

Socio-economic differentials in the effect of formal childcare availability on the timing and level of fertility: Spain 1994-2015

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Abstract

This paper assesses the effect of the expansion in formal childcare availability on fertility in Spain during the period 1994-2015 focusing on its differential impact by women's level of education. I use fertility histories derived from the Spanish samples of the European Union Statistics on Income and Living Conditions (EUSILC) for the years 2016, 2012 and 2008, and regional level data on childcare enrolment rate, women's labor force participation and unemployment. The results of the event history analyses show a substantial effect of the availability of childcare on both the timing and the parity progression ratios for first and second births. The impact of childcare is considerably higher for the better educated women.

Key words: fertility, formal childcare, Spain, family policy.

Introduction

Most social scientists are persuaded that the context “matters” (Mayer 2001). Yet, the link between society level variables and individual demographic behavior has often proven difficult to be established empirically. This has been particularly the case with the “childcare and fertility hypothesis”. While well-grounded arguments on a positive effect of the availability of childcare on fertility exists, most of the studies find weak or no effects (Andersson, Duvander, and Hank 2004; Del Boca 2002; Hank and Kreyenfeld 2003; Lappegård 2010), and only a few studies find substantial positive effects (Baizan 2009; Bauernschuster, Hener, and Rainer 2016; Rindfuss et al. 2007, 2010). Of course, these differences between studies may be simply due to actual differences between societies in the impact of child care services, but also the study design is relevant. For instance, Andersson et al. (2004) and Lappegård (2010), study Sweden and Norway respectively, for only a few years, in a period where the provision was relatively high and where the increases in availability were modest. By contrast, the study of Rindfuss et al (2007) focuses on Norway over an extended period of time and including periods of substantial growth in childcare availability. To find consistent results the availability of childcare must make a difference for parents’ conciliation between employment and parenting, and may be also for gender equity (McDonald 2000). Changes in policies, as the ones that have taken place recently in several countries, provide an opportunity to better identify its impact. Rindfuss et al (2007) argue that the lack of consistent results is largely due to methodological problems, in particular the fact that childcare placement is likely to be endogenous to fertility. Moreover, the data requirements needed to properly study this issue are substantial, since individual level fertility histories need to be matched with the local availability of childcare, for a sufficiently long period of time. An additional reason for the lack of consistent results is the possibility that the population is heterogeneous in its response to the policy (Gauthier 2007). Again, well-grounded theoretical arguments exist predicting a stronger positive effect of childcare on fertility for the better educated. Yet, only a few studies examine this issue (Baizan, Arpino, and Delclòs 2016; Van Bavel and Rozanska-Putek 2010).

The aim of this paper is to provide new empirical evidence on the impact of childcare availability on fertility. Thus, a first goal is to assess if the expansion in formal childcare availability that took place in Spain between 1994 and 2015¹ had any effect on the timing and on the probability of progression to first and second births. It is well known that the fertility levels were very low in Spain during the period analyzed. Indeed, in 1998 the TFR reached its lowest level ever (1.15), which subsequently recovered to 1.4 in 2007, to slightly decline afterwards. Fertility was also considerably postponed during this period. The adoption of a longitudinal (birth-cohort) perspective allowed to empirically assess the effect size and the substantive significance of the childcare increases, controlling for potential confounding factors. A second goal of the study is to test whether differentials

¹ The period studied is basically determined by data availability.

by level of education exist in the impact of formal childcare, both for first and for second births.

Here I exploit the fact that formal childcare expansion in Spain has been substantial, and has proceeded with different timing and extent in each of the 19 regions of the country. By the late 1990s, nearly all children age three to five were enrolled in pre-school, and therefore I focus on children under 3. In 1993 only 4 per cent of children age 0-2 were enrolled in care centers, while in 2017 the percentage was 36. Large geographic differentials exist in the availability of early education and care for children under three, largely stemming from the diversity of policies adopted by regional governments. The empirical analysis uses data from the European Union Statistics on Income and Living conditions, from which I obtain retrospective fertility histories and other individual level information, coupled with regional level information on childcare enrolment rate, women's labor force participation, and unemployment. In the theoretical section I argue that the effect of several macro processes must be distinguished to detect the effects of childcare availability on fertility, in particular the increase in women's labor force participation and the effect of economic conditions. The results show a strong effect of childcare availability on the timing and quantum of fertility, with similar effect for first and second order births. Moreover, the expansion of childcare has had a differential impact according to the women's educational level.

The Spanish setting: family policies and regional diversity

The rise in women's labor force participation has been constant since the 1980s and up to 2018. Thus, the rates for woman aged 25-54, the most relevant for fertility, were 38 per cent in 1986, to become almost universal in 2018 (86 per cent). As can be seen in Figure 1, regional differences were important. A large literature has shown that institutional support has been instrumental in women's participation in the labor market (Del Boca, Pasqua, and Pronzato 2007; Esping-Andersen 1999). It has also been argued that institutional arrangements, including some key family policies, are crucial in reducing the potential role incompatibility between labor force participation and fertility, thus having pro-natalist effects (McDonald 2000; Rindfuss, Guzzo, and Morgan 2003). These policies include, apart from childcare provision, maternity/paternity leave, and benefits and tax breaks for families, with only minor variations across regions (Lapuerta, Baizan, and González 2011). In what follows I will briefly outline the main characteristics of the childcare system and place its role among some of the existing family policies in Spain during the period studied.

Mothers have been entitled to a maternity leave from employment of 16 weeks since 1989, with 100 % compensation of the previous wage up to a fairly high ceiling. In addition, a parental leave of up to three years was established in 1980. Since parental leave is unpaid, however, only about 3 % of eligible mothers and 0.1 % of eligible fathers make use of it, making parental leave of little practical relevance (Lapuerta et al. 2011). In order to claim leave rights, a worker must have made a minimum amount of

contributions into social security, which is normally set at 180 days during the seven years immediately before beginning leave or 360 days during the mother's or father's entire working career (Ministerio de Empleo y Seguridad Social 2014). As a consequence, the leave system excludes some groups of women with an insufficient record of contributions, most notably many unemployed women and women working in the underground economy. Women with fixed-term contracts may avoid having a child because if they take maternity leave their contract may not be renewed, even in the public sector. Benefit levels are closely related to an individual's previous earnings history, creating additional incentives to postpone childbearing until a stable, well-paying position is attained. A paternity leave of two weeks was introduced in 2007, in addition to the two days previously existing. This fully paid time off from work can be taken simultaneously or after the end of the mother's leave. Take-up rates have fluctuated at around 80 % since its introduction.

