DEMOGRAPHIC RESEARCH
A peer-reviewed, open-access journal of population sciences

DEMOGRAPHIC RESEARCH

VOLUME 44, ARTICLE 50, PAGES 1185–1228
PUBLISHED 15 JUNE 2021
https://www.demographic-research.org/Volumes/Vol44/50/
DOI: 10.4054/DemRes.2021.44.50

Research Article

Time preferences and fertility: Evidence from Italy

Daniela Bellani

Bruno Arpino

Daniele Vignoli

Contents

Demographic Research: Volume 44, Article 50
Research Article

Time preferences and fertility: Evidence from Italy

Daniela Bellani[1]

Bruno Arpino[2]

Daniele Vignoli[3]

Abstract

OBJECTIVE
Time preferences, also referred to as impatience, is a personal characteristic that has been found to influence different types of decisions, from financial investments to schooling decisions. The present study is the first that empirically explores whether this trait represents a determinant of human reproductive behaviors.

BACKGROUND
Fertility decisions, as all life actions, imply a balancing of anticipated costs and benefits whose expectations are formed under uncertainty. Fertility research has addressed the backward reasonings (e.g., socioeconomic, psychological, biological factors) influencing fertility decisions. Yet, the role of forward factors, such as the preference for immediate but lower benefits versus future but higher benefits, in influencing fertility decisions has been overlooked.

METHOD
Data are from the Survey on Household Income and Wealth carried out by the Bank of Italy every two years on a sample of about 8,000 households. In particular, we make use of a question included in the 2004, 2008, 2010, and 2012 waves to examine whether, controlling for backward factors, impatience affects parity progressions.

RESULTS
Results from logistic regression models indicate an inverse U-shaped association between impatience and the transition to the first and second child during the observation period, meaning that for very impatient and very patient individuals the probability of having a first and second child is lower than for individuals within intermediate levels of impatience.

[1] Alma Mater Studiorum, University of Bologna, Italy. Email: daniela.bellani@unibo.it.
[2] Università degli Studi di Firenze, Italy.
[3] Università degli Studi di Firenze, Italy.

CONCLUSION
The empirical finding points to the importance of considering time discounting preferences (as well as other forward-looking factors) in fertility research to gain a more complete understanding of fertility behaviours.

1. Introduction

Fertility decisions, like all life actions, imply a balancing of anticipated costs and benefits, the expectations for which are formed under uncertainty. Fertility decisions are affected by the "shadow of the future" (Bernardi, Huinink, and Settersten 2019: 4; Vignoli et al. 2020a), given that the consequences of reproductive choices develop over time, both in the short and long term (Ajzen and Koblas 2013). In this article, we posit that future-oriented thinking of individuals is associated with the fertility decision-making process. In particular, we focus on the role of time discounting preferences (TDP) for fertility behaviours in the Italian context.

TDP indicate the extent to which individuals favour immediate but lower rewards over delayed but higher rewards (i.e., by how much delayed utility is "discounted" by the individual to gain an immediate benefit) (Frederick, Loewenstein, and O'Donoghue 2002). In the following, we use impatience and time discounting preferences interchangeably: an individual with a high discounting rate is referred to as being 'impatient,' while an individual with a low discounting rate is referred to as being 'patient' (Frederick, Loewenstein, and O'Donoghue 2002). Impatient individuals are more likely to 'cash in' a given reward as soon as possible, even if waiting may imply a higher utility; patient individuals instead value more future rather than current benefits (Hoerl and McCormack 2015).[4]

This paper is the first to examine whether TDP are associated with fertility. TDP have become a widely studied construct in behavioural sciences (Spivey 2010), as it strongly influences a variety of human choices, such as educational attainment, labour market participation, and health outcomes (e.g., Breen, van de Werfhorst, and Jæger 2014; Golsteyn, Grönqvist, and Lindahl 2014). Given that "time is an ever present and prominent dimension in all human decision making" (Ranyard, Crozier, and Svenson 1997: 165), TDP could influence fertility choices too. TDP should be key to explaining fertility given that this is, by definition, a decision that implies intertemporal consequences (i.e., occurring at different points in time). Individuals form expectations about the costs and benefits of childbearing, but they differ in how they weigh short-term

[4] In the data used for the empirical analyses, we do not have a direct measure of impatience to have a child. Thus, in the following, the term '(im)patience' refers to the individual level of TDP.

versus long-term costs and benefits. In this sense, impatient people place greater value on the short-term costs and benefits of childbearing, while patient individuals highly rate the long-term outcomes.

Using longitudinal data, we address the research question of whether individual's TDP are associated with parity progressions in the Italian context. The analysis is based on large-scale data from the Survey on Household Income and Wealth collected by the Bank of Italy. The dataset reports information on individuals' sociodemographic and family-related characteristics (including childbirth) of a representative sample of Italian households during the first two decades of the 2000s. Most importantly, it provides measures of general TDP in four waves that are assessed in survey questions related to a hypothetical lottery/inheritance. Italy is an interesting setting for this study for two main reasons. First, the country is well known for its low fertility levels. Second, Italian couples carefully plan fertility choices (Dalla Zuanna, De Rose, and Racioppi 2005) – indeed, the rate of unplanned births in Italy is among the lowest in Europe (Dalla Zuanna, Gavini, and Spinelli 1998; Castiglioni, Dalla Zuanna, and Loghi 2001; Sedgh et al. 2011).

2. Time discounting preferences and fertility

In the last decades, the literature on fertility has extensively analysed several micro-, meso-, and macro-level determinants influencing fertility. Demographic characteristics such as female and male partners' age (e.g., Billari and Tabellini 2010) and the number of previous children (Dommermuth, Klobas, and Lappegård 2015) are among the micro-level factors that have been found to affect fertility behaviour. One strand of the literature has focussed on the impact of the socioeconomic conditions of individuals, such as income, wealth, educational attainment, social background, and employment (e.g., Arpino, Luppi, and Rosina 2021; Bellani 2020, Jones, Schoonbroodt, and Tertilt 2011; Kreyenfeld, Andersson, and Pailhé 2012; Murphy and Wang 2001), as well as trust (Aassve, Le Moglie, and Mencarini 2020) and subjective well-being (e.g., Aassve. Arpino, and Balbo 2016). In the last years, scholars in social demography, as well as in social psychology, have shown that personality traits influence fertility choices too (Jokela et al. 2011; Jokela 2012; Tavares 2016). We argue that a missing element here is the recognition that fertility choices are also driven by factors that are strictly related to individual preferences.

As in other cases where returns are delayed (e.g., educational choices), fertility decisions are oriented towards the future, given that consequences of childbearing are immediate but also develop over time. The importance of examining the individuals' forward-looking perspective in the analysis of the fertility decision-making process has been primarily emphasised within the sociopsychological framework of the theory of

planned behaviour. In this model, perceived constraints related to fertility decisions are operationalised in a hypothetical future situation (Schoen et al. 1999; Ajzen and Klobas 2013).

TDP should play a role in determining fertility decisions. Impatient decision-makers are more focussed on the utility of childbearing in the present and immediate future. Instead, patient individuals place more emphasis on the utility of childbearing in the more distant future. All other factors being equal, are patient or impatient individuals more likely to have children?

3. Background

3.1 Intertemporal choices of childbearing: Theoretical perspectives

Childbearing is not a monolithic experience that affects parental life once and for all but is more a transformative experience that influences individuals' well-being at different points during the life course (e.g., Umberson, Pudrovska, and Reczek 2010). Childbearing can have an immediate utility that may rapidly come into play – for instance, children may act as marital stabilisers (Heaton 1990), but it can also entail a utilitarian/instrumental value (Becker 1974) accessible in the long run (e.g., children as an old-age security). In parallel, childbearing can be associated with costs in the present (as more domestic work, loss of income and wealth, leisure time constraints) but also with strains in the future – such as psychological stress associated with adult children's circumstances and protracted intergenerational transfer from parents to adult children (e.g., Albertini, Gähler, and Härkönen 2018). As such, the sign of the relationship between impatience and fertility is far from being straightforward given that individuals with different levels of patience may weight costs or benefits in the short and long run differently.

Given that impatient individuals focus on short-term fulfilment and tend to undervalue delayed gratification, they are expected to weight more immediate costs and benefits of childbearing. On the one hand, childbearing can be seen as a choice with high immediate material (e.g., money) and immaterial (e.g., spare time) costs (e.g., Nomaguchi and Milkie 2003; Folbre 2008). Thus, under the standard expected utility framework, when impatient individuals perceive the immediate costs of having a child as dominant, a decrease in their parity progression is expected. On the other hand, embracing the value-of-children perspective, which suggests that childbearing is a provider of a significant increase in an individual's immediate well-being, one should expect that impatient individuals are likely to have a(n additional) child. Having a child, in fact, may decrease marital uncertainty through the promotion of marital solidarity and

attachment (e.g., Hill 1988). Other short period rewards include status attainment (of being parent) and stimulation (Nauck 2007). Moreover, when people decide to have a child, anticipating a happy event, they are likely to experience an immediate increase in life satisfaction (Luppi 2016). A rise in subjective well-being around childbirth, typically found in life satisfaction or happiness trajectories before and after the birth of a child, confirms a positive affective forecast (e.g., Balbo and Arpino 2016) – even if afterwards subjective well-being is likely to fall. However, it would be inaccurate to ignore the literature that identifies TDP as not only a driver of 'costs and benefits' rational calculus (as discussed above) but also as a stimulus for certain behavioural choices (e.g., O'Donoghue and Rabin 1999). Studies have shown that impatience is associated with a lower level of self-control, which often leads to an overindulgence in activities involving immediate gratification, such as risky sexual behaviours, less contraceptive vigilance, and a higher number of undesired pregnancies (e.g., Chesson et al. 2006). As such, fertility decision-making processes of impatient individuals is associated with psychological traits, which is beyond the scope of a standard expected utility framework.

As for patient individuals, their fertility decision-making process is expected to be less conditional on concerns about the costs and benefits of childbearing in the short term, valuing childbearing consequences over their life course. In this sense, patient individuals are likely to prioritise future over present utility of childbearing.

