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Working Paper

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IZA Discussion Papers, No. 10269

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Chabé-Ferret, Bastien (2016) : Adherence to Cultural Norms and Economic Incentives: Evidence from Fertility Timing Decisions, IZA Discussion Papers, No. 10269, Institute for the Study of Labor (IZA), Bonn

This Version is available at:

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IZA DP No. 10269

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October 2016

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Discussion Paper No. 10269
October 2016

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ABSTRACT

Adherence to Cultural Norms and Economic Incentives: Evidence from Fertility Timing Decisions*

I analyze the interplay between culture and economic incentives in decision-making. To this end, I study birth timing decisions of second generation migrant women to France and the US. Only the probability to have three or more children increases with the home country fertility norm, whereas the timing of the first two births is either unaffected or negatively correlated. I propose a model that rationalizes these findings in which decisions are the result of a trade-off between an economic cost-benefit analysis and a cultural norm. The model predicts that decisions with a higher cost of deviation from the economic optimum should be less prone to cultural influence. This is consistent with substantial evidence showing that the timing of the first birth bears much larger costs for mothers in terms of labor market outcomes than that of subsequent births.

JEL Classification: J13, J15, Z10, Z12

Keywords: cultural norms, fertility, birth timing

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* This work has been carried out while at U Louvain, Paris School of Economics and UCLA. The author acknowledges financial support from the Belgian French-speaking community (ARC convention 09-14018 on "Sustainability" and 15/19-063 on "Family transformations"), the FNRS and European Research Council (ERC Stg Grant DU 283953). The author wishes to thank Jean-Marie Baland, Thomas Baudin, Leah Boustan, Sylvain Chabé-Ferret, David de la Croix, Hippolyte d'Albis, Paula Gobbi, Hélène Latzer, Fabio Mariani, Nico Voigtländer, Uwe Sunde, Romain Wacziarg as well as participants to seminars or conferences at U Pompeu Fabra, U Louvain, U of Iowa and Toulouse School of Economics.

“Man is by nature a social animal.”

Aristotle, in: *Politics*, Book 1 (4th Century BC)

“The propensity to company and society is strong in all rational creatures, and the same disposition, which gives us this propensity, makes us enter deeply into each other’s sentiments and causes like passions and inclinations to run, as if it were, by contagion, through the whole club of knot of companions.”

David Hume, in: *Essays: Moral, Political and Literary* (1748)

“Well I think that progress is not possible without deviation. And I think that it’s important that people be aware of some of the creative ways in which some of their fellow men are deviating from the norm, because in some instances they might find these deviations inspiring and might suggest further deviations which might cause progress, you never know.”

Frank Zappa (1971)

1 Introduction

There exists a long tradition in philosophy to think of humans as inherently social creatures, whose actions cannot be understood in isolation of their communities’ behavior. In the relatively young field of economics however, the emphasis on humans’ independent will pursuing self-interest has sometimes led to the questionable assumption that humans operate in a social vacuum. This cleavage is summarized by Elster (1989) as the opposition between Adam Smith’s *homo economicus* and Emile Durkheim’s *homo sociologicus*. There has been recently a growing number of contributions in economics using quantitative methods to document the influence of cultural norms on different types of behavior, ranging from labor force participation to fertility, gender roles, violence, geographic mobility, savings behavior or even demand for social insurance.¹

Much less is known about for which type of decision culture matters and why. Do we rely on cultural norms to a similar extent for decisions that bear important consequences than for relatively harmless ones? We know that people incur substantial economic costs in order to stick to their cultural norm, however there is to my knowledge no evidence that cultural

¹Alesina and Giuliano (2010); Alesina et al. (2013); Fernández and Fogli (2006, 2009); Boustan and Collins (2014); Grosjean (2014); Paule-Paludkiewicz et al. (2016); Eugster et al. (2011) study the role of culture in these decisions. See Guiso et al. (2006) for a field-opening contribution, from which I also take the definition of culture: “those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation”. de la Croix and Perrin (2016) go as far as quantifying the respective contribution of rational choice against cultural diffusion in the Demographic Transition in France.

adherence is responsive to this disincentive.²

In this paper, I show evidence that cultural norms matters more for decisions that bear relatively less drastic consequences using data on birth timing decisions. The rationale for looking at fertility choices is twofold. First, we have robust evidence that culture influences fertility.³ Second, looking at different birth parities provides a variation in the economic cost of not following the norm. Indeed, there exists considerable evidence that the timing of the first birth bears much larger consequences than that of later births.⁴ I build a model of decision-making featuring an interplay between an economic cost-benefit analysis and a cultural norm. The former reflects the economic and institutional incentives, while the latter is transmitted by the social environment.⁵ The model implies that decisions with a higher cost of deviation from the economic optimum should be less prone to cultural influence. The intuition is that the utility gain of following a norm is less likely to exceed the cost of deviating from the economic optimum when this cost is large. Fertility norms should then matter less for the age at first birth, which is a costly decision to adjust, than for the timing of the second, third and subsequent births.