During the past few decades, the Spanish government has allocated fairly low levels of public expenditure to benefits and tax breaks for families, implying fairly small effects in terms of fertility or female employment disincentives (Azmat and González 2010; González 2011). For example, in 1999 the government introduced some tax deductions for households with children, and these were substantially increased (from €300 (US\$344) to €1,200 (US\$1,374) per year) in 2003 for children under the age of three. In addition, a new tax credit of €1,200 (US\$1,374) per year was introduced for mothers with children under age three. In 2007, the government introduced a "baby bonus" of €2,500 (US\$2,863), paid at the birth of each child. This policy was discontinued in 2011.

Overall, it can be argued that the policies promoting childcare increase are the ones with the highest potential to affect fertility in Spain, both directly and indirectly through its effect in women's labor force participation. By the late 1990s, nearly all children age three to five were enrolled in pre-school, and by 2017–2018, 36 per cent of children under three were enrolled in center-based care. It should be noted, however, that while Spain's formal childcare system has expanded with the increase in women's labor force participation, it has done so with a significant time lag. Furthermore, and crucially for this study, substantial geographic differentials exist in the availability of early education and care for children under three, stemming from of the diversity of policies adopted by regional and local governments (Figure 2). To illustrate, in the regions with the highest levels, Pais Vasco and Navarre, the coverage was 53 per cent, while the coverage was the lowest in Ceuta (13 per cent) and in the Canary Islands (17 per cent). Educational and care facilities have expanded rapidly all over the country since the Ministry of Education adopted a new law in 2008 called Educa3. This program expanded the number of slots available in some of the regions that previously had lagged behind (Andalucía and Castilla la Mancha), but not in others (Canary Islands, Extremadura). For example, according to the Ministry of Education, the region of Andalucía increased the enrollment rate of children under three from 6 to 24 % between 2007 and 2008 (Ministerio de Educación 2018).

The Ministry of Education provides detailed data on enrolment rates by age: 10 % of children under one, 33 % of one-year-olds, 52 % of two-year-olds, and 96 % of three-year-olds attended educational centers in 2014. Among those enrolled, about one-half of children under three were enrolled in public institutions. Prices in the public sector are moderate in comparison with average wages: about €200–€350 (US\$230–US\$400) per month for each child, including lunch. Usually, public centers stipulate preferential access and lower prices for some categories of families, such as low-income and single-parent families. The range of prices in the private sector is much wider, although private centers may receive public subsidies, depending on regional policies. From age three, children are legally entitled to free preprimary education.

All these data suggest that formal care availability has increased substantially, albeit the demand is far from being fully met, and waiting lists in public centers are long.² Formal childcare has become a crucial means to allow compatibility of childrearing with paid work for an increasing proportion of couples. In particular, the increase in formal childcare availability since the mid-1990s has stimulated the labor force participation of women (Baizan and González 2007). The consistent increase of female labor force participation suggests that without childcare expansion fertility rates would have dropped to much lower levels.

Important gaps in care for children under three persist, however. These are especially serious in the case of children under one, since maternity and paternity leave from employment is very short. Children of mothers with little education are also less likely to be enrolled in formal childcare than children of more-educated mothers (Van Lancker and Ghysels 2016; León 2015). Although full-time care is usually available in childcare centers (about eight hours per day, including lunch time³), it may not suffice to match parental working times, especially in the public childcare sector, where timetables tend to be less flexible.

Contextual influences on fertility

One important feature of the opportunity structure potentially affecting fertility is the availability of formal care for preschool age children. Other dimensions of formal childcare, such as the price, quality, and acceptability are also likely to be relevant (Andersson et al. 2004). In the Spanish case studied here, the focus is on availability, due to the lack of data on other dimensions, but also because of several reasons. First, childcare has been publicly subsidized to varying extents by region and time. During the period studied, quality has been generally high, with standards regulated by the

²In the past few years, the waiting lists have shortened in many cities, most likely due to the economic crisis, price increases, and lower women's employment.

³School hours were usually from 8:30 a.m. or 9:00 a.m. to 5:00 p.m., with a break for lunch. Most schools provided lunch services (83 % of pre-primary schools and 73 % of primary schools, as of 2013) as well as childcare services outside school hours (Ministerio de Educación 2015).

government (González 2004; León 2015). There seems to exist a wide acceptability of formal childcare arrangements (Chung and Meuleman 2017). As noted above, demand of childcare has consistently exceeded supply, as attested by the long waiting lists and unmet demand in public centers. Under these circumstances, availability of childcare should be the most crucial dimension affecting fertility decisions.

The availability of childcare has been long considered to have positive effects on both fertility and on women's labor force participation. The compatibility between the role of mother and the role of worker is clearly enhanced if childcare is available (McDonald 2000; Presser and Baldwin 1980; Rindfuss and Brewster 1996). The opportunity costs of having a child can be reduced if childcare is available, by minimizing interruptions or reductions in employment and the associated losses in human capital accumulation⁴ (Gustafsson 2001; Huinink and Kohli 2014; Hotz et al. 1997). As a result, the availability of childcare should lead to higher probabilities of having a child and a younger age at childbearing than would have otherwise occurred.

While the argument linking childcare and fertility levels is straightforward, it is important to realize that the assignment of child care in a particular location cannot be considered as a random process (Rindfuss et al. 2007). Perhaps the factor that most contributes to this endogeneity between childcare placement and *regional level* fertility is women's labor force participation. The increase in women's labor force participation is a structural trend in post-industrial societies, which has evolved with different speed and with varying characteristics (concerning e.g. working time, flexibility, career interruptions) in each country and region. And this process is at the root of the conflict between family and employment, creating both a higher demand for childcare provision and lower levels of fertility. The potential interrelationship between the processes of labor force participation, the development of childcare services and fertility should be taken into account, both in theory construction and in the empirical strategy used. At the same time, a higher demand for child care provision in a particular location does not automatically lead to higher levels of childcare availability. This link is mediated by how childcare and labor market institutions are organized in each society. For instance, in Spain, where childcare provision and the labor market are strongly regulated, political decisions about public subsidization, direct public provision, and regulation of the private market, have been crucial in driving the expansion of childcare services.

The above considerations lead to expect that childcare availability has a positive effect on fertility, both in terms of the probabilities of parity progression ratios and an earlier timing of births (Hypothesis 1). These effects should hold for all birth orders, although some differentials by parity are possible. First child decisions may be more dependent on the accumulation of human capital and career development, or on couple formation, and consequently less affected by childcare availability than subsequent parities. For instance, individuals who are still enrolled in the educational system or in unstable positions in the

⁴ In a context where women's labor force participation is almost universal, the relative proportion of women's employment income with respect to the total household income is likely to matter more than the absolute amount of women's (potential) earnings.

labor market may not even consider childbearing for normative reasons or due to the lack of resources to form an independent household (Blossfeld and Huinink 1991). Childcare availability could have more impact on second births, since it is only after becoming a parent that one really knows the time demands involved (Rindfuss et al. 2010). At the same time, the fact of having had a first child can be associated with a particular form of resolution of the conflict between employment and childrearing, be it becoming a housewife or a reconciliation arrangement, thus lowering the importance of childcare availability. It can also be argued that second births are more “optional” and that a first child is more important to become a family. This may imply that second and subsequent birth decisions could be more contingent on contextual constraints and opportunities. In contexts with low fertility third or higher order parities involve an increasingly selective group of parents, with a strong family orientation and less likely to be influenced by childcare availability. Overall, the extent to which each parity is affected by the availability of childcare is therefore an empirical question.

