998). In this work, we propose the use of TOPSIS for the ranking of the determined predictors of fertility intentions. This method is one of the most widely used ranking methods because it is rational, simple, comprehensible and computational efficient (Behzadian et al. 2012 and Zyoud and Fuchs-Hanusch, 2017).

Given a set of alternatives valued in a set of decision making criteria, TOPSIS selects alternatives that simultaneously have the shortest distance from the positive ideal solution (PIS) and the farther distance from the negative-ideal solution (NIS). The positive ideal solution maximizes criteria of the type "the more, the better" and minimizes criteria of the type "the less, the better", whereas the negative ideal solution maximizes "the less, the better" criteria and minimizes "the more, the better" criteria.

The high popularity of TOPSIS (see Behzadian et al. 2012 for a state of the art survey on all the practical applications of this method and recent methodological developments) largely relays on the fact that it does not require the attribute preferences to be independent and makes full use of the attribute information providing a cardinal ranking of alternatives (Chen and Hwang, 1992; Yoon and Hwang, 1995). Attribute values must be numeric, monotonically increasing or decreasing, and have commensurable units.

Table 2. Decision criteria (methods for the determination of the relative importance of the predictors in logit regressions).

	Criterion	*Description*
C_1	Odds Ratio Standardized	They measure the relevance of the predictors and are interpreted without the scale and the units of the measure having a distorting effect. They are the exponentials of the standardized parameters.
C_2	Atkinson Semi-partial Correlations	Measures the absolute increase of the coefficient of determination R^2 that is due to the inclusion of an additional variable into the specification of a model.
C_3	Likelihood Ratio (LR)	Measures the marginal contribution of each independent variable for the explanation of the dependent variable.
C_4	C -Statistic	Measures the capacity of a model to differentiate between the two decision alternatives: to have a child or not to have a child in the next three years.
C_5	Dominance Analysis	Measures the relative importance of a predictor with respect to the prediction of a criterion.

A large number of TOPSIS-based approaches have been proposed that consider different type of data, normalization procedures, distance functions, and PIS and NIS solutions (see García-Melón et al. 2016, Acuña-Soto et al. 2018, Calvo et al. 2016, Lamata et al. 2018). However, in this work, due to the characteristics of the addressed problem we will use the classical TOPSIS approach. The main steps of a classical TOPSIS approach can be summarized as follows:

STEP 1. Determine the decision matrix X, where the number of alternatives is m and the number of criteria is n, $X = \left(x_{ij}\right)_{mxn}$, being x_{ij} real numbers.

STEP 2. Construct the normalized decision matrix,

$$R = \left(r_{ij}\right)_{mxn}$$

STEP 3. Determine the weighted normalized decision matrix. Given, $w_j \in [0,1]$ with $w_1+w_2+\ldots+w_n=1$, we calculate

$$v_{ij} = w_j r_{ij}, \quad i = 1,...,m, \quad j = 1,...,n\,.$$

STEP 4. Determine the positive ideal A^+ (PIS) and negative ideal A^- solutions (NIS),

$$A^+ = \left\{ v_1^+,...,v_n^+ \right\} = \left\{ \left(\max_i v_{ij}, j \in F^+\right)\left(\min_i v_{ij}, j \in F^-\right) \right\} \quad i = 1,2,..., m$$

$$A^- = \left\{ v_1^- ,...,v_n^- \right\} = \left\{ \left(\min_i v_{ij}, j \in F^+\right)\left(\max_i v_{ij}, j \in F^-\right) \right\} \quad i = 1,2,..., m$$

where F^+ is associated with "the more, the better" criteria and F^- is associated with "the less, the better" criteria.

STEP 5. Calculate the separation measures with respect to the PIS and NIS,

$$S_i^+ = \left(\sum_{j=1}^{n} \left(v_{ij} - v_j^+\right)^2 \right)^{1/2}, \qquad S_i^- = \left(\sum_{j=1}^{n} \left(v_{ij} - v_j^-\right)^2 \right)^{1/2}, \qquad 1 \le i \le m.$$

STEP 6. Calculate the relative proximity to the ideal solution using the relative index

$$R_i = \frac{S_i^-}{S_i^+ + S_i^-}, \quad 1 \le i \le m.$$

STEP 7. Rank the best alternatives according to R_i in descending order.