To test this hypothesis, I use two data sources on second generation migrants to France and to the US. The identification strategy is based on the so-called epidemiological approach, also featured in Fernández and Fogli (2009); Blau et al. (2013); Stichnoth and Yeter (2016). Using data on second generation migrants allows to separate the effect of host-country specific economic and institutional incentives from the country-of-origin specific cultural norm. I assign to each migrant the total fertility rate (TFR) in the country of origin of their parents to proxy for culture. I then use a proportional hazard model to estimate the effect of fertility norms on

²Atkin (2016) looks at food expenditures of internal migrants in India and show that some of them could get up to 7% more calories if they possessed their neighbors' preferences instead of those in their origin-state. Algan et al. (2013); Biavaschi et al. (2013); Abramitzky and Boustan (2015) study first name decisions in France and the US respectively. The first show that there would be 50% more babies with arabic sounding names if there were no economic cost associated in terms of labor market discrimination. The second find that name americanization to popular first names such as John or William led to a 14% increase in occupation-based earnings in a sample of migrants who naturalized by 1930. The third use data from the Age of Mass Migration to the US and find that brothers with more foreign first names were doing substantially worse in terms of educational and labor market outcomes.

³The seminal contribution by Fernández and Fogli (2009) documents that second generation migrant women to the US make fertility choices that are biased towards the fertility level of their country of origin.

⁴This hypothesis is crucial for the interpretation of the results. I review the literature that documents it at the end of the introduction.

⁵I do not make assumptions on whether cultural norms provide a direct utility gain through the feeling of inclusion in a community, or a more indirect gain stemming from the support provided by the community. Alternatively, cultural norms could also be beliefs transmitted by a community, in which case the gain of following the norm could be to avoid looking for information about what to do.

the parity-specific hazard rate of having a child. I address issues of unobservable heterogeneity by exploiting on the one hand the richness of the French data, which allows to control for a large set of personal, parental and partner’s characteristics, such as education, occupation, or even religion and religiosity, and on the other hand, by controlling for a wide array of country-level characteristics such as geographic, linguistic and genetic distances or average education of the diaspora.

I find that first and second births do not come earlier for women coming from a high fertility country.⁶ On the other hand, the probability to have three children or more is significantly larger for women from a high fertility country. To be more specific, I obtain that shifting up the TFR in the origin country by one standard deviation makes a woman 20 to 36% more likely to have three children or more conditional on having already two in the French data, 9 to 14.5% in the US case. Still, the same shift up in the cultural proxy does not yield any increase in the hazard rate of having a first or second child. The results are robust to changes in the sample selection as well as in the cultural proxies.⁷ Although the magnitude differs (I present potential reasons why in Section 4.2), finding comparable results in two totally different datasets ascertains the external validity of the findings.

This result is of primary importance for several reasons. First, the very existence of cultural norms of behavior is sometimes taken as evidence that humans do not act “rationally”. If this were the case, then trying to understand human behavior as an optimizing process and designing policies based on that principle would not make sense. Providing evidence that there exists a cost-benefit analysis of complying to a norm allows to reconcile rational decision-making and cultural influence.⁸ In particular, relying on cultural norms for harmless decisions may be part of a strategy of rational inattention.⁹ People may choose to rely on norms for decisions that they know cannot have drastic consequences because the cost of acquiring information about what is appropriate to do exceeds the potential gain.

Second, there is now substantial evidence that the impact of culture on migrants’ behavior depends on the intensity of cultural ties and the density of the diaspora. Fernández and

⁶If anything, first births tend to come at a later stage for migrant women in France.

⁷I restrict to the sample of women in a relationship in order to control for partners’ characteristics in the French case. As cultural proxies, I use mean age at first birth instead of TFR to make sure that there are not different norms for the timing of the first birth and for completed fertility.

⁸This way I contribute to the research agenda set by Stigler and Becker (1977) in their seminal contribution not to rely on differences in tastes to explain variation in behavior. Becker (1996) then develops the argument claiming that differences in behavior may arise in a fixed-preferences set-up from different levels of accumulation of either human, social or personal capital, themselves driven by different sets of income and prices.

⁹There exists a growing literature starting with the seminal contribution by Sims (2003) focusing on the implications of rational inattention, costly information acquisition and apparently mistaken choices. See for instance Caplin and Dean (2015).