The arguments explained above also lead to expect that the expansion of childcare should diminish the negative effect of labor force participation on fertility. This argument is closely linked with the observation that fertility is comparatively higher in economically advanced societies where labor force participation and existing institutional arrangements allow for the compatibility between the roles of worker and parent. An interaction between childcare availability and the female labor force participation rate at the regional level should then have a positive effect on the individual level fertility (Hypothesis 2).

There are also good reasons to expect that the effects of contextual variables are not homogeneous by social groups (Baizan et al. 2016). More specifically, the availability of childcare should have stronger positive effects on the family formation of better educated women (Hypothesis 3). The relative cost of non-family care is lower for them than for less educated women (Ermisch 1989; Shalev 2008), assuming that they and their partners have better chances to have a higher income and occupational class. In Spain, several regulations partially offset this mechanism, but with a limited extent. Means tested subsidies apply in public schools only, and in most cases only very poor families are eligible. During the period studied, tax credits on childcare and child benefits have been either non-existent or their amount has been very small (Azmat and González 2010; González 2011). Moreover, these tax measures tend to be regressive in socio-economic terms. Since the economic burden of paid childcare on working mothers is higher for the lower educated, they are primarily dependent on family members (grandmothers in particular) to look after infants and toddlers while mothers are at work (Fernández-Cordón and Tobío Soler 2005). A second mechanism that can contribute to the lower relevance of formal childcare for less educated women is related to the higher prevalence of unemployment and temporary jobs among them. Employment insecurity and short-term changes in income may hinder long term plans and commitments that are usually needed for formal childcare. This is particularly the case in Spain where formal childcare is part of the school system, which requires a number of bureaucratic procedures (for example, long waiting lists involve that parents have to apply for a slot well in advance,

usually just after the birth of the child). Labor force and values surveys also show that the educational level is positively related with being in the labor force and with a stronger work orientation, consistently with the more extensive educational investments of the better educated (Bernardi and Garrido 2008; Hook 2015). Women outside the labor force, which are disproportionately low educated, should be much less affected by the availability of formal childcare. More educated and wealthier households have a higher use of formal childcare (Van Lancker and Ghysels 2016; León 2015), perhaps also because they consider formal options as more reliable and as better for their children's education than informal childcare. Woman's educational level is likely to be related with a higher proportion of employment of their own mothers, which then would be unavailable to care for their grandchildren.

Finally, the analysis of the effect of childcare availability on family formation should take into account the impact of other concurrent contextual processes that can potentially confound the effect of childcare expansion. In addition of the above mentioned process of increase in women's labor force participation, in the Spanish case it is of particular relevance the effect of the recurrent economic crises. The comparatively very strong economic fluctuations suffered by the Spanish economy during the last few decades have led to more young people in education, higher unemployment rates and longer periods to find a stable job during recession periods or their aftermath. There is abundant evidence that these situations have impacted negatively family formation (Adserà 2004; Baizan 2007; González and Jurado-Guerrero 2006).

Data

The individual level data used in the analyses come from the Spanish cross sectional samples of the European Union Statistics on Income and Living Conditions (EUSILC) for the years 2016, 2012 and 2008 (EUROSTAT 2015). Since the survey includes four waves for each individual, choosing the said years allows to ensure that no individual was repeated in the pooled analytical sample. An important advantage of this approach is that no left censoring is present in the retrospective fertility histories. Furthermore, the sample sizes are sufficiently large to obtain stable and significant results. The EUSILC provides the date of birth of each child residing in the household; therefore, the data does not include deceased children or children no longer living with their mothers. I selected women aged 15 to 40 at survey time, to ensure that the process of children leaving the parental home does not bias the analyses. The literature has demonstrated that women can be included in the models up to their early forties without introducing any significant bias in their fertility histories (Klesment et al. 2014; Nitsche et al. 2018), and indeed the resulting fertility histories of women are consistent with the timing and the quantum of official vital registration data. I excluded foreign born women, to avoid including children not born in Spain. The sample comprises 12,787 women for first birth analyses, and 4,245 women for second birth, observed between 1994 and up to 2015 (survey years were not included in the analyses). The EUSILC provides the level of education at survey time.

From this information it is possible to reconstruct the progression of the individual in the educational system. Finally, the region of residence at survey time is recorded, but not the residential histories. The rate of inter-regional migration, however, is very low in Spain, which should minimize the possible bias.

The data on enrolment for children age 0-2 come from the Ministry of Education (Ministerio de Educación 2018). It reports the proportion of children age 0-2 that is officially enrolled in childcare centers and pre-primary schools in each region. Therefore, it is not strictly speaking data on availability, but it can be seen as an approximation of it, given the chronic insufficiency of childcare supply with respect to existing demand. It was necessary to correct part of the data for two regions. In the case of Navarre the enrolment rates series had a discontinuity in 2014, so it had to be estimated for 2014 and 2015. Data for the Canary Islands was interpolated between 2004 and 2010, due to missing data. Following Rindfuss et al. (2010), childcare enrolment rate is lagged two years, allowing for five months average waiting time to conception, for nine-month gestation, and for an average birth occurring during the middle of the calendar year. The results reported below, however, are substantially identical when the enrolment rate is lagged one year only.

The regional-level unemployment rates and the labor force participation rates for women aged 25-54 (activity rate), are provided by the National Institute of Statistics, based on the Labor Force Survey (Instituto Nacional de Estadística 2018).

Methods

Discrete-time event–history analyses are used to model factors associated with the annual probability of experiencing a first or a second birth. A logistic specification is used, which can be viewed as a latent-response model (Rabe-Hesketh and Skrondal 2012). Underlying the observed dichotomous behavior y_{ij} (whether an individual i has a child in duration j), there is an unobserved or latent continuous response y_{ij}^* representing the propensity to bear a child. If the latent response is greater than 0, then the observed response is 1 and 0 otherwise. A linear regression model is specified for the latent response y_{ij}^*

$$Y_{ij}^* = \beta_0 + \beta_1' X_{ij} + \beta_2' X_{ij} + u_{ij}$$

where X_{ij} are vectors of covariates, β_0 is the baseline hazard function (the duration since age 15 or since first birth), β_1 denotes the value of the estimated coefficients of regional variables, β_2 denotes the value of the estimated coefficients of the model for individual level covariates, and the random term u_{ij} is assumed to follow a logistic distribution. Following Rindfuss et al. (2007), regional-level fixed effects are included to control for endogenous placement of childcare facilities. In fixed-effects models, estimates cannot be confounded with omitted covariates and are hence less sensitive to model misspecification than estimates based on a random-intercept model. Identification of the

model relies on the changes over time in the regional variables. Random effects models for the regions were also computed (Barber et al. 2000), providing substantively similar results as the fixed effects. Random-intercept models, however, make the strong assumption that the regional-specific intercepts are independent of the covariates (Rabe-Hesketh and Skrondal 2012).