In this work, we will determine the relative importance of the predictors in logit regressions through the ranking provided by TOPSIS. The relative proximity of each alternative to the ideal solution determining the position in the ranking will reflect the relative importance of the variable or predictor handled by its estimated coefficient. The obtained decision matrix allows comparing the relative contribution of the different variables.

We will consider the following decision criteria which are the most frequently used in the academic literature (Thompson 2009, Johnson 2001, Estrella 1998, Green et. Al 1978): standardized odds ratios, semi-partial correlations, the likelihood ratio test (LR), statistical C-statistics and dominance analysis (see Table 2). Our goal is to rank the predictors simultaneously taking into account the classical relative importance determination methods. In doing so, we will consider the estimated coefficients obtained in the previous phase. Therefore, the rows of our decision matrix will include the standardized estimated coefficients by each of the criteria (methods for the determination of the relative importance of the predictors in logit regressions) displayed in Table 2. Tables 1A and 2A in the appendix display the decision matrices, in which each column corresponds to one of the criteria, all of them to be maximized and 18/19 rows depending on the scenario. We construct the normalized decision matrix using the Euclidean norm. In the literature, there is no criterion that predominates over the others; therefore, we have considered equal weights.

The positive and negative ideal solutions are displayed in Tables 1A and 2A in the appendix. As all the considered decision criteria are of the type “the more the better”, the PIS is composed of the maximum of each column and the NIS is composed of the minimum of each column of the decision matrix.

5. Results

To explore the factors that are associated with fertility intentions, we present below the results of the multivariate analysis for each of the subsamples. The objectives are to identify the factors and sociodemographic characteristics that are associated with fertility intentions and to assess the extent to which fertility intentions are linked to demographic, social, and economic factors. The lately include the socioeconomic characteristics of the people, the housing conditions and contextual factors in the strict sense.

Table 3 lists the descriptive statistics (mean and standard deviation). For binary variables, the sample mean provides information about the percentage of cases that possess the characteristic that is under consideration. For quantitative variables, the value that is specified first is the mean and the value within parentheses is the sample standard deviation.

Table 4 lists the results of the multinomial logistic regression for each model. The dependent variable that is considered corresponds to the *Intention to have a child in the next 3 years*. In the subsample "Childless", of a total of 1,359 observations, 790 intend to have a child in the next 3 years, while 569 indicate that they do not intend to have a child, namely, it is 1.38 times more likely for a woman to intend to become a mother in the next 3 years than to not.

For the subsample "With children", 1 in 5 of the interviewed women indicate that they do not intend to have another child in the next 3 years: 769 indicate their intention to have another child, compared to 3,785 who indicate their intention not to do so.

To facilitate the interpretation of the results, in Table 4 the probability ratios are presented in addition to those of the logit coefficients.

Table 3. Descriptive statistics of the sample

Dimensions	*Variables*		*Model 1 Subsample "With children"*	*Model 2 Subsample "Childless"*
Demographic	X_1	Age	40.087 (5.9729)	38.77 (9.5230)
	X_2	Age2 Number of children	1.8559 (0.8102)	
	X_3	Marital status (Ref. "Not married")	83.12	45.25
	X_4	Years of current relationship	17.00 (7.0759)	13.8977 (10.2781)
	X_5	Immigrant	86.93	13.10
Social	X_6	Secondary educational level	40.64	40.62
	X_7	Higher educational level	38.84	42.83
	X_8	Residency area (Ref. "Rural")	34.99	30.68
	X_9	Religious practitioner (Ref. "No")	13.24	6.77
	X_{10}	State aid (Ref. "No")	91.81	83.15
	X_{11}	Satisfaction distribution Domestic tasks and children	14.9514 (4.3897)	7.7961 (2.3408)
Economic	X_{12}	Employment status (Ref. "Not employed ")	69.81	75.42
	X_{13}	Employment status of the couple (Ref. "Not employed")	90.28	83.66
	X_{14}	Size of Housing	1.3862 (0.4763)	2.2105 (0.8160)
	X_{15}	Ownership of housing (Ref. "No property")	78.00	64.09
TPB factors	X_{16}	Benefits		0.05276 (1.0405)
	X_{17}	Costs		-0.1083 (0.9923)
Geographical areas	X_{18}	Centre	34.53	37.09
	X_{19}	Mediterranean	23.37	20.97
	X_{20}	South	17.88	13.17
		N	4,569	1,359