Fogli (2009); Algan et al. (2013) find that the cultural effect is stronger in ethnically denser environments. Stichnoth and Yeter (2016); Blau et al. (2013) also document that the intensity of the cultural effect declines in the length of exposition to the norm, first generation migrants being more sensitive than their second generation counterparts. Spolaore and Wacziarg (2014) show that cultural distance, as proxied by genetic distance, curbed the diffusion of a low fertility norm in Europe during the demographic transition. However, there is to my knowledge very little out-of-the-lab evidence that cultural adherence is responsive to economic incentives.¹⁰ This way, I contribute to the growing literature on “motivated beliefs”, suggesting that cultural adherence is a form of motivated belief, as it “respond[s] to the costs, benefits, and stakes involved in maintaining different *self-views* and *world-views*, as Bénabou and Tirole (2016) put it.

Third, understanding for which type of decisions culture matters is a first step in answering bigger questions such as: why do we follow cultural norms and how are they enforced? How does culture evolve? Can norms be harmful, can they be efficient?¹¹ This paper suggests that norms that are costly to sustain because they are further away from the economic optimum should tend to disappear. One could therefore conjecture a principle of natural selection of cultural norms.¹²

Articles that point at the existence of a trade-off between costs and benefits of following or transmitting cultural norms are mainly theoretical. In their seminal contribution, Bisin and Verdier (2001) present a model where parental decisions to transmit their culture depend on perceived future benefits for children. In Doepke and Zilibotti (2008), parents decide to transmit the cultural trait that maximizes their children’s fitness to the economic environment. In the framework of the present study, it could well be that parents exert less effort to enforce a cultural norm when they know it will be costly for their children, as suggested by Melindi Ghidi (2012). The model developed in this paper builds on the seminal contribution of Akerlof and Kranton (2000) on the economics of identity, but similar testable implications could be obtained using a Bisin-Verdier framework instead.

On the empirical side, this article is related to the literature that studies the effect of cultural norms on human behavior. While Guiso et al. (2006) make a remarkable review of this

¹⁰One exception is Fisman and Miguel (2007). They find a strong effect of corruption norms on unpaid parking violations among UN officials in Manhattan and show that it disappeared with stronger legal enforcement, that is when incentives were changed.

¹¹See Elster (1989) for an extensive discussion on the efficiency of norms.

¹²Kanazawa (2001) for instance proposes that rational choice theory interacts with evolutionary psychology to offer a theory of values, preferences, norms and identities. Henrich (2015) argues that it is actually a process of culture-gene coevolution that opened a novel and extremely successful evolutionary pathway for the human species.

literature, I will focus on papers more directly related to the present work. Hinde (2003) for instance observes that, while economic pressure may have led the middle-class in England to lower fertility in the late nineteenth century due to economic pressure, this low fertility behavior may have spread to groups closely associated, like those employed in domestic services. The importance of fertility norms has furthermore been tested in several works: for instance, Munshi and Myaux (2006) show evidence that reproductive social norms can explain the inertia of fertility behavior and contraceptive use in rural Bangladesh. Another example can be found in La Ferrara et al. (2012) who document that telenovelas, Brazilian soap operas, have conveyed a low fertility norm, specially among women who were the same age as the main characters. More closely linked to the current article are papers discussing the transmission across generations of such norms. Alesina and Giuliano (2010) show in particular that the strength of family ties in the country of origin of second generation migrants has a robust impact on various aspects of their behavior such as fertility, youth and female labor force participation, youth geographical mobility and home production. This result suggests that the strength of family ties is actually a cultural trait transmitted from parents to children.

Literature review on the cost of children by birth order

The interpretation of the results hinges particularly upon the hypothesis that the cost of deviating from the economic optimum is larger for the first birth than for subsequent ones. More specifically, anticipating the first birth by, say, a year should represent a larger welfare loss than anticipating the second or the third by the same margin. There are several mechanisms that support this hypothesis. Early childbearing may interrupt a woman's studies or career at an age when human capital is acquired more easily and will yield returns on a longer time-horizon. Additionally starting late can be a commitment to having few children (given the biological constraints), which may open better professional opportunities. Therefore, the age at entry into motherhood is of particular importance for outcomes such as educational attainment, employment, wages and earnings of mothers. For instance, using biological fertility shocks as instruments, Miller (2011) shows on US data that delaying birth by one year, while holding completed fertility constant, leads to a 9% increase in earnings, 3% in wages and 6% in hours worked of mothers. Herr (2014); Herr et al. (2015) finds a 5% wage premium for a one year delay, also on US data, while Kind and Kleibrink (2012) use a similar methodology on German data and find a 7% wage premium.