Patient individuals may expect that, in the long run, benefits of childbearing exceed costs. Children may be valued as a potential support for older parents (Dykstra and Fokkema 2011), both from a social and an economic point of view (Henz 2008). Children can embody the role of old-age insurance providers (e.g., Nugent 1985), especially in terms of psychological and emotional suppliers in the case of industrialised economies (e.g., Wenger et al. 2007), dialogical benefits contributors (e.g., Nomaguchi and Milkie 2003), and reciprocity principle engagers. While the majority of studies that provide evidence for the old-age security hypothesis refer to low-income countries, there is also support for its validity in high-income countries, such as Italy (Billari and Galasso 2009; Cigno and Rosati 1992; Galasso, Gatti, and Profeta 2009; Rendall and Bahchieva 1998). Under the standard expected utility framework, an increase in parity progression of patient individuals is anticipated. Similar conclusions, even if grounded in different assumptions, could be drawn from the Barro–Becker dynastic model (1989). The main proposition here is that individuals procreate because they perceive their children's lives as a continuation of their own, and not because children are expected to care about their parents' utility. Under this framework, parents, being altruistic, act in order to guarantee an increase of the future well-being of later generations. Accordingly, patient individuals potentially mirror the forward-looking orientations of Barro-Becker's prototypical parents. As such, they are expected to have a higher number of children if interest rates are higher. However, Cigno and Rosati (1992) provide evidence against the dynastic

model hypothesis for Italy. Indeed, they find a negative relationship between interest rate and fertility, arguing that such a finding is consistent with the children as old-age security hypothesis.[5]

However, the expected positive influence of patience on fertility progression could be reversed if patient individuals put a high weight on the long-term costs of children. Given the challenges that characterise modern societies, children may be expected to be costly for a long period of time (Craig, Powell, and Smyth 2014). The prolonged educational career, the later transition to adulthood, and the precarity of working conditions represent crucial factors that make children dependent to their parents' wealth for many years, regardless of their socioeconomic positions (Lawson and Mace 2010). Moreover, forward-looking individuals could limit their family size because they anticipate the monetary support and time and emotional investment that adult children could need over the life course. They could be indeed more aware of potential psychological and economic stressors triggered by children over the life course, such as psychological stress (for example, in the case of negative treatment of parents by adult children) and economic pressure (necessity of intergenerational flows from parents to adult children; see Albertini, Gähler, and Härkönen 2018). In the same line of reasoning, one could argue that, according to the life course quality-versus-quantity trade-off model (Francesconi and Heckman 2016), patient individuals prefer to have fewer children also because they value offspring's long-term outcomes, such as their future well-being and educational attainment, the achievement of which requires high parental investments in the long run.

Because theoretical arguments sustain both directions of the relationship between impatience and fertility, more complex relationships (nonlinear, e.g., U shaped or inverse U shaped) might also be hypothesised. In other words, it may be that the likelihood of having a child is the highest or lowest for those who are extremely patient or extremely impatient, respectively. The mechanisms driving a potential positive relationship and those operating in the opposite direction may even compensate, giving rise to an overall null relationship. Therefore, we will test whether there is any relationship between impatience and fertility and whether this relationship is linear or not.

3.2 Key differentials

Becoming a parent represents a turning point in life (Neyer, Lappegård, and Vignoli 2013). Accordingly, TDP should weigh heavily in the decision-making process about having or not having the first child. It is widely accepted that first birth produces higher

[5] In the empirical analyses, we controlled for year and regional fixed effects so as to remove the influence of interest rates.

marginal costs than second or subsequent children (e.g., Craig and Bittman 2008), both in the short and long run. According to the principle of the economies of scale, the distribution of fixed costs causes advantages for higher parity transitions (e.g., Schulze 2010). In particular, from the perspective of impatient individuals who attach more weight to the immediate costs of having a child, the transition to the second child tends to be less challenging than the transition to the first one. The entry into parenthood is expected to be more problematic for impatient individuals because the opportunity costs (i.e., related to one's working career) are higher. For instance, Liefbroer (2005) finds that the perceived costs of childbearing in terms of career opportunities are more significant for the transition to the first child. We can apply a similar logic to patient individuals who expect that children will be costly in the long run. In this case, having two children instead of one adds no specific information about the costs and benefits of children in the distant future (exceptions to this are cases where two children have a significant age gap, a rare eventuality in Italy). Accordingly, patient individuals may well perceive that prolonged education, a later transition to adulthood, and precarious working conditions represent crucial factors that would make offspring dependent on their parents' wealth for decades. It would be reasonable to argue that, as is the case here, having a child in the first place is a more crucial decision than having any additional children.

Let us now move to impatient individuals who expect having a child to be a valuable event as it decreases marital uncertainty and favours status attainment. These individuals will marginally benefit more for the transition to the first child given that it ensures parental status (and the social recognition which follows) and deeper bonds with the partner (Friedman, Hechter, and Kanazawa 1994). Being the parent of more than one child is likely to strengthen such pre-existing support. In parallel, it is generally established that, compared to adults who do not have children, parents with at least one child are at lower risk of lacking emotional and instrumental support when they become dependent and frailer (e.g., Grundy and Read 2012). This being the case, time preferences should be especially relevant in the transition out of childlessness. An emerging literature (e.g., Jokela et al. 2011; Jokela 2012) suggests that the association between personality characteristics and having a child is stronger for the first child than for any subsequent children. Similarly, the level of patience, being a personal characteristic, is likely to play a more major role for the entry into parenthood than for higher order parities. Thus, the relationship between TDP and fertility is expected to be more evident in the case of the transition to the first birth.

The association between time preferences and fertility outcomes might differ between different segments of the population. Some of the reasons why impatience might affect childbearing may be age-specific. The role of TDP might be crucial during younger ages. This is the life course stage when discount rates might play a major role because individuals can take decisions about reproductive behaviour on the basis of their

preferences without consequences for the chances of eventually having a baby – infertility and sterility are, in a sense, minor issues (Mills et al. 2011). This argument is particularly relevant if one considers the female partner's age.

Education is also likely to moderate the association between TDP and fertility. In fact, low-educated individuals spend fewer years in the educational system; the time window for becoming a parent is overall wider compared to the time window for those who obtained a degree. Therefore, the association between TDP and fertility outcomes might be more evident for those with lower levels of education. Adult children in Italy tend to leave the parental home at a late age – a behaviour which does not strongly vary by social origin (Dalla Zuanna 2001; Manacorda and Moretti 2006). Over 80% of Italian men aged 18 to 30 live with their parents – and the co-residence does not usually imply intergenerational transfers from children to parents but instead the reverse (Manacorda and Moretti 2006). As explained by Albertini and Kohli (2013), Italy belongs to the group of countries characterised by a low frequency but a very high intensity of intergenerational solidarity (i.e., financial transfers from parents to their adult children). In other words, in Italy, both high and low socioeconomic status parents invest in their adult children and are accustomed to financially supporting them for years in proportion to their resources.

4. The Italian case of low fertility

Persistently low fertility levels and strong family ties have long characterised Italy (Dalla Zuanna 2001; Dalla Zuanna and Micheli 2006). After the baby boom in the mid-1960s, the total fertility rate (TFR) steadily declined to very low levels in the mid-1980s, reaching lowest-low fertility rates (less than 1.3 children per woman) in the period 1993–2003 (De Rose, Racioppi, and Zanatta 2008). At the turn of the century, fertility started to increase again, and TFR peaked in 2010 at 1.46. Then, since 2010, Italian fertility has declined again; since 2017, Italy has fallen again into a lowest-low fertility regime, with a TFR of 1.3 (Istat 2019). A glance at age-specific birth rates suggests that the recent fall in period fertility is essentially attributable to birth postponement (Caltabiano, Comolli, and Rosina 2017). In this context, the level of an individual's impatience might prove a crucial interpretative lens, as the decision to postpone the first birth is likely to depend on whether women believe that they will still have time to have a child afterwards.

Italy offers an interesting case study for investigating the relationship between TDP and fertility as reproductive decisions are carefully managed by couples. We give three examples to substantiate this claim. First, rates of unintended pregnancies, including among adolescents, are extremely low (Castiglioni, Dalla Zuanna, and Loghi 2001; Sedgh et al. 2011). Second, fertility realisations are highly consistent with previously

stated intentions (e.g., Rinesi et al. 2011); in particular, negative fertility intentions have been proven to almost perfectly predict subsequent realisations (Régnier-Loilier and Vignoli 2011). Third, the literature on contraception in Italy helps to delineate how carefully fertility choices are managed within couples. In fact, the decline in Italian fertility from the 1970s to 2000 occurred without the diffusion of modern contraception; it was, instead, the result of deliberate and carefully planned decisions using natural contraceptive methods (Dalla Zuanna, De Rose, and Racioppi 2005: 27). Indeed, withdrawal was the most popular method until the mid-1990s (idem), when Italy became the country with the world's lowest fertility rates – with an average of 1.19 children per woman in 1996. Things have now changed. More recent data revealed that the most used contraceptive method in 2013 was the pill (27%), followed by condoms (25%), while 20% still relied on coitus interruptus (see De Rose and Dalla Zuanna 2013). Interestingly, the ethnographic study of Gribaldo and colleagues (2009) interprets the refusal of some Italian women to use contraception and their use of non-technological methods not as "irrational choices" but as a way for reaching motherhood (or have another child) in a context where there is "never a good time" to have a child. Simply put, they run a calculated risk when practicing unprotected sex.

In the following, we analyse fertility transitions while taking into consideration individuals' future orientation, namely their forward-looking perspective. We believe that uncovering the role played by TDP in fertility behaviour could provide us with new insights into the difficult, carefully considered decision to have a child in Italy. Given the weight that individuals attach to rational calculations regarding childbearing, as well as the crucial timing of the first birth due to the limited time interval left for second or higher order births, we expect the role of TDP to be highly significant.

This is the first study concerned with TDP and fertility in an Italian context; we thus deliberately abstain from formulating analytical hypotheses. Nonetheless, we might expect a stronger role of TDP for young and childless individuals. Fertility differentials in Italy have been increasingly examined with respect to rising external uncertainties and economic constraints (e.g., Vignoli, Rinesi, and Mussino 2013). The employment instability and job precariousness that characterise the Italian labour market have served to increase uncertainty and intensify the difficulties experienced by the young in their transition to adulthood – typified by entry into the labour market, strengthening their economic position and beginning to consider family formation (e.g., Vignoli, Tocchioni, and Mattei 2020b). In such a context, the importance of TDP is thus intuitively relevant for the progression to the first child. The argument of seeing children as a vehicle for receiving emotional and material support in old age further reinforces the view that TDP should be especially important for the transition to the first child. In a familistic culture (as in Italy), where family members are likely to perceive that the quality of emotional support from a child would be far greater compared to that of other actors, such as

extended members of the family/friends/care services (Dalla Zuanna and Micheli 2006), parents with at least one child are at a lower risk of lacking symbolic and instrumental support during their senescence. We also expect the association between TDP and fertility to be particularly evident for couples with low educated female partners. In Italy, having a child while studying is a rarity (e.g., Cantalini 2017). Consequently, the time window for becoming a parent is smaller for higher educated individuals, and the effect of impatience on childbearing is expected to become decreasingly salient as individuals reach career and life goals.

5. Method

5.1 Data and sample selected

We used data from the Survey on Household Income and Wealth (SHIW) carried out by the Bank of Italy every two years since the mid-1960s. SHIW collects information on consumption, income, and wealth, in addition to several household characteristics, for a representative sample of Italian households drawn in two stages from population registers. The sample used in the most recent waves comprises about 8,000 households (20,000 individuals). From the 1989 wave, a rotating panel component has been introduced. The share of panel households has been around 45%–50% of the total since 1993. The SHIW provides detailed information on the demographic and socioeconomic characteristics of individuals that belong to sampled households. Moreover, the questionnaire includes questions that allow us to measure the TDP of the head of the household. To the best of our knowledge, SHIW is the only survey with a panel component that provides this information.