Source: Our elaboration, based on the Spanish INE (2018).

The demographic variables significantly affect the intention to have a child. Their marginal contribution is significant in both models for explaining the variations in the dependent variable (Scenario or Model 1 $Likelihood\ ratio = 482.6383;\ p-valor = 0.0000$; Scenario or Model 2 $Likelihood\ ratio = 1134.098;\ p-valor = 0.0000$). *Age* influences the expected, statistically significant and positive direction; women without children are those who show a higher propensity for motherhood, while as *Age* increases the probability of

having a child progressively decreases. *Marital status* has a weak significant effect on the likelihood of becoming a mother. *Years of the current relationship* of the couple inhibits the desire for motherhood for women "with children" but does not significantly affect the desire to become a mother for the first time. Women who were born abroad have a higher propensity for motherhood than native women who become mothers for the first time, but not for higher-order births, for which I*mmigrant* status is not significant.

Background factors of a social nature significantly affect maternity intentions (Scenario or Model 1 $Likelihood\ ratio = 49.33250;\ p-valor = 0.0000$, Scenario or Model 2 $Likelihood\ ratio = 29.56581;\ p-valor = 0.0000$). More educated women have higher mean fertility intentions than their less educated counterparts, although the results of the regression demonstrate that first-maternity intentions are weakly associated with the level of education that has been attained, while higher levels of education significantly increase the propensity for higher order motherhood.

The results demonstrate that religious practice is a significant predictor of fertility intentions, with positive and significant effects in both models. Similarly, the role of *State aid* in supporting motherhood is positive and significant in both models. An aspect that is intimately related to the dedication of mothers to the care of their children is the paternal role in domestic work and in the care of children. In this respect, gender roles are significant in both models. Higher satisfaction with the distribution of household tasks and tasks that are related to the care of and attention to children (Model 1) increases the propensity for fatherhood.

The socioeconomic status of the parents, which is measured through the current job statuses of the interviewee and her partner and the housing size and property ownership status, is a key predictor of paternity (Scenario or Model 1 $Likelihood\ ratio = 24.08321;\ p-valor = 0.0001$; Scenario or Model 2 $Likelihood\ ratio = 6.148066;\ p-valor = 0.0462$). The results demonstrate that the "employed" status of the couple is a significant factor in maternity intentions, while female labour participation is only significant in the transition to second and subsequent maternity. Housing, as a variable that indicates the socioeconomic position of the individual, exhibits influence on higher-order births but not in the

transition to first motherhood, which is probably a consequence of the current characteristics of the Spanish real estate market.