A large literature has more broadly focused on the career costs of children using various methodologies. Anderson et al. (2002) follow a fixed-effect estimation strategy on the panel of the NLSYW to show that there are substantial wage penalties associated to motherhood, ranging from 3-4% for one child to 5-8% for two or more children. Extending this study with the use of later cohorts of the NLSY and NLSYW, Loughran and Zissimopoulos (2009) apply

a similar strategy and confirm the negative impact of children on female wages and labor force participation. They also find suggestive evidence that a second child has no incremental effect on female wages. On a more selected web-based survey conducted on University of Chicago MBAs from the graduating classes of 1990 to 2006, Bertrand et al. (2010) show that women's earnings drop by 30 log points at three or more years after the birth of a child, through a combination of, mainly, decreased hours worked as well as, more modestly, a cut in hourly wages. Importantly, they also find that the birth of a second child has little additional adverse effect on women's labor supply and earnings. Adda et al. (2011) build a dynamic life-cycle model of labor supply, fertility and savings, incorporating occupational choices, which they estimate using German data, and find comparable results: "the cost of a second child is lower than the cost of the first child. For instance, a first child at age 20 induces a total career costs of 31% (in terms of net present value of life-cycle earnings computed at age 15) compared to a scenario without children. A second child conceived at age 22 increases these costs to 36%".

Consistent with these findings, the seminal contribution by Angrist and Evans (1998), using the preference for mixed gender composition of offsprings, shows that a third child does reduce the labor supply of mothers, but that the effect is actually small and even close to inexistent for educated mothers or mothers married to a high-wage husband. Alternatively, Silles (2015) uses twin births at different parities as instruments for family size and documents similar results: an extra child does have a negative impact both on the extensive and intensive margins of labor force participation and earnings (although less robustly). Effects are overall larger at first parity.

First births could also be costlier than subsequent ones because their timing have an impact on the cognitive skills and human capital of offsprings. Altruistic parents would internalize these costs in their decision-making process. Worst labor market outcomes, as those experienced after first births, particularly for single mothers, could translate into less investment in children's education. Alternatively, there could exist some economies of scale in parenting, making higher order births less costly. Miller (2009) finds that delayed first births lead to a significant increase in test scores of children. Using data from the American Time Use Survey, Price (2008) finds that a first-born child receives 20-30 more minutes of quality time each day with his or her parent than a second-born child of the same age from a similar family. Additionally Black et al. (2005); Angrist et al. (2010) find that a large sibship size does not causally induce a lower educational attainment or lower earnings of children, suggesting that higher order births do not impose a substantial cost.

2 A Model of Endogenous Cultural Norms

Consider the following indirect utility function, inspired by Akerlof (1997); Spolaore and Wacziarg (2014):

$$U_{i,h,n} = b_h f - c_h f^2 - \sigma(F_n - f)^2 \quad (1)$$

Individual i , living in institutional setting h and belonging to a cultural group n , makes a decision about the optimal amount of f , say number of children, considering two types of utility sources. First she looks at the economic cost and benefit, which Akerlof calls “intrinsic”, of having f children given by the institutional setting in the country: b_h and c_h . Second there is a cultural component to the utility function that is always negative and proportional to the quadratic distance between the chosen f and the cultural prescription F_n . The intensity of this cost is exogenously given and noted σ .

The first order conditions of this problem yield an optimal choice of fertility given by:

$$f_{h,n}^* = \frac{b_h + \sigma F_n}{c_h + \sigma}. \quad (2)$$

$f_{h,n}^*$, although individually rational, is economically suboptimal provided that $\sigma > 0$ and $F_n \neq \frac{b_h}{c_h}$. Economic suboptimality is a form of inefficiency as a benevolent social planner could either set $\sigma = 0$ or $F_n = \frac{b_h}{c_h}$ and enhance welfare for everyone. One question is therefore why is the cultural component there in the first place. It could be that some decisions are particularly difficult to take because we face them only a limited number of times in life, have little feedback on outcomes and/or that this feedback comes too late for people to adjust their decisions. This behavioral argument would apply for instance if b and c were only observed with a noise by individuals for instance. Another reason can be that the economic problem has actually several optima, but for instance one is Pareto superior (due to externalities say). Cultural norms would serve as a coordinating device to guide individual decisions towards the efficient equilibrium.