TDP are measured in the 2004, 2008, 2010, and 2012 waves. We assume TDP is stable over time (e.g., see Meier and Sprenger 2015 and Supplementary Material, Section 2) and consider all households who participated in at least one of these waves and use all data available for these households in the preceding and following waves covering the period 1995–2016. We consider married and cohabiting couples in a heterosexual partnership and restrict the sample to couples in which the male partner is aged between 18 and 54 (we drop 42% of the initial sample) and in which the female partner is aged between 18 and 45 (we drop about 22% of the remaining sample). In order to study parity transitions we drop couples who participated in a single wave of observation (about 46% of the remaining sample). This is due to the fact that the panel component of SHIW is rotating.[6]

[6] The code generated and analysed during the current study is available from the corresponding author upon request.

5.2 Variables and empirical strategy

We test whether TDP were associated with fertility outcomes distinguishing (1) the likelihood of having the first child and (2) the likelihood of having the second child.[7]

The question on time discounting preferences provided by SHIW data was included in the 2004, 2008, 2010, and 2012 questionnaires. It presents to the head of the household a hypothetical situation where he or she has to decide how much money to give up in order to receive a certain amount of money in the present instead of after one year. Questions of these type have previously been widely used to determine the impatience of individuals in a survey (Frederick, Loewenstein, and O'Donoghue 2002). Unlike other surveys, the SHIW does not assume that the head of the household is a man. It defines head of the household as the person in charge of economic decisions. About 30% of households in our sample had a woman as the household head.

It is clear that the availability of information on the time preferences of both partners would allow for a more exhaustive study. Although observing only one member of the couple could be said to be a limitation (one that we share with many fertility studies), there are several reasons for which we believe that our estimates provide valid knowledge on the relationship between TDP and fertility. First, as shown by a growing literature (e.g., Arrondel and Fremeaux 2016; Gnagey, Grijalva, and Rong 2020) partners tend to resemble, rather than differ from, each other in terms of TDP. Accordingly, in our sample, one partner's time discounting preference is expected to be similar to that of their partner. This is confirmed by a high correlation (0.7) between partners' TDP for the couples where both partners' TDP are available.[8] Second, heterogamy in TDP would not systematically bias our estimates under the golden-mean and power-rule models (for supporting evidence and extensive reviews, please see Bauer and Kneip 2013, 2014; Jansen and Liefbroer 2006).[9]

[7] We also tested whether TDP are associated with a variable that captures fertility intentions, obtaining similar results to those reported in the main text. Given that the formulation of the question contained in the SHIW is questionable, and that the available sample size for this analysis is small, we have not reported these results, though they are available upon request.

[8] Regarding the problem of measurement error related to the observation of only the household head's TDP, we took advantage of our dataset containing TDP for both partners. This is due to the fact that, in some households (N = 38), the member of the couple identified as the household head changed during the observation period and could be either the male or female partner. The correlation within couples between partners' TDP is approximately 0.7. We are aware that the number of observations is very low, yet, for these couples at least, the partners' TDP appear to be highly similar, which thereby confirms findings from previous studies.

[9] According to the golden-mean model (see Jansen and Liefbroer 2006), both partners have equal power in the negotiations surrounding childbearing decisions. If we consider the extreme cases, in which household heads tend to systematically be the most or least patient partners, we would expect to observe a more limited variability in the distribution of the TDP variable under this model. Therefore, our analyses would offer a conservative test of the relationship between TDP and fertility. According to the power-rule model (e.g., McDonald 1980; Sorenson 1989), bargaining power related to fertility decisions is unequally distributed among

After the description of the hypothetical situation, the respondent is given a series of questions about the percentage he or she would be willing to give up. More precisely, household heads are asked the following question (see Supplementary Material, Section 1 for a more detailed description of the question):

> Q. "Imagine receiving an unexpected inheritance (or lottery) equal to the amount of income that your family earns in a year. Now, imagine that the inheritance/lottery is only available after one year. Would you be willing to sacrifice 10% of that amount to have immediate access to the remaining 90%?
>
> - yes: go to question Qa
> - no: go to question Qb
>
> Qa. Would you sacrifice 20%?
>
> - yes
> - no
>
> Qb. Would you sacrifice 5%?
>
> - yes
> - no: go to question Qc
>
> Qc. Would you sacrifice 2%?
>
> - yes
> - no"

The maximum percentage of sacrificed inheritance/lottery represents a measure of TDP (note: 0 is given if the respondent is not willing to sacrifice any money to anticipate the benefit). The corresponding indicator operationalises TDP as the rate at which the head of the household discounts future utility. The considered rates are slightly inconsistent across the waves (see Supplementary Material, Section 1 for the exact rates used in the different waves). In order to harmonise the answers to the TDP questions across the years, we construct five thresholds: 0%, 2%, 5%, 10%, and 20%. We transform these values into discount rates (Samuelson 1937), thus dividing the percentage given up in order to obtain the money immediately by 1 minus that percentage; following this formula, the discount rate of 20% is 0.25 given that $[0.2 / (1 – 0.2)] = 0.25$. Computing the discount rate, we generate our explanatory variable that represents a numerical measure (that can assume values between 0 to 0.25) of the degree to which respondents prefer a bigger economic reward in the future but a smaller in the present (in this case the variable takes lower values) or prefer a smaller reward in the future but a higher reward

partners. In the SHIW survey, the household head is the person most knowledgeable, or in charge, of household finances (often the male partner). The partner with greater access to information or resources that are partly precluded to the other may have a stronger influence over the couple's decision-making processes, such as deciding to have a(n additional) child. In this case, the analyses would overlap the results presented in the text. Notice also that each partner might exert a veto in fertility decisions (Doepke and Kindermann 2019).

in the present (in this case the variable takes on higher values). Giving our intention to interact this variable with others in order to test the moderating effect, we centre it on the sample mean – thus its mean becomes 0. The missing values are less than 7% and are homogenously distributed across our sample.

We find that, as expected, this measure is relatively stable over time (see Supplementary Material, Section 2). As a consequence, we treat this variable as time constant within our observation period. In cases where more than one answer is given, we compute the measure of impatience taking the average value of the answers given across the waves.

Control variables include standard variables in fertility studies (e.g., Hill and Johnson 2004): the female partner's age (and its square), the male partner's age, and the gender of the household head (0 = male, 1 = female). We also include both partners' level of education. We use the International Standard Classification of Education (ISCED), distinguishing three categories: lower secondary education or less ('low'; ISCED 0, 1, and 2), upper secondary education or postsecondary non-tertiary education ('medium'; ISCED 3 and 4), and tertiary education ('high'; ISCED 5 and 6). Other observable characteristics that we control for in our model are the equalised family net income (excluding financial assets) and social origins. The latter is operationalised with the educational level of the head of the household's father categorised into three levels: 1 ('low'; ISCED 0, 1, and 2), 2 ('medium'; ISCED 3 and 4), and 3 ('high'; ISCED 5 and 6); note that about 3.5% of the respondents do not report the father's education. We also add a control for the head of the household's occupational status at the moment of the interview. The variable takes value 1 if, at the moment of the interview, he or she was self-employed or an employer and otherwise takes value 0.

Another two variables that capture the household's economic conditions are included in the model as controls. The first is self-reported credit rejection. The survey reports whether the family did not ask for credit for fear of being rejected. The exact question addressed to the household head is the following: "During the previous year did you or another member of your household consider the possibility of applying to a bank or a financial company for a loan or a mortgage but then changed your mind thinking that the application would be rejected?" Households with perceived credit constraints are those who respond yes to this question. In this case the variable credit rejection takes on value 1, and 0 otherwise. The second variable is a more explicit indicator of liquidity constraints given that the survey asks whether a credit request has been rejected: "[In the case the household applied to a bank or a financial company for a loan or a mortgage], was the application granted in full, in part, or rejected?" Households with objective liquidity constraints were those who respond "in part" or "rejected" to this question. Thus, the variable takes on value 1 in this case, otherwise 0. As a robustness check, we control for additional measures of economic conditions that capture not only the stock but also

the flow in the household's economic circumstances. Results are reported in Section 6.1, "Additional issues and robustness checks."

Additionally, in the model where the dependent variable is 'having or not the second child' we control for the age of the first child (losing about 7% of the sample). Finally, we control for time period (years fixed effects) and for the region of residence of the respondent (regions fixed effects). All the control variables are lagged, that is, measured in the wave preceding the measurement of the outcome. Our final samples for the transition to the first child and to the second child are, respectively, N = 760 and N = 1,284.

For the first outcome (having/not the first child), the categorical variable takes value 1 (17.59%) in case of the transition to the first child during the observation period, value 0 if not (82.41%). For the second outcome (having or not the second child), the dummy variable takes value 1 in case of transition to the second child during the observation period (15.25%), and value 0 otherwise (84.75%).

We analyse the probability for each fertility outcome using logistic panel regression models, that are extremely flexible in terms of model specification (Greene 2003). We cluster the standard errors around the household unit. More specifically, we estimate separate panel logistic regression models for the probability of having the first and second child between two waves. In the first case, only childless respondents are considered until they have the first child or until the end of the observation period. In the second case, respondents with one child enter the sample and are considered until they have their second child or until the end of the observation period. We consider models with only the linear term of our explanatory variable (TDP) and models including also the squared term in order to test for potential nonlinear associations between impatience and fertility outcomes. To examine the moderating role of age and education, we run models interacting, in turn, female age groups and female education with our TDP measure. We consider two age groups (based on female partner's age): 18 to 31 and 32 to 45. As for education, we consider three groups based on the educational attainment of the female partner: low, medium, and high (see above).

The first row of Table 1 summarises the explanatory variable for each sample. The mean is always 0 given that we have centred the variable within each sample. In the rest of Table 1, we report summary statistics for the other independent variables.

Table 1: Descriptive statistics

	Transition to 1st child		Transition to 2nd child	
	Mean	St. Dev.	Mean	St. Dev.
Time discounting rate (TDP) (impatience)	0	6.05	0	6.21
Age of female partner	33.18	5.28	35.66	5.28
Age of male partner	36.16	5.95	39.03	5.83
Equivalised income	22095	15733	17559	10324
Female partner's education				
Low	33.73		45.68	
Medium	43.57		42.00	
High	22.70		12.32	
Male partner's education				
Low	41.47		51.87	
Medium	4.29		38.04	
High	18.24		1.09	
Sex of the respondent				
Male	70.87		71.04	
Female	29.13		28.96	
Credit rejected				
Yes	1.57		1.87	
No	98.43		98.13	
Liquidity constrains				
Yes	1.97		2.38	
No	98.03		97.62	
Employment status				
Self-employed	11.55		11.60	
Not Self-employed	88.45		88.40	
Education of the hh's father				
Low	43.18		55.91	
Medium	52.49		39.70	
High	4.33		4.39	
N	760		1284	

Notes: 'hh' means 'head of the household.' Descriptive statistics for region and year are reported in the Supplementary Material Table S-1.

6. Empirical results

In Tables 2 and 3 we present results from the logistic regression models. The reported estimates represent the log-odds and standard errors of each regressor on the probability to have the first (Table 2) or the second (Table 3) child during the observation period. We consider four alternative specifications of the model for the first and second (or higher) parity progressions.