Table 4. Regression results

Dimensions		*Variables*	*Model 1 Subsample "With children"*		*Model 2 Subsample "Childless"*	
			Coefficient	*Odds Ratio*	*Coefficient*	*Odds Ratio*
		Constant	-5.2328		17.4871	
Demographic	X_1	Age	0.4636***	1.5897	107.398***	2.9270
		Age2	-0.0087***	0.9914	-0.0170***	0.9831
	X_2	Number of children	-1.2734***	0.2799		
	X_3	Marital status (Ref. "Not married")	-0.1412	0.8683	-0.2998*	0.7409
	X_4	Years of current relationship	-0.0628***	0.9391	-0.0198	0.9803
	X_5	Immigrant	-0.2270	0.7969	0.5993**	1.8209
Social	X_6	Secondary educational level	0.0914	1.0957	0.0442	1.0452
	X_7	Higher educational level	0.5308**	1.7004	0.3244	1.3832
	X_8	Residency area (Ref. "Rural")	-0.1187	0.8881	0.0512	1.0525
	X_9	Religious practitioner (Ref. "No")	0.5667***	1.7624	0.7353**	2.0861
	X_{10}	State aid (Ref. "No")	0.6345***	1.8860	1.0145***	2.7584
	X_{11}	Satisfaction distribution Domestic tasks and children	0.0191*	1.0193	0.0264*	1.0267
Economic	X_{12}	Employment status (Ref. "Not employed ")	0.0686	1.0710	0.3640**	1.4391
	X_{13}	Employment status of the couple (Ref. "Not employed")	0.5818***	1.7893	0.3638*	14.389
	X_{14}	Size of Housing	0.3082***	1.3609	-0.0103	0.9897
	X_{15}	Ownership of housing (Ref. "No property")	-0.1991*	0.8195	0.0444	1.0454
TPB factors	X_{16}	Benefits			0.3667***	1.4430
	X_{17}	Costs			-0.7854***	0.4559
Geographical areas	X_{18}	Centre	0.1774	1.1942	0.3739**	1.4534
	X_{19}	Mediterranean	0.1548*	1.1674	0.3302	1.3913
	X_{20}	South	0.1840*	1.2020	0.8467**	2.3321
N			4569		1359	
McFadden R- squared			0.6285		0.4286	
LR statistic			1357.143***		792.0030***	
AIC			2871.718		1097.872	

Source: Our elaboration, based on the Spanish INE (2018).

Note: *p<0.1; **p<0.05;***p<0.01; AIC= Akaike Information Criteria; LR statistic= Likelihood ratio test. Dependent Variable: *Intention to have a child in the next 3 years*. Yes=1 No=0.

Method: ML - Binary Logit (Newton-Raphson / Marquardt steps). Coefficient covariance computed using the Huber-White method.

TPB factors have a significant effect on the likelihood of becoming a parent. The *Benefits* a child is believed to bring to the lives of respondents are positively associated with parenting intentions, while the *Costs* exert the opposite effect.

Finally, the effects of the territory are manifested mainly in the model of the progression towards the first maternity (Model 2 $Likelihood\ ratio = 6.8125; p - valor = 0.0781$). According to the test, the *Central* and *South* territories are significant at level $\alpha = 0.05$. In Model 1, the marginal contribution of the territory is not significant (Model 1 $Likelihood\ ratio = 4.9460; p - valor = 0.1758$); hence, in global terms, the territory is not a significant predictor of higher order motherhood.

The TOPSIS analysis will allow us to determine, based on the estimated regression coefficients and the simultaneous consideration of the methods of determination of relative importance, the ranking of the most influential variables of the probability of becoming new parents (see Table 5).

Table 5. Obtained rankings of predictors

Rank	*Model 1 Subsample "With children"*	R_i	*Model 2 Subsample "Childless"*	R_i
1	Age	0,70222141	Age	0.96910874
2	Number of children	0,65097359	Costs	0.16166756
3	Years of current relationship	0,20776559	State aid	0.1281083
4	Size of Housing	0,06569832	Years of current relationship	0.10780645
5	State aid	0,06066151	Benefits	0.09148998
6	Higher educational level	0,06059525	South	0.05407261
7	Employment status of the couple	0,05446612	Employment status	0.04112605
8	Religious practitioner	0,05167946	Higher educational level	0.03954288
9	Ownership of housing	0,03156429	Religious practitioner	0.03953688
10	Marital status	0,02987301	Immigrant	0.03833372
11	South	0,02879645	Employment status of the couple	0.03570862
12	Centre	0,02822052	Marital status	0.03195757
13	Mediterranean	0,02748969	Centre	0.02839781
14	Satisfaction distribution Domestic tasks and children	0,02726377	Mediterranean	0.02754403
15	Nivel educativo Secundario	0,02364496	Ownership of housing	0.02515482
16	Immigrant	0,02230844	Satisfaction distribution Domestic tasks	0.02063805
17	Residency area	0,02077909	Nivel educativo Secundario	0.02005216
18	Employment status	0,02055363	Size of Housing	0.01890682
19			Residency area	0.01760818

Source: Our elaboration

According to the results that were obtained for the "With children" model, *Age* is the variable that has the strongest influence on the fertility intentions, followed by *Number of children* (Table 5). When considering subgroups of age, especially "under 30 years of age", "between 30 and 35 years of age", "between 35 and 40 years of age" and "over 40 years of age", *Number of children* occupies the first position for

the first three subgroups and is ranked after *Years of current relationship* in the subgroup "over 40 years of age".