Let us now hypothesize that the cultural prescription F_n actually evolves over time, depending on how individuals in the cultural group [and neighboring ones] actually behave. To keep the problem simple, we focus on culturally homogenous countries and all countries have the same population size. For instance, we consider the following law of motion for the cultural norm F_n :

$$F_{n,t+1} = \sum_j \frac{1 - d_{ij}}{D_i} f_{j,t} \quad \text{with} \quad D_i = \sum_j (1 - d_{ij}) \quad (3)$$

Where $d_{ij} = d_{ji}$ is the social distance between individual i and j . This distance represents the extent to which the behavior of a given person matters to determine the cultural norm. The cultural norm of the next generation in country n is therefore a weighted average of the

observed behavior of all individuals in the world where the weights are inversely proportional to the social distance between countries. More specifically, some countries may be at a social distance of 1, resulting in no social influence across these countries. Moreover, I set $d_{ii} = 0$, that is social distance within a given country is nil. Let us take the polar case of an autarkic country to start the analysis: $d_{ij} = 1, \forall j$. The law of motion of the cultural norm simplifies to:

$$F_{n,t+1} = f_{h,n,t}^* = \frac{b_h + \sigma F_{n,t}}{c_h + \sigma} \quad (4)$$

Looking for the fixed point of this equation, I obtain that the unique steady state is:

$$F_n^* = \frac{b_h}{c_h} \quad (5)$$

So that, at the autarkic steady state, there is no welfare cost of cultural norms. This steady state is moreover globally stable.¹³

Let me now consider a situation where people actually migrate from one country to another in a process that is not modelled here. Say all countries were in steady state to start with. Then some people move from a high fertility country H to a low fertility country L ($\frac{b_H}{c_H} > \frac{b_L}{c_L}$). Migration has a first order effect on the decision making of migrants in that it changes their institutional setting: they now face the same cost to benefit ratio $\frac{b_L}{c_L}$ as natives. However, migration does not affect the cultural norm F_H , which is considered acquired before reaching the age at migration. Let me for now assume that migrants keep on living in a cultural autarky. Migrants then face the following problem:

$$U_{i,L,H} = b_L f - c_L f^2 - \sigma(F_H - f)^2 \quad \text{where} \quad F_H = \frac{b_H}{c_H} \quad (6)$$

The optimal choice of migrants is thus:

$$f_{L,H}^* = \alpha \frac{b_L}{c_L} + (1 - \alpha) F_H \quad \text{where} \quad \alpha = \frac{c_L}{c_L + \sigma} \quad (7)$$

Hence, migrants choose an economically suboptimal fertility that lies in between the level given by their cultural norm and the economically optimal level (that is the one of natives). In this situation, migrants would be willing to pay in order not to be subject to their home country norm. More specifically, not being subject to their home country norm would represent the following utility gain:

$$\Delta U = \left[\frac{c_L}{2}(1 - \alpha)^2 + \frac{\sigma}{2}\alpha^2 \right] \delta^2 \quad \text{where} \quad \delta = \frac{b_H}{c_H} - \frac{b_L}{c_L} \quad (8)$$

¹³A way to see this is to notice that the optimal f is a convex combination of the economically optimal $f = \frac{b_h}{c_h}$ and the cultural norm F_n . Consequently, whatever the initial condition $F_{n,0}$, f_0^* and consequently $F_{n,1}$ will lie between the initial norm and the economically optimal level. By iteration, I obtain that the norm will get arbitrarily close to the economic optimum as time goes by.

It appears from this expression that the utility gain is strictly increasing in the distance between the economically optimal levels in the two countries.¹⁴

The position of the optimal $f_{L,H}^*$ with respect to the economic optimum and the home country cultural norm depends on α , which is the relative size of c_L and σ . The larger the economic cost of fertility c_L with respect to the cost of deviating from the cultural norm σ , the closer to the economic optimum, and conversely. The following comparative statics holds:

$$\frac{\partial f^*}{\partial F_H} > 0; \quad \frac{\partial^2 f^*}{\partial F_H \partial C_L} < 0; \quad \lim_{C_L \rightarrow \infty} \frac{\partial f^*}{\partial F_H} = 0 \quad (9)$$

From expressions in (9), I infer two testable implications:

1. The fertility choice of migrants should be positively correlated to the cultural norm in their origin country (Fernández and Fogli (2006, 2009) are the first to test these in their seminal contributions);
2. The influence of the home country cultural norm should be smaller as the economic cost in the host country c_L increases. More specifically, if $c_L \gg \sigma$, as it might be the case for decision about the age at first birth, then the effect of the home country cultural norm should be negligible.

This is this second prediction that is taken to the data for the first time in this paper.

The same predictions survive if I relax the assumption that people from different cultures live in autarky. This extension is shown in Appendix A.

3 Data and samples

I construct two samples of women born in the host country (France or the US) from at least one foreign-born parent. The rationale for excluding first generation migrants is to avoid the potential direct impact of migrating on fertility.¹⁵ It furthermore allows to assume that all women in the sample face the same institutional setting (such as the same education system, parental benefits or labor market regulations). I also exclude women who had twins in order to focus on strictly positive birth intervals.