We start with Model 1. We include here the variable impatience and its square, and we control for the sociodemographic backward variables (i.e., factors measuring current and past conditions, such as the male partner's age, male partner's education, sex of the respondent, year fixed effects, and regional fixed effects). In Model 1 (Tables 2 and 3) the coefficient of the squared term of the TDP is negative and statistically significant for all outcomes (at the 1% level for the first birth and at 10% for the second birth), pointing to a quadratic relationship between impatience and fertility. In Model 2 (Tables 2 and 3) we also control for credit rejection and liquidity constraints, equivalised income, self-employed status, and the education of the head of the household's father.

Table 2: Summary of estimates from logistic regressions analysis for variables predicting the transition to the first child

	(M1)		(M2)		(M3)		(M4)	
	Coef.	St. err.	Coef.	St. err.	Coef.	St. err.	Coef.	St. err.
TDP	0.078***	0.026	0.075***	0.030	0.105**	0.046	0.152***	0.050
TDP squared	–0.008***	0.002	–0.009***	0.000	–0.016***	0.005	–0.016***	0.004
Age of woman	1.556***	0.294	1.571***	0.290			1.605***	0.289
Age of woman squared	–0.022***	0.004	–0.022***	0.001			–.022***	0.004
Woman education. Ref: primary								
Secondary education	0.148	0.235	0.267	0.254	0.246	0.235	0.033	0.282
Tertiary education	0.117	0.293	0.311	0.321	0.429	0.307	–0.154	0.368
Age category: Ref: 18–31								
Older than 31					0.596*	0.311		
Older than 31 × TDP					–0.057	0.058		
Older than 31 × TDP squared					0.009*	0.006		
Woman secondary education × TDP							–0.094	0.065
Woman tertiary education × TDP							–0.142*	0.073
Woman secondary education × TDP squared							0.007	0.005
Woman tertiary education × TDP squared							0.015***	0.005
Constant	–24.971		–25.251		–25.982		–25.721	
N	760		760		760		760	

Notes: Controls in M1, M2, M3, and M4 are male partner's age, male partner's education, sex of the respondent, year fixed effects, and regional fixed effects. In Model M2, M3, and M4, controls are also credit rejection and liquidity constraints, equivalised income, self-employed status, and father's education of the head of the household. Coef.=Coefficient. St. err.= Robust standard error. * p<.1, ** p<.05, *** p<.01.

We find that for all specifications and for all three outcomes the coefficient of the squared term of the TDP remains negative and statistically significant. Thus, our findings show an inverse U-shaped association between impatience and progressions probability.[10]

Table 3: Summary of estimates from logistic regressions analysis for variables predicting the transition to the second child

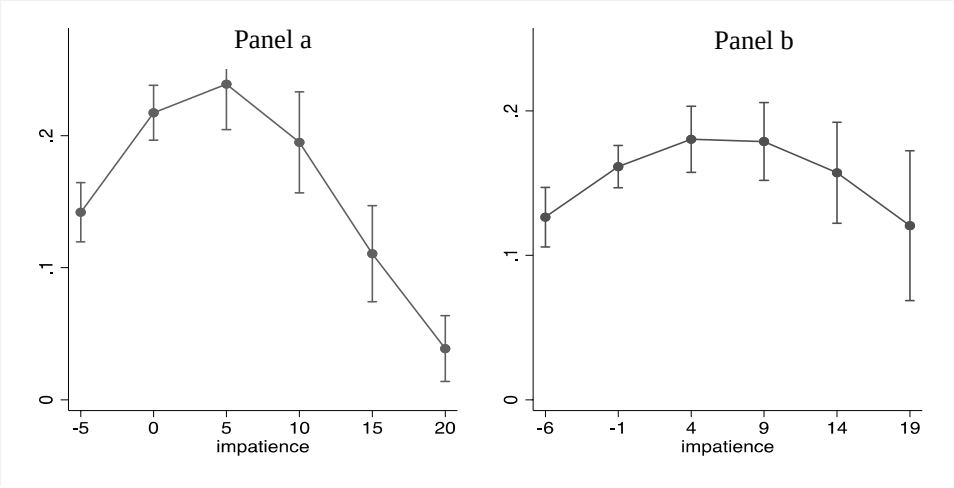
	(M1)		(M2)		(M3)		(M4)	
	Coef.	St. err.	Coef.	St. err.	Coef.	St. err.	Coef.	St. err.
TDP	0.040*	0.021	0.042**	0.021	0.056*	0.033	0.078**	0.037
TDP squared	–0.000*	0.000	–0.000*	0.000	–0.003	0.003	–0.004	0.003
Age of woman	0.991***	0.242	0.981***	0.242			1.043***	0.244
Age of woman squared	–0.020***	0.000	–0.022***	0.000			–0.018***	0.004
Woman education. Ref: primary								
Secondary education	0.041*	0.021	0.041**	0.021	0.220	0.197	0.031	0.244
Tertiary education	–0.001*	0.000	–0.000*	0.000	0.882***	0.282	0.801**	0.343
Age category: Ref: 18–31								
Older than 31					–0.317	0.287		
Older than 31 × TDP					–0.025	0.044		
Older than 31 × TDP squared					0.003	0.004		
Woman secondary education × TDP							–0.023	–0.049
Woman tertiary education × TDP							–0.125**	–0.057**
Woman secondary education × TDP squared							–0.002	–0.004
Woman tertiary education × TDP squared							0.004	0.005
Constant	–14.951		–15.242		–15.361		–16.173	
N	1,284		1,284		1,284		1,284	

In order to ease the interpretation of the estimates presented previously (Model 2 of Tables 2 and 3), we plot them in terms of predicted probabilities (Figure 1). The confidence intervals for pair-wise comparisons (5% significance level) are also reported. These intervals are centred on the predictions and have lengths equal to 2 × 1.39 × standard errors. This is necessary in order to have an average level of 5% for Type I error in pair-wise comparisons of a group of means in pair-wise comparisons (Goldstein and Healy 1995). Panel a of Figure 1 illustrates that TDP are not linearly associated with the likelihood of the transition to first child. The relationship follows a clear, well-defined inverse U shape. In fact, Figure 1, Panel a shows that an increase in impatience from its minimum value to its average is associated with an increase in the likelihood of having a first child from approximately 14% to 24% (i.e., a 71% increase); the change in the level

[10] Similar results are obtained when the outcome variable considered is the transition to an additional child (estimates available upon request).

of impatience from the average value to the maximum corresponds to a decrease of roughly 20 percentage points (from 24% to 4%) in the likelihood of having the first child (i.e., the middle impatience group shows a predicted probability of having the first child that is approximately six times that of the most impatient individuals).

Figure 1: Predicted probabilities (y axis) with confidence intervals for pair-wise comparisons (5% significance level) of the transition to the first and second child according to the level of impatience



Note: Predicted probabilities calculated from Model 2 in Tables 2 and 3.

A similar inverted U-shaped association is observed for the second birth (Figure 1, Panel b). However, in this case the relationship is less salient. Moving from the minimum to the mean level of impatience we observe an increase of about 5 percentage points (from 12% to 17%). Going, instead, from the mean to the maximum level of impatience, the predicted probability of having a second child decreases by about 6 percentage points (reaching 11%).

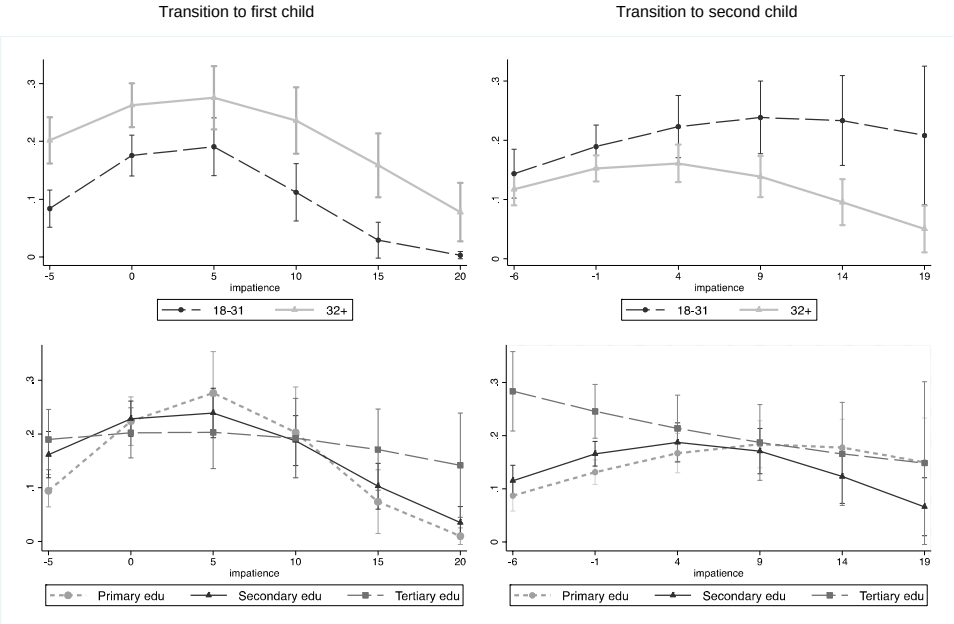
The probability to have a(n additional) child is lowest for very low and very high degrees of impatience. This is true especially in the case of the transition to the first child, and, to a lesser extent, also for the probability of a second birth. Patient individuals, who are strongly focussed on future gratifications or, on the contrary, impatient decision makers that highly discount future utilities, are less likely to become parents, and if they do become parents, they are less likely to progress to having a second child. This finding is supported also when the explanatory variable is categorised in five thresholds that

represent the percentage the respondent would be willing to give up. As reported in the Supplementary Material (Table S-2) results do not change when this model specification is implemented.

We now turn to moderation tests. We tested whether TDP are moderated by age and education in models M3 and M4 (Tables 2 and 3), which include interactions between impatience and, respectively, age (categorised) and education. Results are displayed, graphically, in Figure 2. The two graphs at the top of Figure 2 show that in the case of the transition to the first birth, the shape of the association for young female partners is more delineated than for their older counterparts, which is flatter. The gap in the predicted probabilities of having the first birth between the medium-impatience and lowest-impatience groups amounts to 10 and 6 percentage points for the younger and older individuals, respectively. Similarly, the gap between the medium-impatience and highest-impatience groups equals 17 and 14 points for the younger and older individuals, respectively. Given that younger women have a longer reproductive life ahead of them, their preferences seem to exert a stronger effect. In the case of the transition to the second child, however, we do not observe clear divergent paths.

The two graphs at the bottom of Figure 2 show the moderating role of education. In couples with low educated woman, the estimates show a clear inverse U shape. For the low educated group, the predicted probability of having a first child varies from a level of 10% to about 26% moving from the lowest to average values of impatience. After this peak the trend reverses and becomes negative, reaching a very low level for the maximum value of impatience. In the case of the other educational groups, the trend is not so well defined, especially for the transition to the second child.

Figure 2: Predicted probabilities (y axis) with confidence intervals for pair-wise comparisons (5% significance level) of the transition to the first and to second child according to the level of impatience by age groups (first row) and by educational groups (second row)



Note: Predicted probabilities calculated from Models 3 and 4 in Tables 2 and 3.

We report the results of several robustness checks in the Supplementary Material. First, as already mentioned, in Table S-2 we report results categorising the explanatory variable in five categories that represent the five thresholds of TDP. As also reported in Figure S-1, we observe again an inverted U-shaped association.