The years of coexistence of the couple is a relevant variable in all age subgroups: in the global analysis, this variable occupies the third position, as in the younger age subgroup, and the second position for subgroups "between 30 and 35 years of age" and "between 35 and 40 years of age", while for "over 40 years of age" it is ranked first. *Size of the house* is in fifth place in the global order, which is the same position as it occupies in the younger subgroups, although it is relegated to higher positions as age increases.

The variables *Higher educational level* and *Employment status* of the couple also occupy prominent positions in the global analysis and in all age subgroups. Last, being a *Religious practitioner* is ranked fourth in the youngest subgroups and eighth globally.

6. Summary and conclusions

This study presents an analysis of the process of decision-making regarding desired fertility in Spain, which is conducted using the theoretical framework of the theory of planned behaviour (TPB) (Ajzen 1985, Ajzen 2005). Based on the 2018 Fertility Survey, which was conducted by the INE, the social, economic and relational factors that drive or inhibit desired fertility are analysed, which include the socioeconomic characteristics of the people, the housing conditions and contextual factors in the sense strict. Taking as a reference the works of Billari et al. (2009), Fishbein and Ajzen (2011), Dommermuth et al. (2011) and Ciritel et al. (2019), we estimate a multinomial probit model with the objective of exploring the factors that are associated with fertility intentions in Spain. Subsequently, based on a TOPSIS analysis of Hwang and Yoon (1981), we order or rank the predictors that inhibit or drive desired fertility.

Since the intention to have a first child differs qualitatively from the decision to have subsequent children (Billari et al. 2009; Philipov et al. 2006), two separate analyses are conducted: model "With children" and model "Childless". The dependent variable in both models corresponds to the intention to have a child in the next 3 years and the regressions are statistically significant from a global perspective.

According to previous studies, within the characteristic factors of the TPB we have determined that the behavioural attitudes of progression to paternity and the perceived benefits of having a child impact significantly on decisions of first maternity (Billari et al. 2009, Fishbein and Ajzen 2011, Dommermuth et al. 2011). The TOPSIS analysis highlights how Costs acts in Spain as one of the most influential variables in first-maternity decisions and in all considered age subgroups, Costs is ranked higher than Benefits.

The demographic variable *Age* has the strongest influence on the intentions of motherhood, in both the "With children" model and the "Childless" model. It is closest to the ideal solution and farthest from the remaining variables. The behaviour patterns that are related to age are reflected in the positive and negative signs of their coefficients in linear and quadratic forms, respectively, which correspond to an inverted U-shaped relationship between age and fertility intentions (Ajzen 2013). The results also demonstrate that in Spain, the effect of motherhood status is a decisive factor in the intentions of fertility (Yamaguchi and Ferguson 1995, Dommermuth et. al 2011), and the number of children is the second most important variable for the progression to the second or later birth.

Our study also demonstrates how the TPB can help us better understand the roles that are played by background factors such as variables that are related to the couple's coexistence, nationality or religiosity and other socioeconomic variables such as housing conditions, education and labour status.

Among the variables that are related to the couple's state of coexistence, *Marital status* shows only weak relevance in the "Childless" model; when ordering the predictors of this model, it is relegated to the twelfth position. In the transition to subsequent births, *Marital status* is not relevant. The couple's *Years of current relationship* is a significant variable for the intention to have a child. In both models, this variable plays a highly influential role and is ranked in all age subgroups among the first four positions of the ordering. The behaviour of de facto couples in terms of fertility is similar to that of legally married couples and demonstrates the weakening of the regulatory role of nuptiality in the fertility behaviour in Spain (Mathew et al. 2013, Llorente and Díaz 2014).