Results

The results of the models are presented on tables 1 and 2, respectively for first births and second births. Here I give a preference to fixed effects models, for the reasons mentioned above, but models 3 and 7 report the results from random effects models which are otherwise identical to the fixed effects models 2 and 7. All other models were also computed using both methods, yielding substantively similar results.

In models 1 and 5, for first and second birth respectively, the only regional variables included are dummies for the regions and the childcare enrolment rate. This last variable is barely significant (first birth) or non-significant (second births). Yet, when women's activity rate is included in the models the results become significant at the 95 per cent level or higher. A one percent change in childcare enrolment involves an odds ratio of 1.013 for first births and 1.015 for second births. This positive result, which is robust to several specifications of the models, suggest that women's labor force participation has a key role in accounting for the endogeneity between childcare development and fertility. The inclusion of the unemployment rate is also useful to disentangle its potentially offsetting effects with respect to childcare, although other results change little with its inclusion. Both variables, women's activity rate and unemployment rate, have negative effects on fertility, which are not always significant.

The first hypothesis presented above distinguished between the timing and probability effects of childcare, which are mixed in the results from event history models (Bernardi 2001). The introduction of an interaction term between age and childcare enrolment (for first births⁵), and an interaction term between age of first child and childcare enrolment (for second births), turned out to be significant, both in terms of predicted probabilities and in terms of improvement of the model significance. A higher availability of childcare clearly advances the timing of second births (Figure 4), consistently with the expectations. The advancement is not large (about one year, comparing 0 availability of childcare and 60 percent enrolment rate). By contrast, the availability of childcare does not seem have a strong impact on first births before the late 20s; but it has a significant and large positive impact beyond age 30 (Figure 3). Contrary to the expectations, childcare availability does not lead to an earlier timing of first births, but it greatly increases the probabilities of bearing a first child at later ages of childbearing. This result is consistent with the idea

⁵ Additionally, an interaction term between age and education was included in the model for first birth, with highly significant coefficients. More educated women postpone first births, as the literature on first birth postponement abundantly shows (e.g. Martin-Garcia and Baizan 2006).

that childcare availability is of little relevance during the years were teenagers and young adults are investing in education and in their employment careers. It is highly relevant, however, to allow compatibility between employment and childrearing for women that have already established themselves in the labor market.

The investigation of whether increasing levels of childcare availability lead to higher parity progression ratios involved the computation of survival functions for each birth order, derived from the predicted probabilities estimated in the models. The results, presented in Table 3, show that indeed childcare availability has a substantial impact on the number of children ever born. The estimations suggest that an increase from 0 to 60 percent in the childcare enrolment rate is associated with an increase in the first birth parity progression ratio from 0.64 to 0.83. This is an absolute difference of 0.19 child. For second births, the same increase in enrolment leads to a jump in the parity progression ratio from 0.68 to 0.95, i.e. an absolute difference of 0.27 child. The *relative* differences in parity progression ratios by level of enrolment are of the same order of magnitude for first and second births (1.3 and 1.4, respectively), suggesting that the effect of childcare availability is similar for both birth orders.

The second hypotheses presented above proposed that the increasing availability of childcare should dampen the negative effects of women's labor force participation. The introduction of an interaction term between childcare availability and women's labor force participation provided the expected positive odds for first births (1.001, $p < 0.01$; this model is not shown). However, the results for second births were not significant.

Finally, a number of arguments presented above provided support for Hypothesis 3: the effect of childcare availability should be stronger for better educated women. The results of models 4 and 8 (Tables 1 and 2) unambiguously support this hypothesis. Yet, this is so in different ways for first and second births (Figures 4 and 5). An increase in childcare availability from 0 to 60 percent is associated to a jump from 0.02 to 0.03 in the predicted annual probability of first births for the tertiary educated, while it has no effects for the other educational levels. Considering the previous results concerning the timing and quantum of first birth, the results of this interaction suggest that childcare availability substantially increases the probability of having a first birth for tertiary educated women during their 30s, but not to women with other levels of education. By contrast, childcare expansion very clearly increases the hazard of second births both for higher secondary educated and tertiary educated women.

Discussion and conclusion

The availability of childcare has been considered as a key institutional variable in reducing the conflict between the role of worker and the role of parent in economically advanced countries. Yet, the theoretically expected role of childcare availability in increasing fertility rates has only been found in a few studies, while several other found no effects or inconclusive results. Here I provide new evidence that show a strong effect

of childcare availability on the timing and quantum of fertility, with similar effect for first and second order births. Thus, it is found that an increase in the childcare enrolment rate from 0 to 60 would involve a decrease in childlessness from 36 to 17 percent of women at age 40. Similarly, the results obtained imply that the proportion of women progressing from parity 1 to parity 2 would be 0.68 per cent with a childcare coverage of 0 and 0.95 per cent with a coverage of 60 percent. While such an increase from 0 to 60 percent in childcare availability is somewhat outside the scope of the one actually observed in Spain during the period studied, it shows well that the effects are substantial and that they fall within a plausible range. Indeed, if such an increase had materialized during the period studied, Spain would have been removed from the list of countries with very low levels of fertility. It is interesting that the effects found here are of a similar order of magnitude that the ones reported for Norway by Rindfuss et al (2010), considering that that country has higher levels of gender equality, higher income and economic stability, as well as more powerful and consistent policies supporting conciliation between work and family responsibilities. This finding suggest that childcare policies can have substantial effects in contexts with less favorable characteristics for fertility than the Nordic countries. The results obtained also showed that, contrary to expectations, the timing of childbirth was little affected by childcare availability. By contrast, the results provided a strong support for the hypothesis that the expansion of formal childcare should have a stronger positive effects on the family formation of better educated women.

From a methodological perspective it is relevant to note that, unlike previous studies, I obtained substantively identical results applying random effects and fixed-effects models. Several factors can account for this results. On the one hand, the period analyzed here is relatively long (21 years), the increases in childcare availability are unusually large, and the regional and time variability of the increases are substantial. On the other hand, the models applied controlled for several macro processes that can act as confounders of the effect of interest. In particular, the increase in women's labor force participation and the effect of economic conditions were considered particularly relevant in the Spanish context. In fact, these parallel processes are likely to account for the paradox that, despite substantial increase in childcare availability, the fertility levels in Spain have remained low.