Data on migrants to France

¹⁴The chosen functional form induces the gain to be maximum when $c_L = \sigma$, that is when the cost of deviating from the economic optimum equals that of deviating from the cultural norm. This way, migrants choose a fertility level that is right in the middle of the economic optimum and the cultural norm, which maximizes the utility gain of getting rid of the norm.

¹⁵See Mayer and Riphahn (2000) for a discussion on disruption and catching-up effects of migration on fertility.

I use the TeO survey that interviewed 21800 persons in total aged 18 to 60 residing in metropolitan France late 2008. The sample gathers 17900 immigrants (8900 first generation, 9000 second generation), as well as a control group of 3900 French persons from metropolitan France.¹⁶ They were asked a wide range of questions that provide a lot of information on their characteristics (age, educational attainment, marital status, number of siblings, place of residence, religion, religiosity), characteristics of their partner and parents as well as their respective origins. This data is specially interesting in two respects: it is among the very few surveys in France that report the country of origin of second generation migrants as well as religion, which are considered as sensitive data by the French authorities; it is moreover very rich in terms of information on parents and partners as well as on fertility timing (year and month of birth).

Data on migrants to the US

I use the June supplement of the 1995 Current Population Survey (CPS).¹⁷ Indeed, it is the only wave of the CPS that asked not only the number of children ever born (FREVER variable, usual in the June fertility supplement) but also about the timing of these births (age in months at each birth). The pitfall of using this data source with respect to the data from France is that the focus is not on migrants, so i) the number of second generation migrants observed is modest; ii) there is less information on family background (such as parental education and occupation, not to mention religion). However, it allows to improve substantially the external validity of the results as not only the host country differs but also origin countries do not overlap much.

3.1 Origin country data

I assign to each individual the country of birth of the foreign born parent.¹⁸ In the rare event that only a region of birth (e.g. South America) is given, I drop the observation. I furthermore include a categorical variable that indicates whether only the mother, the father or both parents are foreign born in order to test for different transmission channels of the cultural norm. I assign to each country of origin its total fertility rate (TFR) in order to proxy the fertility norm in vigor in the country of origin. In my preferred specification, I

¹⁶Trajectoire et origines (TeO) - version complète - 2008 - (2008) [fichier électronique], INED et INSEE [producteur], Centre Maurice Halbwachs (CMH) [diffuseur]

¹⁷Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2015. See Ruggles et al. (2015) for more on the IPUMS collaboration.

¹⁸If the parents come from two different foreign countries, then I assign that of the mother. The results hold whether I decide to assign the country of the father or to exclude these observations.

use the TFR when women were age 18 (tfr18) following the *impressionable years hypothesis* according to which beliefs crystallize between age 18 and 25.¹⁹ I use alternatively the TFR in the year of birth of women in my sample (tfr0), considering that the relevant cultural proxy is the average fertility behavior of the parents' generation. For comparison purposes, I also reproduce the strategy in Fernández and Fogli (2006, 2009) by using the TFR in 1960 (from now on tfr1960). I use 1960 (rather than 1950 or 1970) because it is the first year for which the World Bank releases consistent TFR data for a large sample of countries. One criticism though is that women in my sample vary substantially in terms of age and therefore assigning the same cultural proxy could lead to a fair amount of measurement error, specially in those countries of origin experiencing a fast demographic transition. More specifically, women in my samples were born between 1930 and 1990. In order to mitigate this potential issue, my preferred specification uses a cultural proxy that varies with year of birth.

Finally, I replace TFR by MA1B (ma1b) in order to discard the possibility that TFR, a number of children, is only a noisy measure of a norm about fertility timing, while age at first birth would be more suitable. Unfortunately this indicator has not been measured consistently for a long period. I thus use the most ancient data available I could find, which dates from the 1990s for most countries in my sample. For the French sample, I focus on observations for which all four indicators are available. For the US sample instead, because it is smaller to start with, I only restrict to those for whom I observe tfr18 (and thus tfr60). Finally I drop countries of origin for which I have fewer than 10 observations.

I use data gathered by the World Bank from different sources²⁰, which I complement with a UN source²¹, to obtain the TFR from 1948 to 1995. When using the TFR in the year of birth of migrants, I assign that in 1960 for all women born before (around 7% of the sample). As for MA1B, I use UN data²² that reports either the mean age of women declaring a first birth in a given year, or the median age at first birth among women aged 25-29 at the date of the survey.

¹⁹Giuliano and Spilimbergo (2014) rely on this hypothesis to identify the effect of growing up in a recession on preferences for redistribution.

²⁰(1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database

²¹United Nations Demographic Yearbook, 1997, table 4.