Second, we performed an analysis adding to our model a variable that identifies the primary earner within the couple. The reasoning here is that, resembling the power-rule theories (e.g., McDonald 1980; Sorenson 1989), we sought to control for a factor likely associated with being the head of the household and, accordingly, to TDP. We also ran models by the gender of the household head. The results (reported in Tables S-3 and S-4 of the Supplementary Material) do not differ from those of the main model.[11]

[11] This was further confirmed by the two-sample Wilcoxon rank-sum (Mann-Whitney) test that failed to reject the null hypothesis that there is no difference between the TDP of the main earners and the TDP of partners.

Third, in order to capture stock and flow of economic conditions in detail, we included controls for household wealth, average household income over the observation period, percentage change in the equivalised income between each wave, *t*, the preceding wave, *t–1* (using the formula: $\frac{(Y_{it}-Y_{it-1})}{(Y_{it}-Y_{it-1})/2} \times 100$), and the quartile of the standard deviation of the change in equivalised income (if in the first, second, third, or fourth). A measure of the time persistency in the lower quartile of the distribution of the equivalised income operationalised as the percentage of years in the first quartile of the (equivalised) income distribution was also added as a control. The results for the transition to first and second child are reported in Tables S-5 and S-6, respectively, of the Supplementary Material. We can observe that adding the listed variables changes neither the magnitude of the coefficients nor the statistical significance of the results.

Finally, we added, as a control, a proxy of risk aversion. Following Aassve, Le Moglie, and Mencarini (2020), we constructed a proxy of risk aversion based on the following question (reported in the 2004, 2008, 2010, and 2012 questionnaires and asked to the household heads): "In managing your financial investments, would you say you have a preference for investments that offer

1) very high returns, but with a high risk of losing part of the capital
2) a good return, but also a fair degree of protection for the invested capital
3) a fair return, with a good degree of protection for the invested capital
4) low returns, with no risk of losing the invested capital?"

First, we created a variable that takes the corresponding value of the respondents' answers (and the means of the values in the case of multiple responses). Second, we created a categorical variable based on the four quartiles of the continuous variable's distribution. As shown, controlling for a continuous proxy of risk aversion (Table S-7 in the Supplementary Material) and for its categorical equivalent (Table S-8 in the Supplementary Material) does not alter the results reported in the main text (see Bellani and Arpino 2021, for a detailed study on risk aversion and fertility in Italy).

7. Conclusion and discussion

This article has introduced theoretical arguments about the role of time discounting preferences for fertility and has tested this relationship, distinguishing by parity and considering the moderating role of the female partner's age and education. Personal orientations are at the core of fertility decisions (Aassve et al. 2015) and have become more and more important determinants over time (Jokela 2012). We believe that

individual preferences play a major role in fertility decisions. In particular, we argue that expectations and future prospects (i.e., 'forward-looking' orientation) play a crucial role in defining fertility careers. We have explored whether an individual trait that drives preferences about the future, namely time discounting preferences, is associated with fertility outcomes.

We used unique data from a nationally representative survey from Italy, the Survey on Household Income and Wealth (SHIW). By estimating logistic regression models, we found that there is an inverse U-shaped relationship between the degree of TDP and childbearing. In particular, very patient individuals and those very impatient have a considerably lower probability of having a first and second child, as compared to individuals with average discounting rates. The association is particularly strong for the probability of having a first child.

Our findings suggest that *in medio stat filius*, that is, we observe a higher likelihood of having children when TDP are neither too low nor too high. On the one hand, we found that strong preferences for future but higher benefits are associated with lower likelihood of having a(n additional) child. One possible interpretation is that very patient individuals, weighing the economic security and emotional investment children need in the long run, make more effort to 'settle down,' searching for a good job, a good income, and a good partner (Wilson and Daly 2004). Only when these conditions are satisfied do they feel ready to achieve their fertility plans. In this sense, very low time discounting preferences influence individuals who hold them to follow a specific sequence of life events in order to have a child (Francesconi and Heckman 2016). The risk is, however, to be not able to achieve such ideal conditions, thus forgoing parenthood (or reducing fertility levels). Moreover, Borghans et al. (2008) show that time preferences are linked to a high level of conscientiousness that, in turn, is associated with self-control and self-discipline. It follows that very patient individuals constantly monitor themselves and regulate their behaviour in line with their own goals and self-imposed standards. The persistent tendency to inhibit emotion in order to build a high-quality career in the labour market and/or marriage-market could induce very patient people to delay childbearing for too long. Waiting too long lowers, of course, the chances of having a(n additional) child (e.g., due to supervening infecundity).

On the other hand, we found that also a too high level of impatience is associated with lower likelihood of having a(n additional) child. One could also argue that very impatient individuals perceive childbearing as a choice that, in the near future, is more costly than beneficial. One possible interpretation is that they weigh immediate costs associated with childbearing, and resulting loss of possibilities for other activities, more than short-run benefits. The expected decrease in economic well-being, the intensive supervision of children envisaged, and the potential reduction of sleeping hours represent some of the short-run costs of childbearing that very impatient individuals might consider

a very large concern. Moreover, they might want to avoid the loss of payoffs associated with current-benefit activities (as opposed to delayed-benefit activities) that are seen as incompatible with childrearing. For instance, they might not be willing to give up to certain leisure practices characterised by immediate but small reward, such as excessive drinking, gambling, cheating, and less contraceptive vigilance – given that they give high value to what happens in the present (Spivey 2010). Moreover, as argued by De Paola and Gioia (2017), impatient individuals, more set on immediate fulfilment, are less likely to invest time in searching for a well-matched partner and may end up, as a result, with a worse match. The quality of the partnership will, in turn, negatively affect the likelihood of having a(nother) child, also given the potential higher degree of partnership instability. We convey that these valid considerations are beyond the scope of a standard expected utility framework, given that TDP have been identified as a direct stimulus for certain behavioural choices (e.g., Chesson et al. 2006) – even if its direct influence is likely minimal in the Italian context, where childbearing is the result of deliberate and carefully planned decisions (De Rose and Dalla Zuanna 2013).

Our analyses also demonstrate that the (nonlinear) association between TDP and fertility is particularly evident for couples composed of young and low educated female partners. These results are consistent with the idea that the greater availability of time for reproduction that younger women have ahead may facilitate the expression of certain inclinations for time discounting rates. The stronger effect of TDP for couples with low educated women is also consistent with an explanation based on a future window of reproductive opportunity. Given that, in the Italian context, it is uncommon to have a child while studying, the time window for becoming a parent is smaller for higher educated individuals. Conditional on having reached educational and career goals, the effect of impatience on childbearing appears to be small.

The study is not without limitations. First, though we used rich panel data, including a measure of TDP that is unusual in surveys typically employed for fertility research, our data did not allow us to directly test mechanisms behind the relationship found between TDP and fertility. Hopefully, this study will stimulate the inclusion of TDP in other longitudinal datasets permitting a better understanding of the effects of this important personal trait. Second, the TDP measure was available only in few waves, and because of the rotating nature of the panel data we used, the overall number of observations per couple was limited. Thus, it was not possible to use more sophisticated approaches (e.g., dynamic panel data models). However, psychological and economic studies have found personality to be stable during adulthood (e.g., Cobb-Clark and Schurer 2012); this was also suggested by our data. Third, information about the duration of the relationship is not available in our data. However, controlling for both partners' age profiles should limit the impact of the failure to include information about relationship duration. Fourth, we do not distinguish between the ways in which TDP are associated with fertility indirectly

through union formation and directly within unions. A simultaneous consideration of patterns of union formation and parenthood in relation to TDP would be an interesting avenue for future research. Finally, we are aware that our data may be limited by the absence of the information about both members' TDP. Although this might represent a concern for our findings, as we have explained above, there is a growing agreement in the literature about the frequency of couple homogamy (also) in terms of TDP. In parallel, future studies should capitalise on the availability of richer data about both partners' perceived costs and benefits in the short and long term of having a(n additional) child (as in Liefbroer 2005). This would be an interesting avenue for future research.

It would also be intriguing to extend this leading study to other contexts characterised by different orientations towards the use of contraceptive methods and fertility planning. As the literature shows, TDP is associated with younger age at first birth, number of pregnancy scares, and teenage childbearing (e.g., Chesson et al. 2006; Golsteyn, Grönqvist, and Lindahl 2014). This could be explained by impatient individuals' tendency to rapidly and systematically devalue delayed sex, preferring instead the immediate rewards of unprotected sex (e.g., Jarmolowicz, Bickel, and Gatchalian 2013). Further research is needed in order to assess whether TDP play a major role in those societies where contraceptive methods are less widespread – as in the United States or the United Kingdom.

Despite the limitations outlined here, this article offers an original perspective on an overlooked determinant of fertility. We provided theoretical arguments justifying the important role of forward-looking factors in fertility decisions. In a context in which (bounded) rational calculations of opportunities and constraints concerning fertility decisions are carefully managed, like Italy, forward-looking factors become important drivers for directing individual action. Our analyses show that TDP represent a crucial individuals' predisposition that affect fertility behaviour, which is an intertemporal decision taken with uncertainty about future costs and benefits and other future events. For Italy, where individuals carefully plan their reproductive decisions, forward factors seem to play a key role especially in the transition to the first child. We conclude that regardless of backward factors, the orientation towards the future represents a potential determinant of fertility behaviour. Not only TDP, but also subjective interpretations regarding the future, as well as the self-representation of forthcoming circumstances (e.g., beliefs about the evolution of the COVID-19 pandemic), may be key to better understanding contemporary fertility decision-making processes.

8. Acknowledgements

The authors are also thankful to the colleagues from the Unit of Population and Society (UPS) of the University of Florence for their comments on a preliminary version of this research. The authors acknowledge the financial support provided by: (1) the European Union's Horizon 2020 research and innovation programme / ERC Consolidator Grant Agreement No 725961 (EU-FER project) "Economic Uncertainty and Fertility in Europe" (PI: Daniele Vignoli) and (2) the Italian Ministry of University and Research / FARE grant "Narratives" (PI: Daniele Vignoli).

References

Aassve, A., Arpino, B., and Balbo, N. (2016). It takes two to tango: Couples' happiness and childbearing. *European Journal of Population* 32(3): 339–354. doi:10.1007/s10680-016-9385-1.

Aassve, A., Le Moglie, M., and Mencarini, L. (2020). Trust and fertility in uncertain times. *Population Studies* 75(1): 19–36. doi:10.1080/00324728.2020.1742927.

Aassve, A., Mencarini, L., and Sironi, M. (2015). Institutional change, happiness, and fertility. *European Sociological Review* 31(6): 749–765.

Ajzen, I. and Klobas, J. (2013). Fertility intentions: An approach based on the theory of planned behavior. *Demographic Research* 29(8): 203–232. doi:10.4054/DemRes.2013.29.8.

Albertini, M. and Kohli, M. (2013). The generational contract in the family: An analysis of transfer regimes in Europe. *European Sociological Review* 29(4): 828–840. doi:10.1093/esr/jcs061.