In 2018, according to the data that are provided by the INE, 14.5% of female residents in Spain are of foreign origin. This group is mainly responsible for the modest recovery of fertility in the last decade; however, as of 2008, with the arrival of the economic crisis, fertility resumed its decline. The results of the study demonstrate that foreign origin is a variable that positively influences the intentions to have the first child, but not for subsequent births. Similar to other studies, the fertility behaviour of the *Immigrant* population tends to converge to that of the native population, although the former remains characterized by an earlier calendar (González-Ferrer et al. 2017, Kraus and Castro-Martín 2018).

The analysis that was conducted examined the effect of religiosity on the desire for motherhood. The condition of *Religious practitioner* operates positively on the intentions of motherhood and its influence does not vary between the intention to become parents for the first time and the intention for subsequent births. The positions of this variable in the two models are similar and, as in recent studies, demonstrate the persistent influence of religion on fertility patterns (Adsera 2006, Frejka and Westoff 2008, Peri-Rotem 2016).

In Spain, as in other European societies, the decision to have children is also influenced by the equitable distribution of domestic tasks in relationships and the care of and attention to children within the family unit (Cooke 2004, 2009, Craig and Siminski 2011, De Laat and Sevilla-Sanz 2006, Sevilla-Sanz 2010). The degree of satisfaction with the distribution of domestic tasks and the care of children is a variable that positively influences maternity decisions; however, in the ranking of predictors, it does not occupy relevant places. The results also demonstrate how incentives or grants from state institutions to increase the birth rate are a factor that favours the propensity for motherhood. Both in the model that relates to the first birth and in that of subsequent births, this variable is ranked highly in the order. In the model "Childless", this variable is ranked the third most relevant and in the "With children" model, it is ranked fifth. This is an outstanding aspect in a country such as Spain that is characterized by the lack of an adequate system of aid to families and children, with very short maternity/paternity leave and a limited number of places in schools for children from 0 to 3 years old (Castro-Martín 2019).

The effects of the real estate market on fertility intentions are reflected in the variables *Size of Housing* and *Ownership of housing*, but only for the propensity for the second and subsequent births. Ownership of housing inhibits the desire to transition to later births and a larger home size increases the likelihood of becoming a parent again. According to the TOPSIS analysis, the size of the housing is one of the most influential variables of the probability of becoming new parents. In the "Childless" model, the size of the housing and its ownership lose relevance, which may be due to the rigidity of the Spanish real estate market (Díaz-Fernández et al. 2019).

The contribution of S*econdary educational level* is not significant in any of the models and a higher educational level only affects the transition to subsequent births. This result supports that in Spain, unlike other European countries, the desired number of children is similar among women of various educational levels (Castro-Martín and Martín-García 2013). The sign and significance of the coefficient that is associated with *Higher educational level* for the transition to subsequent births accord with recent studies that show that in countries such as Norway, the Netherlands and Belgium, the gradient of education in the progression to the second child seems to have been reversed and is positive (Wood et al. 2014). Adsera (2017) highlights the importance of the evolution of the fertility patterns of the most qualified women in the context of a country such as Spain with a continuous increase in the female educational level.

Studies have found that scenarios of labour uncertainty correspond to the postponement of the decision to have a child (Kreyenfeld et al. 2012). According to our results, the variable *Employment status* is only significant in the model "Childless" and it occupies the seventh place in the ranking. Its positive sign indicates that a favourable scenario in terms of female employment increases the propensity for motherhood and highlights the importance in Spain of eliminating the uncertainty that is associated with the labour market, which is fundamentally related to high levels of unemployment and the temporality of contracts (Toharia and Villalón 2005, Castro-Martín 2019). In addition, the results demonstrate the importance of the employment status of the spouse or partner, which reflects the association between the uncertainty of the labour market and fertility decisions (Kreyenfeld et al. 2012).

The region of residence is of low relevance to the desire for maternity. Urban or rural residence does not have a significant effect on the desire for maternity and the southern territory corresponds to a higher propensity for maternity for both first maternity and the transition to subsequent births.