²²United Nations, Department of Economic and Social Affairs, Population Division (2013). World Fertility Report 2012 (United Nations publication)

3.2 Destination country data, samples and summary stats

I create two samples: 3852 second generation migrant women to France from 25 countries, 18 to 60 years of age, and 2504 migrants to the US from 34 origin countries, aged 15 to 65. Figure 1 shows the distribution of `tfr18` for the two samples at hand. Notice there are sizable variations in the cultural proxy and a similar pattern in both cases: a concentration of observations around 2 and then a long right tail. To ease the illustration, I divide both samples between high and low fertility individuals, setting the limit arbitrarily at 2.8.²³

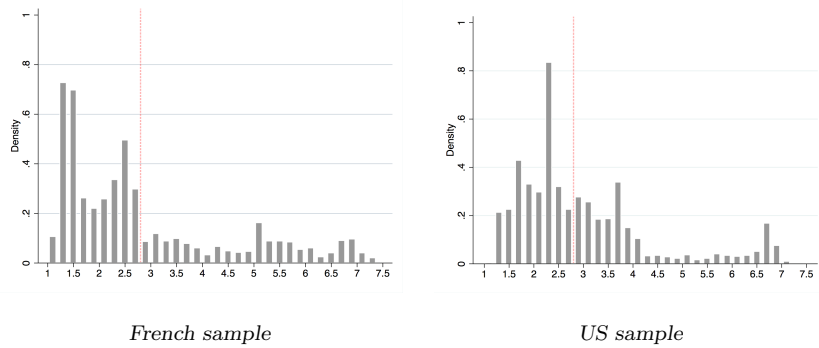


Figure 1: Distribution of the cultural proxy for fertility: `tfr18`

Tables B3 and B4 show summary statistics for the origin country data. In the French sample, a large share of the sample comes from North Africa, while the remainder is divided between subsaharan Africa, Turkey, Europe (mostly Southern but also some from Eastern Europe) and South East Asia. As for the US sample, migrants mainly originate from neighbouring countries Mexico and Canada, but also from the Caribbean and Central America. Another large share comes from Europe, particularly from the historical providers of migrants to the US: the UK, Ireland, Germany, Italy, Poland. The remainder comes from other European countries, Russia and Asia. The coefficient of correlation of `tfr18` with `tfr0`, `tfr60` and `ma1b` is respectively 0.86, 0.67 and -0.68 in the French sample (0.84, 0.79 and -0.78 in the US sample). An interesting feature of these two samples is that they overlap relatively little in terms of country of origin, which gives further confidence that what I capture is not specific to migration from a given region.

Table B1 and B2 give summary statistics for the variables that I use as controls. Notice that the French sample allows me to control for many more potential confounders, such as number of siblings, parental education, religion and religiosity. In both instances, women in the

²³The rationale for setting the limit TFR at 2.8 is to have all individuals reasonably close to 2 in the low fertility group, while the long right tail would be in the high fertility group. The illustrations I draw using this distinction are little sensitive to small changes in the limit.

high fertility subsample tend to be slightly older, slightly less educated, substantially less born to a mixed couple and in a relationship at the same rate than in the low fertility subsample. The main difference between the French and the US samples comes from labor force participation, which is clearly lower in the high fertility subsample in the US, while no such difference is observed in the French sample. Moreover, high fertility women in the French sample tend to have a substantially greater number of siblings and a relatively lower level of parental education. They also are more likely to be urban and muslim (as opposed to christian or atheist in the low fertility group). They instead do not differ much in terms of religiosity.

3.3 Identification Strategy

I use a Cox proportional hazard model to estimate the instantaneous hazard rate of going from one regime to the next. I consider four regimes: childless, one child, two children and three or more children.²⁴ I consider that the at-risk period starts at the age of the first entry into motherhood in the sample, therefore 14 in the French case and 12 in the US sample.²⁵ The analysis time is therefore time between 14th (respectively 12th) birthday and first birth, time between first and second birth, and finally time between second and third birth, all measured in months. Coefficients can alternatively be interpreted as affecting the probability of having one, two and three or more children conditional on the previous birth order having occurred or the timing of each birth order. This model assumes that the hazard function λ is of the form given in equation (1) and I then estimate the coefficients by maximum likelihood.

$$\lambda(t | \text{norm}, X) = \lambda_0(t) e^{\beta \text{norm}_{o,b} + \gamma X_i} \quad (10)$$

where λ_0 is the baseline hazard and X_i a set of controls specific to individual i . “Norm_{o,b}” represents my variable of interest, namely the proxy for culture, which is always specific to country of origin o and in some specifications to year of birth b . I successively use the TFR in the country of origin when the migrant was age 18 (tfr18), when she was born (tfr0), in 1960 (tfr1960) and then the mean age at first birth in the 1990s (ma1b). The third and fourth variables vary across individuals with the country of origin of their parents, while the first and second also vary with their year of birth.