Albertini, M., Gähler, M., and Härkönen, J. (2018). Moving back to "mamma"? Divorce, intergenerational coresidence, and latent family solidarity in Sweden. *Population, Space and Place* 24(6): e2142. doi:10.1002/psp.2142.

Arpino, B., Luppi, F., and Rosina, A. (2021). Changes in fertility plans during the COVID-19 pandemic in Italy: the role of occupation and income vulnerability. [electronic resource]. SocArXiv. doi:10.31235/osf.io/4sjvm.

Arrondel, L. and Frémeaux, N. (2016). 'For richer, for poorer': Assortative mating and savings preferences. *Economica* 83(331): 518–543. doi:10.1111/ecca.12176.

Balbo, N. and Arpino, B. (2016). The role of family orientations in shaping the effect of fertility on subjective well-being: A propensity score matching approach. *Demography* 53(4): 955–978. doi:10.1007/s13524-016-0480-z.

Barro, R.J. and Becker, G.S. (1989). Fertility choice in a model of economic growth. *Econometrica: journal of the Econometric Society* 57(2): 481–501. doi:10.2307/1912563.

Bauer, G. and Kneip, T. (2013). Fertility from a couple perspective: A test of competing decision rules on proceptive behaviour. *European Sociological Review* 29(3): 535–548. doi:10.1093/esr/jcr095.

Bauer, G. and Kneip, T. (2014). Dyadic fertility decisions in a life course perspective. *Advances in Life Course Research* 21: 87–100. doi:10.1016/j.alcr.2013.11.003.

Becker, G.S. (1974). A theory of social interactions. *Journal of Political Economy* 82(6): 1063–1093. doi:10.3386/w0042.

Bellani, D. (2020). The institutional and cultural framing of the educational stratification in fertility. A review of the role of labor market institutions and attitudinal orientations. *Research in Social Stratification and Mobility* 66: 100482. doi:10.1016/j.rssm.2020.100482.

Bellani, D. and Arpino, B. (2021). Risk aversion and fertility. Evidence from a lottery question in Italy. Florence: 79. Department of Statistics, Computer Science, Applications "G. Parenti" (DiSIA), University of Florence: (Working Paper DISIA No. 2021/02).

Bernardi, L., Huinink, J. and Settersten, R.A. (2019). The life course cube: A tool for studying lives. *Advances in Life Course Research* 41: 100258. doi:10.1016/j.alcr.2018.11.004.

Billari, F.C. and Galasso, V. (2009). What explains fertility? Evidence from Italian pension reforms. Naples: Centre for Studies in Economics and Finance (CSEF), University of Naples, Italy. (CSEF Working Paper 209).

Billari, F.C. and Tabellini, G. (2010). Italians are late: Does it matter? In: Shoven, J.B. (ed.). *Demography and the economy*. NBER Books. Chicago: University of Chicago Press.

Borghans, L., Duckworth, A.L., Heckman, J.J., and Ter Weel, B. (2008). The economics and psychology of personality traits. *Journal of Human Resources* 43(4): 972–1059. doi:10.3386/w13810.

Breen, R., van de Werfhorst, H.G., and Jæger, M.M. (2014). Deciding under doubt: A theory of risk aversion, time discounting preferences, and educational decision-making. *European Sociological Review* 30(2): 258–270. doi:10.1093/esr/jcu039.

Caltabiano, M., Comolli, C.L., and Rosina, A. (2017). The effect of the Great Recession on permanent childlessness in Italy. *Demographic Research* 37(20): 635–668. doi:10.4054/DemRes.2017.37.20.

Cantalini, S. (2017). Does education affect the timing or probability of family formation? An analysis of educational attainment and first union in Italy. *Research in Social Stratification and Mobility* 49: 1–10. doi:10.1016/j.rssm.2017.03.002.

Castiglioni, M., Dalla Zuanna, G., and Loghi, M. (2001). Planned and unplanned births and conceptions in Italy, 1970–1995. *European Journal of Population* 17(3): 207–233. doi:10.1023/A:1011810602552.

Chesson, H.W., Leichliter, J.S., Zimet, G.D., Rosenthal, S.L., Bernstein, D.I., and Fife, K.H. (2006). Discount rates and risky sexual behaviors among teenagers and young adults. *Journal of Risk and Uncertainty* 32(3): 217–230. doi:10.1007/s11166-006-9520-1.

Cigno, A. and Rosati, F.C. (1992). The effects of financial markets and social security on saving and fertility behaviour in Italy. *Journal of Population Economics* 5(4): 319–341. doi:10.1007/BF00163064.

Cobb-Clark, D.A. and Schurer, S. (2012). The stability of big-five personality traits. *Economics Letters* 115(1): 11–15. doi:10.1016/j.econlet.2011.11.015.

Craig, L. and Bittman, M. (2008). The incremental time costs of children: An analysis of children's impact on adult time use in Australia. *Feminist Economics* 14(2): 59–88. doi:10.1080/13545700701880999.

Craig, L., Powell, A., and Smyth, C. (2014). Towards intensive parenting? Changes in the composition and determinants of mothers' and fathers' time with children 1992–2006. *The British Journal of Sociology* 65(3): 555–579. doi:10.1111/1468-4446.12035.

Dalla Zuanna, G. (2001). The banquet of Aeolus: A familistic interpretation of Italy's lowest low fertility. *Demographic Research* 4(5): 133–162. doi:10.4054/DemRes.2001.4.5.

Dalla Zuanna, G., Gavini, S., and Spinelli, A. (1998). The effect of changing sexual, marital and contraceptive behaviour on conceptions, abortions, and births. *European Journal of Population/Revue européenne de démographie* 14(1): 61–88. doi:10.1023/A:1006000814951.

Dalla Zuanna, G., De Rose, A., and Racioppi, F. (2005). Low fertility and limited diffusion of modern contraception in Italy during the second half of the twentieth century. *Journal of Population Research* 22(1): 21–47. doi:10.1007/BF03031802.

Dalla Zuanna, G. and Micheli, G.A. (2006). *Strong family and low fertility: A paradox? New perspectives in interpreting contemporary family and reproductive behaviour*. Dordrecht: Kluwer. Springer Science and Business Media.

De Paola, M. and Gioia, F. (2017). Does patience matter in marriage stability? Some evidence from Italy. *Review of Economics of the Household* 15(2): 549–577. doi:10.1007/s11150-014-9275-4.

De Rose, A. and Dalla Zuanna, G. (eds.) (2013). *Rapporto sulla popolazione: Sessualità e riproduzione nell'Italia contemporanea* [Report on population: Sexuality and reproduction health in contemporary Italy]. Bologna: Il Mulino.

De Rose, A., Racioppi, F., and Zanatta, A.L. (2008). Italy: Delayed adaptation of social institutions to changes in family behavior. *Demographic Research* 19(19): 665–704. doi:10.4054/DemRes.2008.19.19.

Dommermuth, L., Klobas, J., and Lappegård, T. (2015). Realization of fertility intentions by different time frames. *Advances in Life Course Research* 24: 34–46. doi:10.1016/j.alcr.2015.02.001.

Dykstra, P.A. and Fokkema, T. (2011). Relationships between parents and their adult children: A West European typology of late-life families. *Ageing and Society* 31(4): 545–569. doi:10.1017/S0144686X10001108.

Doepke, M. and Kindermann, F. (2019). Bargaining over babies: Theory, evidence, and policy implications. *American Economic Review* 109(9): 3264–3306. doi:10.1257/aer.20160328.

Folbre, N. (2008). *Valuing children: Rethinking the economics of the family*. Cambridge: Harvard University Press. doi:10.2307/j.ctvjnrt57.

Francesconi, M. and Heckman, J.J. (2016). Child development and parental investment: Introduction. *The Economic Journal* 126(596): 1–27. doi:10.1111/ecoj.12388.

Frederick, S., Loewenstein, G., and O'Donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of Economic Literature* 40(2): 351–401. doi:10.1257/jel.40.2.351.

Friedman, D., Hechter, M., and Kanazawa, S. (1994). A theory of the value of children. *Demography* 31(3): 375–401. doi:10.2307/2061749.

Galasso, V., Gatti, R., and Profeta, P. (2009). Investing for the old age: Pensions, children and savings. *International Tax and Public Finance* 16(4): 538–559. doi:10.1007/s10797-009-9104-5.

Gnagey, M., Grijalva, T., and Rong, R. (2020). Spousal influence and assortative mating on time preferences: A field experiment in the USA. *Review of Economics of the Household* 18(2): 461–512. doi:10.1007/s11150-019-09466-x.

Goldstein, H. and Healy, M.J.R. (1995). The graphical presentation of a collection of means. *Journal of the Royal Statistical Society A* 158(1): 175–177. doi:10.2307/2983411.

Golsteyn, B.H., Grönqvist, H., and Lindahl, L. (2014). Adolescent time preferences predict lifetime outcomes. *The Economic Journal* 124(580): 739–761. doi:10.1111/ecoj.12095.

Greene, W.H. (2003). *Econometric analysis*. Trenton: Pearson Education.

Gribaldo, A., Judd, M.D., and Kertzer, D.I. (2009). An imperfect contraceptive society: Fertility and contraception in Italy. *Population and Development Review* 35(3): 551–584. doi:10.1111/j.1728-4457.2009.00296.x.

Grundy, E. and Read, S. (2012). Social contacts and receipt of help among older people in England: are there benefits of having more children? *Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 67(6): 742–754. doi:10.1093/geronb/gbs082.

Heaton, T.B. (1990). Marital stability throughout the child-rearing years. *Demography* 27(1): 55–63. doi:10.2307/2061552.

Henz, U. (2008). Gender roles and values of children: Childless couples in East and West Germany. *Demographic Research* 19(39): 1451–1500. doi:10.4054/DemRes.2008.19.39.

Hill, M.S. (1988). Marital stability and spouses' shared time: A multidisciplinary hypothesis. *Journal of Family Issues* 9(4): 427–451. doi:10.1177/019251388009004001.

Hill, L.E. and Johnson, H.P. (2004). Fertility changes among immigrants: Generations, neighborhoods, and personal characteristics. *Social Science Quarterly* 85(3): 811–827. doi:10.1111/j.0038-4941.2004.00246.x.

Hoerl, C. and McCormack, T. (2015). Making decisions about the future: Regret and the cognitive function of episodic memory. In: Michaelian, K., Klein, S.B., and Szpunar K. (eds.). *Seeing the future: Theoretical perspectives on future-oriented mental time travel.* Oxford: Oxford University Press: 241–266. doi:10.1093/acprof:oso/9780190241537.003.0012.

Istat (2019). Population Statistics on-line. http://www.istat.it.

Jansen, M. and Liefbroer, A.C. (2006). Couples' attitudes, childbirth, and the division of labor. *Journal of Family Issues* 27(11): 1487–1511. doi:10.1177/0192513X06291038.

Jarmolowicz, D.P., Bickel, W.K., and Gatchalian, K.M. (2013). Alcohol-dependent individuals discount sex at higher rates than controls. *Drug and Alcohol Dependence* 131(3): 320–323. doi:10.1016/j.drugalcdep.2012.12.014.