In conclusion, fertility is socially and economically important. Its implications are diverse and are manifested in both the short and long terms, from both a microeconomic perspective and a macroeconomic perspective, both locally and globally. The main limitation of our study is the use of cross-sectional data. However, this study facilitates understanding of the patterns of this phenomenon in a "lowest-low fertility" country, namely, Spain, by analysing a key aspect for predicting future behaviour: the intentions of fertility. Additional research in this field is necessary. Dissatisfaction with fertility is on current public agendas. Discussions are being conducted about the implementation of social policies that aim at eliminating obstacles by facilitating the balancing of work and family life (OECD 2007).

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Appendix

Table 1A. Decision matrix subsample "With children"

Alternatives	**C1**	**C2**	**C3**	**C4**	**C5**
A_1	15.941	0.2523	21.4663	0.3718	-0.1214
A_2	0.3560	0.2082	240.17	0.2315	-0.1750
A_3	0.9480	0.0262	1.4263	0.0932	-0.0224
A_4	0.6410	0.162	36.3726	0.3263	-0.0688
A_5	0.9260	0.0086	2.4372	0.0433	-0.0200
A_6	1.0460	0.0014	0.5037	0.0069	0.0114
A_7	1.2950	0.0091	15.3211	0.0448	0.0548
A_8	0.9450	0.0022	1.3829	0.0120	-0.0170
A_9	1.212	0.0052	13.5331	0.0006	0.0401
A_{10}	1.1900	0.0085	11.4184	0.0236	0.0478
A_{11}	1.0880	0.0059	2.9154	0.0394	0.0271
A_{12}	0.9690	0.0012	0.3776	0.0125	-0.0056
A_{13}	1.1970	0.0061	13.0266	0.0255	0.0412
A_{14}	1.1580	0.0461	8.9739	0.0441	0.0664
A_{15}	0.9210	0.0264	2.8797	0.0844	-0.0338
A_{18}	1.0880	0.0013	2.4114	0.0047	0.0266
A_{19}	1.0960	0.0011	3.0270	0.0147	0.0227
A_{20}	1.1040	0.0028	3.1293	0.0031	0.0277
PIS	0.1380	0.0831	0.1397	0.0384	0.0901
NIS	0.00014	0.0004	0	0	0.0029

Source: Our elaboration.

Table 2A. Decision matrix subsample “Childless”

Alternatives	**C1**	**C2**	**C3**	**C4**	**C5**
A_1	2.9600	0.2502	125.6991	0.0171	0.1605
A_3	1.1655	0.0215	3.154228	0.0004	0.0596
A_4	0.8030	0.1384	1.96933	0.0046	0.0085
A_5	1.2066	0.0066	4.851125	0.0129	0.0658
A_6	1.0107	0.0043	0.008581	0.0361	0.0124
A_7	1.1571	0.0329	1.517297	0.0685	0.0590
A_8	1.0164	0.0003	0.043157	0.0031	0.0045
A_9	1.2093	0.0017	4.409398	0.0062	0.0411
A_{10}	1.4878	0.0452	24.01876	0.0733	0.1319
A_{11}	0.9435	0.0036	0.486875	0.0503	-0.0133
A_{12}	1.1644	0.0205	3.143679	0.0909	0.0668
A_{13}	0.8446	0.0039	3.594687	0.0685	-0.0854
A_{14}	0.9917	0.0020	0.010858	0.0122	0.0231
A_{15}	1.0314	0.0219	0.151605	0.0676	-0.0115
A_{16}	1.4822	0.0547	16.0345	0.1814	0.1176
A_{17}	0.4656	0.0972	50.47859	0.1518	-0.1438
A_{18}	1.1951	0.0029	3.758093	0.0056	0.0509
A_{19}	1.2034	0.0045	2.771637	0.0100	0.0485
A_{20}	1.339	0.0054	6.337252	0.0013	0.0717
PIS	0.1428	0.0955	0.1099	0.1228	0.0782
NIS	0	0.0001	5.636E-06	9.826E-05	0.0016

Source: Our elaboration.