Although the data used (EUSILC) is generally adequate for the intended purpose of the study, they did not provide information on the migration history of individuals. This limitation might involve a slight overestimation of the effects of childcare availability if the migrants systematically choose regions with higher availability of childcare. Given the low recorded levels of inter-regional migration, this bias is unlikely to have a large effect on the estimates.

Finally, the scientific and policy relevance of the results obtained should be highlighted. The results reported give support to the sociological and economic theories that point to the importance for fertility of the enhanced compatibility between the role of mother and the role of worker, and the resulting reduction in the opportunity costs of having a child. A particularly clear and novel result is that childcare availability has a stronger positive

effect for the better educated women; indeed, our results show that formal childcare increases had no significant effect on women with lower secondary education. The existence of contrasting or even opposite results by level of education in other contexts or periods could lead to insignificant effects. Moreover, this finding gives support to the argument that the relative cost of non-family care is lower for better educated women than for less educated women, involving an increasing relevance of childcare availability with the level of education. As noted, these results apply to a society in which several institutions and policies are conducive to very low fertility levels, and where gender relations have been rapidly changing. In this context, the expansion in the availability of formal childcare can be seen as booster, or even as a prerequisite, for enhancing gender equality. The resulting reduction in the conflict between the role of worker and the role of mother opens up the possibility of more equal roles and relationships between genders inside the household, and indirectly in the labor market, likely promoting a rise in the fertility levels.

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Table 1. Results of the event–history analysis for first births. Odds Ratios

	Model 1	Model 2	Model 3	Model 4
	Fixed	Fixed	Random	Fixed
Age	1.675***	1.674***	1.735***	1.704***
Age squared	0.993***	0.994***	0.993***	0.993***
Birth-cohort (ref.: <1970)	1	1	1	1
Birth-cohort 1970-74	1.250**	1.278**	1.166*	1.274**
Birth-cohort 1975-79	1.123	1.184	1.167	1.169
Birth-cohort 1980-84	0.982	1.082	1.119	1.068
Birth-cohort 1985-89	1.088	1.260	1.170	1.262
Birth-cohort >=1990	1.039	1.273	1.147	1.409
Education (ref: Lower secondary)	1	1	1	1
Higher secondary	0.681***	0.680***	0.644***	0.654***
Tertiary	0.524***	0.525***	0.504***	0.387***
Missing	0.148***	0.147***	0.171***	0.0369***
Not enroled in education (ref.)	1	1	1	1
Enroled in education	0.104***	0.104***	0.144***	0.105***
Region (ref.: Galicia)	1	1		1
Asturias	0.971	0.952		0.932
Cantabria	1.221	1.189		1.175
Pais Vasco	0.833	0.748**		0.706**
Navarra	0.896	0.922		0.938
La Rioja	1.362**	1.350*		1.362**
Aragon	0.949	0.903		0.904
Madrid	0.840	0.804**		0.779**
Castilla Leon	0.971	0.966		0.960
Castilla La Mancha	1.463***	1.405**		1.378**
Extremadura	1.623***	1.682***		1.607***
Catalunya	0.967	0.910		0.938
Valencia	1.295**	1.310***		1.291**
Illes Balears	0.994	1.052		1.011
Andalucia	1.497***	1.528***		1.490***
Murcia	1.457***	1.404**		1.398**
Ceuta	2.802***	2.661***		2.586***
Melilla	2.365***	2.174***		2.189***
Canarias	1.401**	1.480***		1.411**
Childcare enrolment	1.007*	1.013***	1.010***	0.997
Unemployment rate		0.992**	1.000	0.992*
Women’s activity rate		0.991	0.978***	0.993
Interaction education*childcare				
Lower sec * childcare				1
Higher sec * childcare				1.006
Tertiary * childcare				1.024***
Missing * childcare				1.110*
Observations	125575	125575	125575	125575

Significance: '*'=10%; '**'=5%; '***'=1%.

Table 2. Results of the event–history analysis for 2nd births. Odds Ratios

	Model 5 Fixed	Model 6 Fixed	Model 7 Random	Model 8 Fixed
Age of 1st child	2.715***	2.731***	2.626***	2.728***
Age of 1st child squared	0.911***	0.911***	0.913***	0.911***
Woman’s age at first birth	1.013	1.016*	1.015**	1.016*
Not enroled in education (ref.)	1	1	1	1
Enroled in education	0.540	0.549	0.372	0.576
Education (ref: Lower secondary)	1	1	1	1
Higher secondary	1.009	1.010	0.982	0.888
Tertiary	1.395***	1.404***	1.328***	1.251**
Missing	1.199	1.384	1.036	5.270**
Region (ref.: Galicia)	1	1		1
Asturias	0.729	0.751		0.757
Cantabria	1.246	1.234		1.231
Pais Vasco	1.827***	1.243		1.240
Navarra	1.451*	1.750**		1.741**
La Rioja	1.414	1.523*		1.520*
Aragon	1.451*	1.295		1.262
Madrid	1.610***	1.370**		1.359*
Castilla Leon	1.115	1.178		1.176
Castilla La Mancha	1.631***	1.636***		1.624***
Extremadura	1.269	1.485**		1.478**
Catalunya	1.559***	1.277		1.266
Valencia	0.995	1.059		1.055
Illes Balears	1.908***	2.198***		2.164***
Andalucia	1.372**	1.512***		1.504***
Murcia	1.447**	1.373*		1.382*
Ceuta	1.653*	1.547		1.546
Melilla	2.248***	2.037***		2.081***
Canarias	0.787	0.967		0.948
Childcare enrolment	0.997	1.015**	1.009**	1.008
Activity rate		0.982***	0.987***	0.984**
Unemployment rate		0.984***	0.986***	0.984***
Interaction education*childcare				
Lower sec * childcare				1
Higher sec * childcare				1.010
Tertiary * childcare				1.009
Missing * childcare				0.795
Observations	15799	15799	15799	15799

Significance: '*'=10%; '**'=5%; '***'=1%

Table 3: Predicted parity progression ratios by different levels of childcare enrolment rate. Predictions from Models 2 and 6, for first and second births, respectively

Childcare enrolment rate	Parity progression ratio at age 40: 0 to 1	Parity progression ratio ten years after first birth: 1 to 2
0	0.64	0.68
20	0.71	0.80
40	0.77	0.89
60	0.83	0.95
Absolute difference 0-60	0.19	0.27
Relative difference 0-60	1.30	1.40