Jones, L.E., Schoonbroodt, A., and Tertilt, M. (2011). Fertility theories: Can they explain the negative fertility-income relationship? In: Shoven, J.B. (ed.). *Demography and the economy*. NBER volume. Chicago: University of Chicago Press.

Jokela, M., Alvergne, A., Pollet, T.V., and Lummaa, V. (2011). Reproductive behavior and personality traits of the Five Factor Model. *European Journal of Personality* 25(6): 487–500. doi:10.1002/per.822.

Jokela, M. (2012). Birth-cohort effects in the association between personality and fertility. *Psychological Science* 23(8): 835–841. doi:10.1177/0956797612439067.

Kreyenfeld, M., Andersson, G., and Pailhé, A. (2012). Economic uncertainty and family dynamics in Europe: Introduction. *Demographic Research* 27(28): 835–852. doi:10.4054/DemRes.2012.27.28.

Lawson, D.W. and Mace, R. (2010). Optimizing modern family size. *Human Nature* 21(1): 39–61. doi:10.1007/s12110-010-9080-6.

Liefbroer, A.C. (2005). The impact of perceived costs and rewards of childbearing on entry into parenthood: Evidence from a panel study. *European Journal of Population/Revue européenne de démographie* 21(4): 367–391. doi:10.1007/s10680-005-2610-y.

Luppi, F. (2016). When is the second one coming? The effect of couple's subjective well-being following the onset of parenthood. *European Journal of Population* 32(3): 421–444. doi:10.1007/s10680-016-9388-y.

Manacorda, M. and Moretti, E. (2006). Why do most Italian youths live with their parents? Intergenerational transfers and household structure. *Journal of the European Economic Association* 4(4): 800–829. doi:10.1162/JEEA.2006.4.4.800.

McDonald, G. (1980). Family power: The assessment of a decade of theory and research, 1970–1979. *Journal of Marriage and Family* 42(4): 841–854. doi:10.2307/351828.

Meier, S. and Sprenger, C.D. (2015). Temporal stability of time preferences. *Review of Economics and Statistics* 97(2): 273–286. doi:10.1162/REST_a_00433.

Mills, M., Rindfuss, R.R., McDonald, P., and Te Velde, E. (2011). Why do people postpone parenthood? Reasons and social policy incentives. *Human Reproduction Update* 17(6): 848–860. doi:10.1093/humupd/dmr026.

Murphy, M. and Wang, D. (2001). Family-level continuities in childbearing in low-fertility societies. *European Journal of Population/Revue européenne de démographie* 17(1): 75–96. doi:10.1023/A:1010744314362.

Nauck, B. (2007). Value of children and the framing of fertility: Results from a cross-cultural comparative survey in 10 societies. *European Sociological Review* 23(5): 615–629. doi:10.1093/esr/jcm028.

Neyer, G., Lappegård, T., and Vignoli, D. (2013). Gender equality and fertility: Which equality matters? *European Journal of Population* 29(3): 245–272. doi:10.1007/s10680-013-9292-7.

Nomaguchi, K.M. and Milkie, M.A. (2003). Costs and rewards of children: The effects of becoming a parent on adults' lives. *Journal of Marriage and Family* 65(2): 356–374. doi:10.1111/j.1741-3737.2003.00356.x.

Nugent, J.B. (1985). The old-age security motive for fertility. *Population and Development Review* 11(1): 75–97. doi:10.2307/1973379.

O'Donoghue, T. and Rabin, M. (1999). Doing it now or later. *American Economic Review* 89(1): 103–124. doi:10.1257/aer.89.1.103.

Ranyard, R., Crozier, W.R., and Svenson, O. (1997). *Decision making: Cognitive models and explanations*. London: Routledge

Régnier-Loilier, A. and Vignoli, D. (2011). Fertility intentions and obstacles to their realization in France and Italy. *Population-E* 66(2): 361–390. doi:10.3917/pope.1102.0361.

Rendall, M.S. and Bahchieva, R.A. (1998). An old-age security motive for fertility in the United States? *Population and Development Review* 24(2): 293–307. doi:10.2307/2807975.

Rinesi, F., Pinnelli, A., Prati, S., Castagnaro, C., and Iaccarino, C. (2011). Avoir un deuxième enfant en Italie: De l'intention à la réalisation. *Population* 66(2): 434–450. doi:10.3917/popu.1102.0434.

Samuelson, P.A. (1937). A note on measurement of utility. *The Review of Economic Studies* 4(2): 155–161. doi:10.2307/2967612.

Schoen, R., Astone, N.M., Kim, Y.J., Nathanson, C.A., and Fields, J.M. (1999). Do fertility intentions affect fertility behavior? *Journal of Marriage and the Family* 61(3): 790–799. doi:10.2307/353578.

Schulze, A. (2010). Changes in family income around the time of birth of children in Germany between 1985 and 2004. *Comparative Population Studies* 35(1). doi:10.12765/CPoS-2010-03.

Sedgh, G., Singh, S., Henshaw, S.K., and Bankole, A. (2011). Legal abortion worldwide in 2008: Levels and recent trends. *Perspectives on Sexual and Reproductive Health* 43(3): 188–198. doi:10.1363/4318811.

Sorenson, A. (1989). Husbands' and wives' characteristics and fertility decisions: A diagonal mobility model. *Demography* 26(1): 125–135. doi:10.2307/2061499.

Spivey, C. (2010). Desperation or desire? The role of risk aversion in marriage. *Economic Inquiry* 48(2): 499–516. doi:10.1111/j.1465-7295.2008.00181.x.

Tavares, L.P. (2016). Who delays childbearing? The associations between time to first birth, personality traits and education. *European Journal of Population* 32(4): 575–597. doi:10.1007/s10680-016-9393-1.

Umberson, D., Pudrovska, T., and Reczek, C. (2010). Parenthood, childlessness, and well-being: A life course perspective. *Journal of Marriage and Family* 72(3): 612–629. doi:10.1111/j.1741-3737.2010.00721.x.

Vignoli, D., Rinesi, F., and Mussino, E. (2013). A home to plan the first child? Fertility intentions and housing conditions in Italy. *Population Space and Place* 19(1): 60–71. doi:10.1002/psp.1716.

Vignoli, D., Guetto, R., Bazzani, G., Pirani, E., and Minello, A. (2020a), A reflection on economic uncertainty and fertility in Europe: the narrative framework. *Genus* 76(28): 1–27. doi:10.1186/s41118-020-00094-3.

Vignoli, D., Tocchioni, V., and Mattei, A. (2020b). The impact of job uncertainty on first-birth postponement. *Advances in Life Course Research* 45: 100343. doi:10.1016/j.alcr.2019.100308.

Wenger, G.C., Dykstra, P.A., Melkas, T., and Knipscheer, K.C. (2007). Social embeddedness and late-life parenthood: Community activity, close ties, and support networks. *Journal of Family Issues* 28(11): 1419–1456. doi:10.1177/0192513X07303895.

Wilson, M. and Daly, M. (2004). Do pretty women inspire men to discount the future? *Proceedings of the Royal Society of London. Series B: Biological Sciences* 271(4): 177–179. doi:10.1098/rsbl.2003.0134.

Supplementary material

1. SHIW key questions

We report here the questions of the SHIW questionnaires 2004, 2008, 2010, and 2012.

Questionnaire 2004

Imagine you were told you had won on the lottery the equivalent of your household's net annual income. The sum will be paid to you in a year's time. However, if you give up part of the sum you can have the rest immediately.

E09.a To get the money right away would you give up 5 percent of this sum?
- Yes ..... 1 ➔ Quest. E09.b
- No ..... 2 ➔ Quest. E09.d

E09.b Or 10 percent?
- Yes ..... 1 ➔ Quest. E09.c
- No 2

E09.c Or 20 percent?
- Yes 1
- No 2

E09.d Or 3 percent?
- Yes 1
- No ..... 2 ➔ Quest. E09.e

E09.e Or 2 percent?
- Yes 1
- No, I'd wait a year to collect the whole amount 2

In this case, we do not differentiate between 3% and 2%. Thus, respondents that answer yes to the question E09.d were assimilated to those that answer yes to E09.e.

Questionnaire 2008

R2.14. You have won the lottery and will receive a sum equal to your household's net yearly revenue. You will receive the money in a year's time. However, if you give up part of the sum you can collect the rest of your win immediately.

R2.14a. To obtain the money immediately would you give up 20 percent of your win?
- Yes 1
- No .....2 ➔ Question R2.14b

R2.14b. What about 10 percent?
- Yes 1
- No .....2 ➔ Question R2.14c

R2.14c. And 5 percent?
- Yes 1
- No .....2 ➔ Question R2.14d

R2.14d. Just 2 percent?
- Yes 1
- No 2

In this case, we do not manipulate any answers.

Questionnaire 2010

You have won the lottery and will receive a sum equal to your household's net yearly revenue. You will receive the money in a year's time. However, if you give up part of the sum you can collect the rest of your win immediately.

C33a. To obtain the money immediately would you give up 20 percent of your win?
- Yes 1
- No .....2 ➔ Question C33b

C33b. What about 10 percent?
- Yes 1
- No .....2 ➔ Question C33c

C33c. And 5 percent?
- Yes 1
- No .....2 ➔ Question C33d

C33d. And 2 percent?
- Yes 1
- No 2

In this case, we do not manipulate any answer.

Questionnaire 2012

Imagine, instead, that you would receive this inheritance only after a year. Would you give up 10 percent of it in order to have the remaining 90 percent right away?

- Yes ..... 1 ➔ Question E19a
- No ..... 2 ➔ Question E19b

E19a. What about 20 percent?
- Yes ..... 1 ➔Question E19c
- No ..... 2➔ Question E19d

E19b. What about 4 percent?
- Yes ..... 1 ➔ Question E19e
- No ..... 2➔ Question E19f

E19c. What about 30 percent?
- Yes 1
- No 2

E19d. What about 15 percent?
- Yes 1
- No 2

E19e. What about 7 percent?
- Yes 1
- No 2

E19f. What about 2 percent?
- Yes 1
- No 2

In this case, in order to harmonise these answers with those of the other waves, we assign the value of 5% to the questions E19b and E19e.

2. Stability of TDP

We did a sensitivity analysis for the stability over time within individuals of time discounting preferences.

Considering the sample of individuals that answer more than once to the question regarding their time discounting preferences, we observe that about 70% did not change consistently their response. In fact, the maximum difference between their answers in the discount rate is about 5%. Only 5% of the respondents changed consistently their answer (with a difference of about 25%). As a robustness check we excluded from the analyses these individuals and results did not change. We also constructed a dummy variable that takes value 0 if the respondent answers 0%, 2%, or 5%, while it takes value 1 if the respondent answers 10% or 20%. About 75% of the respondents answer the same (0 or 1) across waves. The intraclass correlation coefficient excluding those respondents that changed consistently their answer (N = 142) was about 0.70, meaning that the between variation explains about 70% of the variance (and only 30% is due to the within-individual variation).

3. Additional tables and figures

Table S-1: Descriptive statistics of the variables region and year, %

	Transition to first child	Transition to second child
Region	5.12	
Piedmont	1.44	8.57
Val d'Aosta	9.19	1.37
Lombardy	4.20	10.45
Trentino-Alto Adige	9.71	2.45
Veneto	5.38	8.93
Friuli Venezia Giulia	5.25	2.38
Liguria	13.91	3.24
Emilia-Romagna	7.74	10.16
Tuscany	3.94	6.05
Umbria	4.59	7.71
Marche	4.07	4.11
Lazio	2.10	5.84
Abruzzo	0.26	1.80
Molise	3.15	1.01
Campania	4.99	4.32
Puglia	3.02	5.19
Basilicata	2.10	0.79
Calabria	6.82	3.10
Sicily	3.02	8.29
Sardinia		4.25
Year	4.86	
1995	6.56	3.48
1998	8.01	7.43
2000	12.20	9.44
2002	12.86	13.93
2004	14.57	14.16
2006	14.44	12.54
2008	12.34	14.32
2010	9.84	11.38
2012	4.33	8.82
2014	5.12	4.49

Table S-2: Summary of estimates from logistic regressions analysis for variables predicting the transition to the first child (first panel) and second birth (second panel) by level of TDP (categorical)

	(M1)	(M2)
TDP: Ref 0		
Around 0.01	.062	.029
	(.29)	(.295)
Around 0.05	.557**	.013
	(.276)	(.25)
Around 0.10	.638**	.531*
	(.307)	(.274)
Around 0.20	–1.03*	.002
	(.542)	(.373)
N	760	1,277

Notes: Controls in M1 and M2 are male partner's age, male partner's education, sex of the respondent, year fixed effects and regional fixed effects, credit rejection and liquidity constraints, equivalised income, self-employed status, and father's education of the head of the household. In Model M2 we control for female age at the first child. Coef.=Coefficient. Robust standard errors in parenthesis. * p<.1, ** p<.05, *** p<.01.

Figure S-1: Predicted probabilities (y axis) of the transition to the first and second child according to the level of impatience

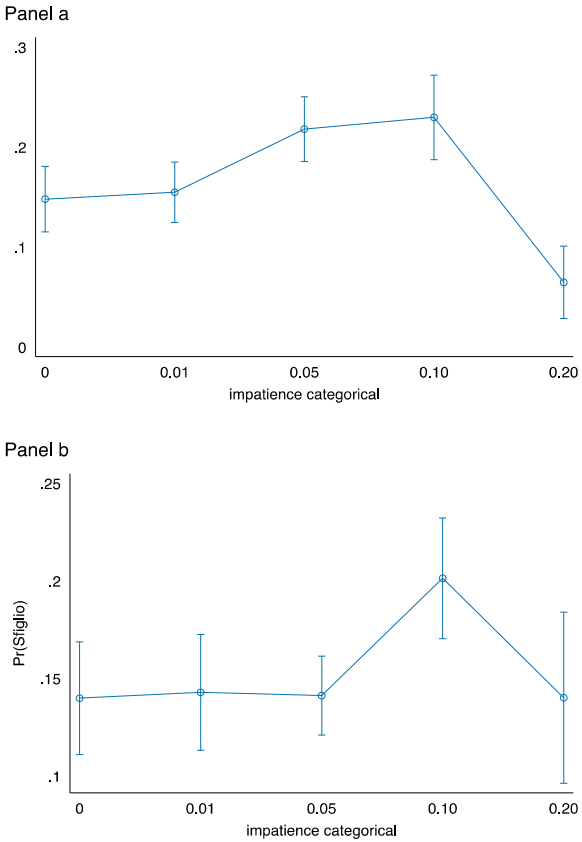


Table S-3: Summary of estimates from logistic regressions analysis for variables predicting the transition to the first child (M1) and second child (M2) adding a control for the main income earner within the couple

	(M1)		(M2)	
	Coef.	St. err.	Coef.	St. err.
TDP	0.078***	0.026	0.043**	0.021
TDP squared	–0.008***	0.002	–0.004**	0.002
Head of the household as the major income earner	0.221	0.223	–0.082	0.027
N	760		1284	

Notes: Controls in M1 and M2 are woman's age and its squared, male partner's age, year fixed effects and regional fixed effects, and age of the first child (only in Model M2). Coef.=Coefficient. St. err.= Robust standard error. * p<.1, ** p<.05, *** p<.01.

Table S-4: Summary of estimates from logistic regressions analysis for variables predicting the transition to the first child for male head of the household (M1) and for female head of the household (M2), and the transition to the second child for male head of the household (M3) and for female head of the household (M4)

	First child				Second child			
	(M1)		(M2)		(M3)		(M4)	
	Coef.	St. err.	Coef.	St. err.	Coef.	St. err.	Coef.	St. err.
TDP	.086	.034**	.174	.073**	.024	.027	.067	.046
TDP squared	–.0101	.003***	–.021	.007***	–.002	.002	–.002	.004
N	498		159		868		297	

Notes: Controls in M1 to M4 are woman's age and its squared, male partner's age, female educational level, male educational level, year fixed effects and regional fixed effects, and age of the first child (only in Model M3 and M4). Coef.=Coefficient. St. err.= Robust standard error. * p<.1, ** p<.05, *** p<.01.

Table S-5: Summary of estimates from logistic regressions analysis for variables predicting the transition to the first child adding controls for stock and flow of household's economic conditions

	(M1)		(M2)		(M3)		(M4)		M(5)	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
TDP	0.071***	(0.026)	0.070***	(0.026)	0.082***	(0.031)	0.089***	(0.031)	0.087***	(0.031)
TDP squared	–0.010***	(0.002)	–0.009***	(0.002)	–0.010***	(0.002)	–0.011***	(0.002)	–0.011***	(0.002)
Age woman	1.706***	(0.311)	1.694***	(0.309)	1.630***	(0.347)	1.644***	(0.348)	1.654***	(0.349)
Age woman squared	–0.024***	(0.005)	–0.024***	(0.005)	–0.023***	(0.005)	–0.023***	(0.005)	–0.023***	(0.005)
Woman education. Ref primary										
Secondary education	0.372	(0.275)	0.357	(0.267)	0.396	(0.289)	0.401	(0.287)	0.445	(0.284)
Tertiary education	–0.052	(0.368)	–0.086	(0.358)	–0.000	(0.427)	–0.015	(0.434)	–0.006	(0.437)
Household wealth (in thousands)	0.002***	(0.001)	0.002***	(0.001)	0.002***	(0.001)	0.002***	(0.001)	0.002***	(0.001)
Average household income			0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Percentage change in income					–0.003	(0.006)	–0.003	(0.006)	–0.003	(0.006)
Income instability. Ref. first quartile=Low instability										
2^{nd} quartile							0.203	(0.231)	0.168	(0.236)
3^{rd} quartile							–0.320	(0.356)	–0.415	(0.342)
4^{th} quartile							–0.071	(0.574)	–0.365	(0.586)
% of years in first quartile of the income distribution									0.638	(0.782)
Constant	–26.794***	(5.071)	–26.750***	(5.101)	–24.620***	(5.800)	–24.849***	(5.824)	–25.353***	(5.943)
N	760		760		617		617		617	

Notes: Controls in M1, M2, M3, M4, and M5 are male partner's age, male partner's education, sex of the respondent, year fixed effects and regional fixed effects, credit rejection and liquidity constraints, equivalised income, self-employed status, and father's education of the head of the household. Coef.=Coefficient. St. err.= Robust standard error. * p<.1, ** p<.05, *** p<.01.

Table S-6: Summary of estimates from logistic regressions analysis for variables predicting the transition to the second child adding controls for stock and flow of household's economic conditions

	(M1)		(M2)		(M3)		(M4)		(M5)	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
TDP	0.042**	(0.021)	0.043**	(0.021)	0.052**	(0.024)	0.049**	(0.024)	0.044*	(0.024)
TDP squared	–0.003*	(0.002)	–0.003*	(0.002)	–0.005**	(0.002)	–0.004**	(0.002)	–0.004**	(0.002)
Age woman	0.987***	(0.243)	0.983***	(0.243)	0.692***	(0.247)	0.721***	(0.248)	0.849***	(0.254)
Age woman squared	–0.017***	(0.004)	–0.017***	(0.004)	–0.012***	(0.004)	–0.013***	(0.004)	–0.015***	(0.004)
Woman education. Ref primary										
Secondary education	0.199	(0.201)	0.178	(0.205)	0.017	(0.228)	–0.001	(0.228)	0.127	(0.238)
Tertiary education	0.854***	(0.303)	0.833***	(0.306)	0.656**	(0.332)	0.663**	(0.338)	0.820**	(0.361)
Household wealth (in thousands)	–0.000	(0.000)	–0.000*	(0.000)	–0.000	(0.000)	–0.000	(0.000)	–0.000	(0.000)
Average household income			0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Percentage change in income					0.007	(0.006)	0.009	(0.006)	0.010	(0.007)
Income instability. Ref. first quartile=Low instability										
2nd quartile							–0.088	(0.228)	–0.188	(0.231)
3rd quartile							–0.929**	(0.404)	–1.101**	(0.429)
4th quartile							–0.489	(0.464)	–1.156**	(0.515)
% of years in first quartile of the income distribution									1.482***	(0.516)
Constant	–15.652***	(3.985)	–15.649***	(3.979)	–10.382**	(4.131)	–10.521**	(4.150)	–13.139***	(4.220)
N	1,284		1,284		1,119		1,119		1,119	

Notes: Controls in M1, M2, M3, M4, M5, and M6 are male partner's age, male partner's education, sex of the respondent, year fixed effects and regional fixed effects, age of the first child, credit rejection and liquidity constraints, equivalised income, self-employed status, and father's education of the head of the household. Coef.=Coefficient. St. err.= Robust standard error. * p<.1, ** p<.05, *** p<.01.

Table S-7: Summary of estimates from logistic regressions analysis for variables predicting the transition to the first child (M1) and second child (M2) adding a control for a proxy of risk aversion (continuous)

	(M1)		(M2)	
	Coef.	St. err.	Coef.	St. err.
TDP	0.070***	0.028	0.033	0.021
TDP squared	–0.007***	0.002	–0.004*	0.002
Proxy of risk aversion (continuous)	–0.001	0.001	–0.001	0.001
N	590		1,080	

Notes: Controls in M1 and M2 are woman's age and its squared, male partner's age, year fixed effects and regional fixed effects, sex, and age of the first child (only in Model M2). Coef.=Coefficient. St. err.= Robust standard error. * p<.1, ** p<.05, *** p<.01.

Table S-8: Summary of estimates from logistic regressions analysis for variables predicting the transition to the first child (M1) and second child (M2) adding a control for a proxy of risk aversion (categorical)

	(M1)		(M2)	
	Coef.	St. err.	Coef.	St. err.
TDP	0.066**	0.028	0.033	0.023
TDP squared	–0.006***	0.002	–0.004*	0.002
Proxy of risk aversion (ref=very low)				
Medium	0.109	0.828	0.470	0.793
High	–0.284	0.818	0.152	0.793
Very high	–0.563	0.824	0.092	0.798
N	590		1,284	

Notes: Controls in M1 and M2 are woman's age and its squared, male partner's age, year fixed effects and regional fixed effects, sex, and age of the first child (only in Model M2). Coef.=Coefficient. St. err.= Robust standard error. * p<.1, ** p<.05, *** p<.01.