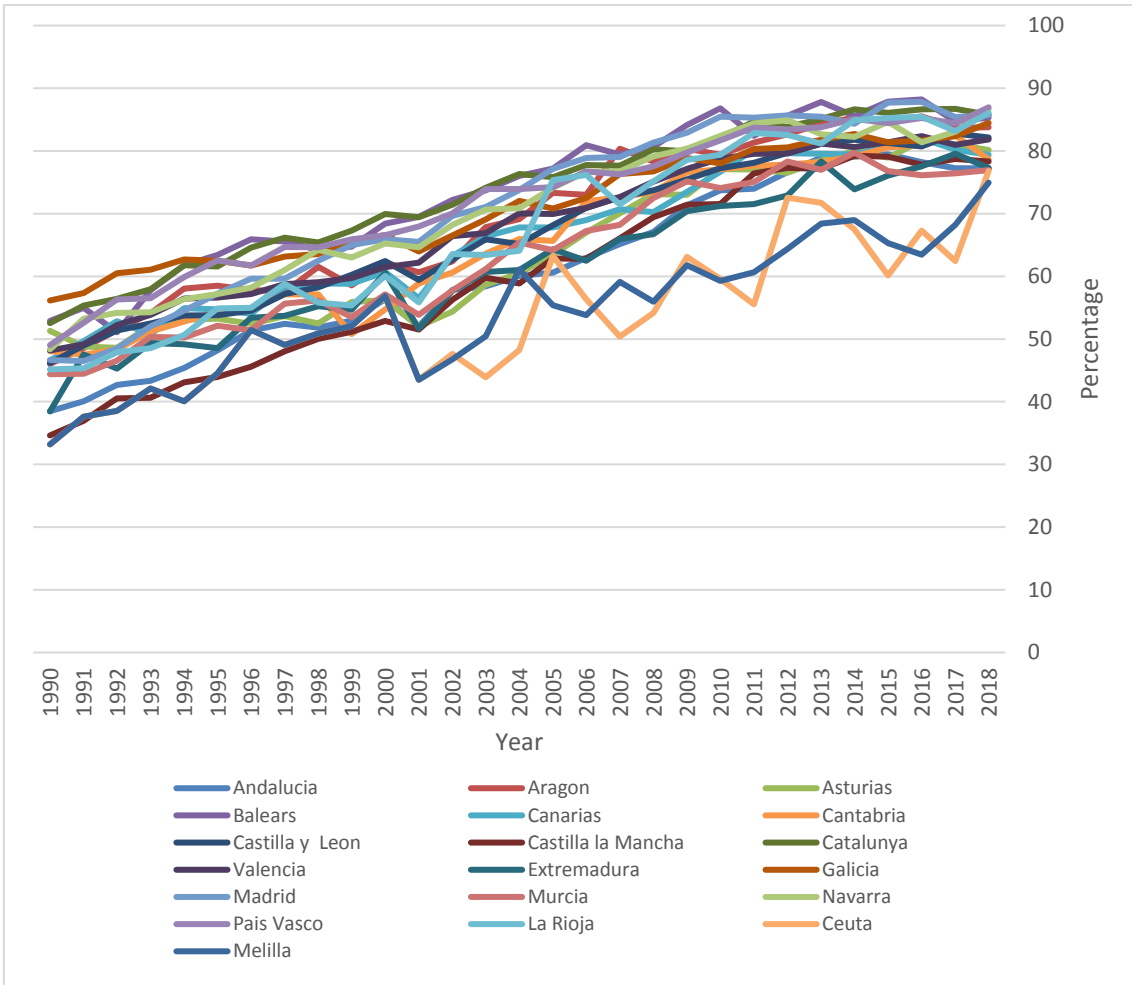


Figure 1. Woman's labor force participation rate, age 25-54. Spanish regions 1990-2018. Based on data from the Labor Force Survey (Instituto Nacional de Estadística 2018).

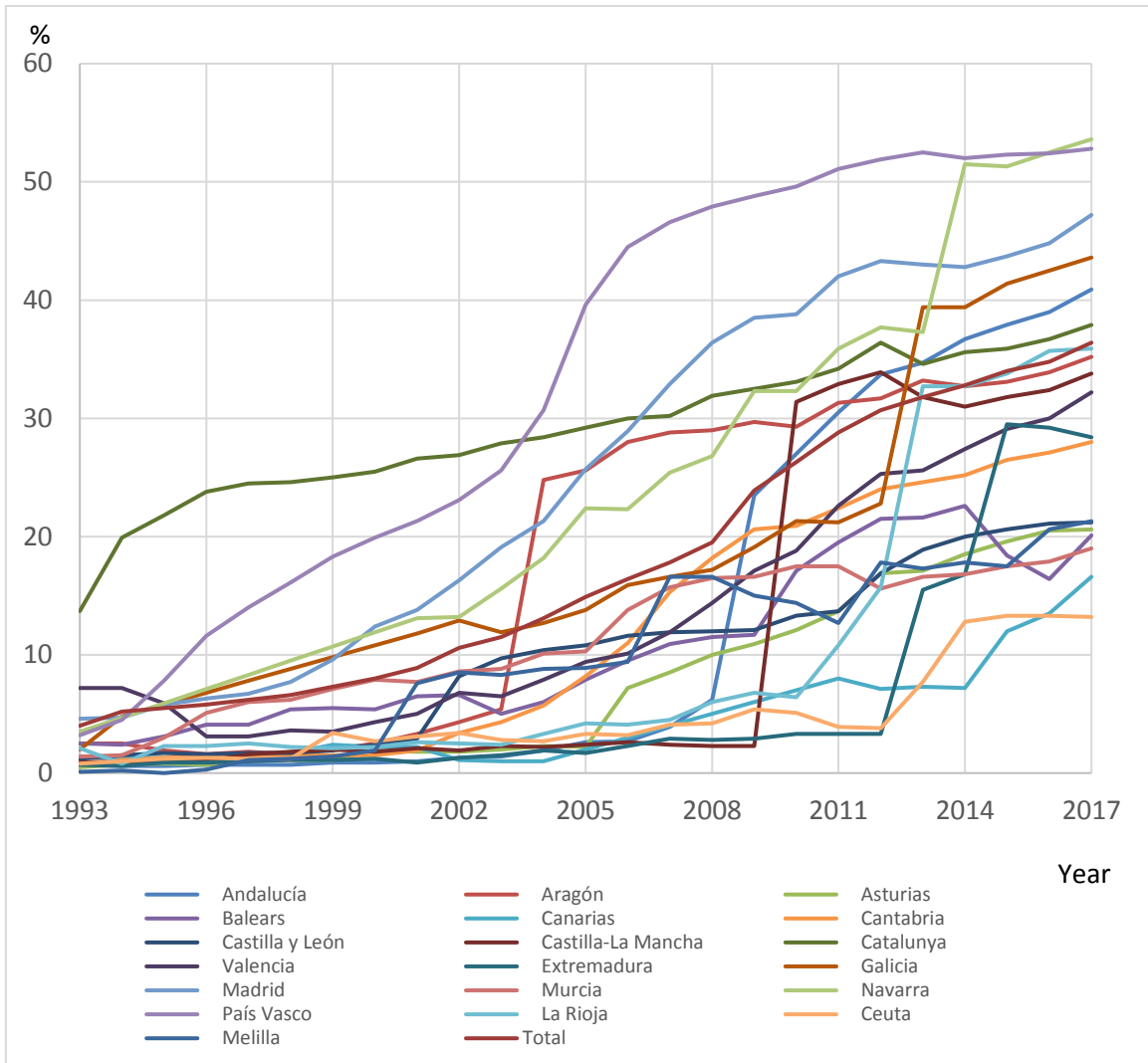


Figure 2. Percentage of children age 0-2 in formal care, by region. Spain 1993-2017. (Ministerio de Educación 2018).

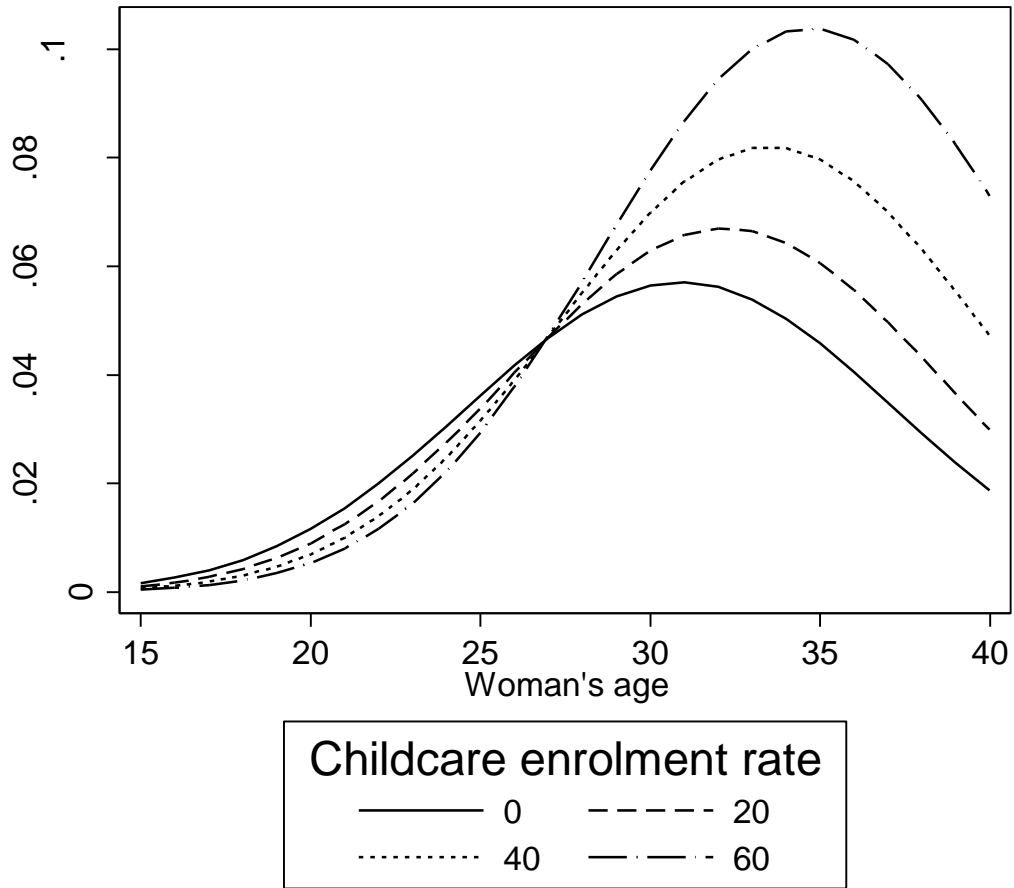


Figure 3. Predicted annual probability of a first birth by childcare enrolment rate. Controls as in Model 2. Includes interaction terms between woman's age and childcare enrolment rate, and between age and education.

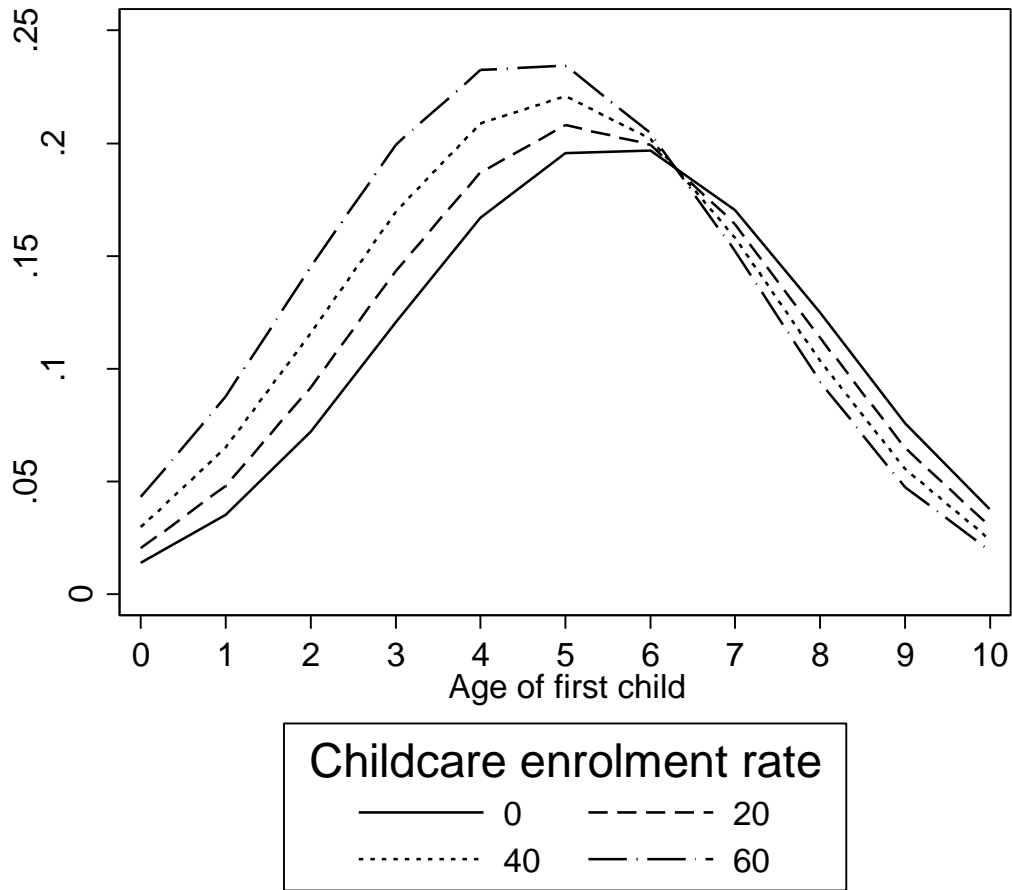


Figure 4. Predicted annual probability of a second birth by childcare enrolment rate. Controls as in Model 6. Includes an interaction term between duration since first birth and childcare enrolment rate.

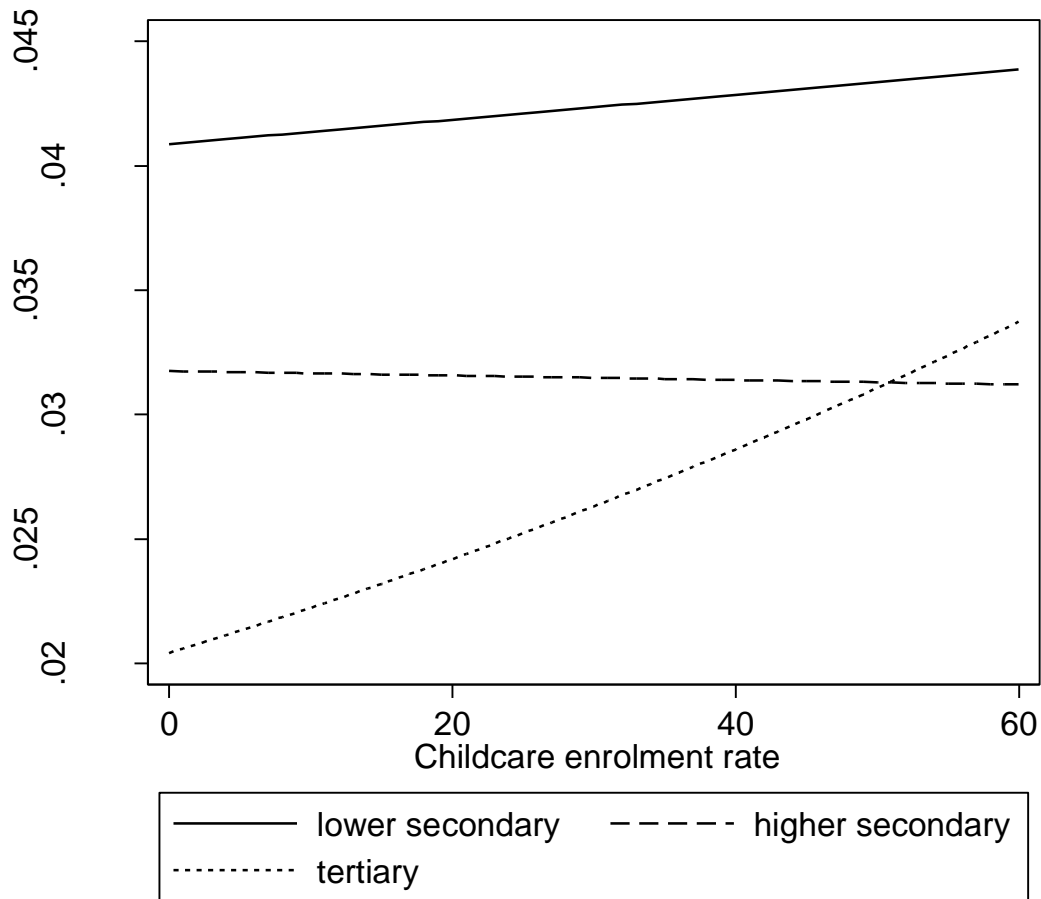


Figure 5. Predicted annual probability of a first birth by educational level and childcare enrolment rate. Controls as in Model 4. Includes interaction terms between education and childcare enrolment rate, and between age and education.

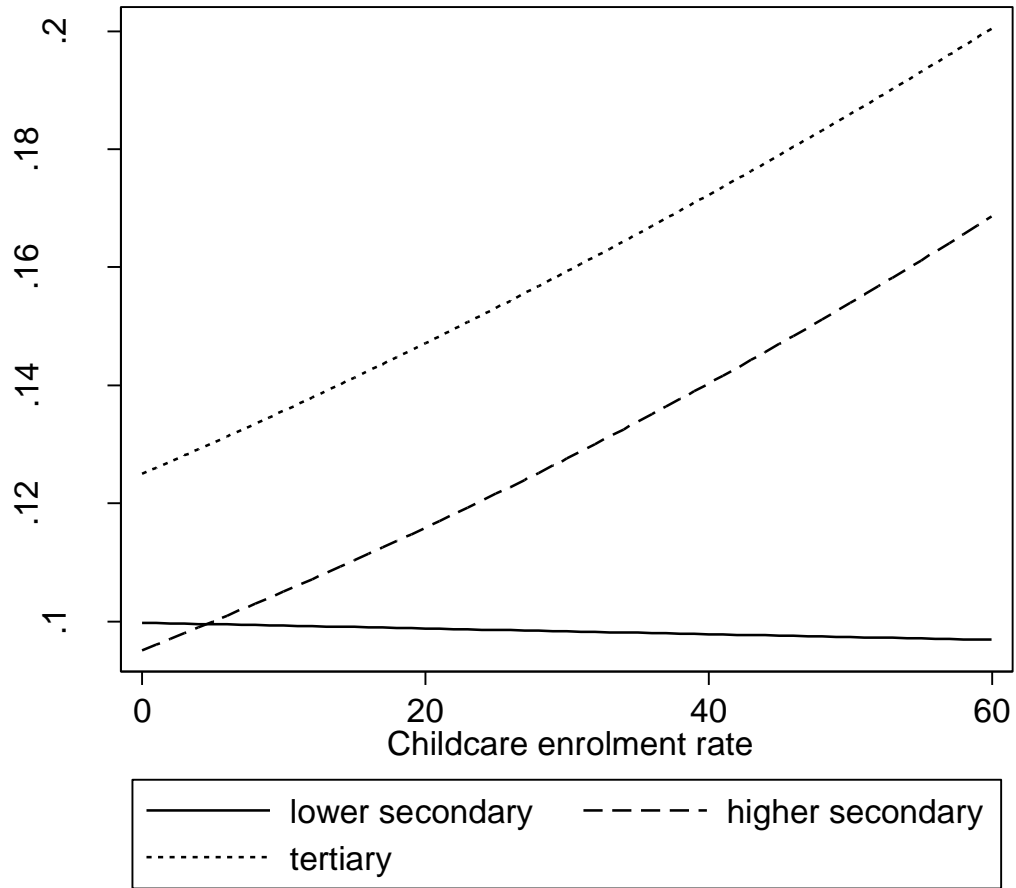


Figure 6. Predicted annual probability of a second birth by educational level and childcare enrolment rate. Controls as in Model 8.