β identifies the causal impact of culture on the hazard rate of having children as long as the dispersion in the cultural proxy is uncorrelated to the error term, which would be the case

²⁴I do not consider higher birth orders because it would considerably shrink the sample. Furthermore, I do not consider the age at which the relationship started because it is ill-measured (only age at marriage, nothing on age when the civil union took place e.g. for France, no information at all for the US) and because it might also be part of the cultural effect to marry sooner or later, or even to marry at all.

²⁵The results are not sensitive to the choice of a different at-risk period.

if characteristics that influence fertility decisions were randomly distributed across countries of origin. Of course the distribution of labor market abilities among migrants could be country specific and correlated to fertility decisions in the country of origin. Indeed, women coming from countries where female wages are low may hold a lower ability because their parents did not invest much in them. Not controlling for abilities would therefore lead to impute to a cultural effect what is due to low returns to abilities, so that estimates might be biased upward. To overcome this problem, I include educational attainment of women and their parents as a proxy for ability. Nevertheless, educational attainment may be endogenous to the ‘treatment’ as women who come from a high fertility country may systematically be less educated because they are expected to raise large families rather than achieve a successful professional career. In this case, the coefficient on the fertility norm would be biased downward.

The same issue arises with further determinants like educational attainment and migration status of partners. There may exist country-of-origin specific patterns for these variables correlated to the fertility norm for reasons that are cultural or not.²⁶ For instance, women from high fertility countries may choose more often a migrant partner either because they prefer someone with matching preferences regarding fertility, or because high fertility countries are also more conservative and it is less socially accepted to enter a partnership with someone from a different origin. I therefore adopt an agnostic view and perform the two exercises: with and without controlling, and thus obtain a lower and an upper bound of the cultural effect.

As apparent in equation (1), the model leaves the baseline hazard unspecified and assumes that covariates have a constant impact on the hazard rate over the whole at-risk period (the coefficients are independent of time). Actually one may think in the case of fertility of both negative (the older women get, the less fertile they become) and positive (reaching the situation in terms of employment, housing etc. to raise a child might take time) time dependence. As in previous studies (Gutiérrez-Domènech (2008)), I stick to the Cox model as a reasonable approximation. I furthermore test the proportional hazard assumption in Appendix C and do not find evidence against it.

²⁶Fernández and Fogli (2006, 2009) plead for controlling as much as possible for anything that is not strictly speaking a fertility norm, while Blau et al. (2013) take the opposite stand to control for as little as possible not to bias downward the coefficient on the fertility norm.

4 Analysis and Results

4.1 French sample

I run for each birth parity the same set of regressions, increasing gradually the number of controls. I first test in specification (1) the raw correlation between the outcomes and the cultural proxies, including only region of residence, urban status and age dummies. Urban status and region of residence pick up all the effects that local conditions could have such as price of housing or amenities. Dummies for age ensures that time varying economic conditions or public policies that affect a whole cohort are controlled for. Indeed, public policies are found to be at least partly responsible of the persistently high fertility in France compared to its neighbors. More specifically, Lalive and Zweimüller (2009) finds that extended legal parental leave increases the probability of a second child, as well than fertility in the long-run. There also exists evidence that economic conditions such that output volatility and unemployment affect fertility outcomes.²⁷

In (2), I add controls for parental characteristics such as mother’s and father’s education (two 6-level categorical variables) and father’s occupation (a 7-level categorical variable). The rationale here is to use some predetermined variables at the time of the fertility decision in order to control for part of the heterogeneity that could confound the cultural effect through an intergenerational transmission of human capital without controlling for a variable as certainly endogenous as own education.

In (3), I include own education (a 5-level categorical variable), nativity (which tells whether only the mother, only the father or both parents are migrants) and sibship size. Own education is clearly an endogenous variable in the sense that fertility and education decisions may well be co-determined. Still, including educational attainment as a control allows to capture the residual effect of the cultural norm on fertility, net of the effect of education. Nativity controls for the direct effect of being born to a mixed couple (either to a foreign-born father or mother) with respect to a couple with two foreign-born parents. This way, I avoid that the cultural proxy may pick up the effect of a low intermarriage rate in the parents’ generation. Additionally, I test the heterogeneity of the cultural effect along this dimension in Section 4.3. Sibship size is used in Fernández and Fogli (2006) as a proxy for personal experience as opposed to the country-of-origin specific cultural norm. When applicable, I also include the gender composition of previously born children. This ensure that my results are not driven by a potential preference for boys or for gender mixity, as observed in Almond et al. (2013); Kugler and Kumar (2015); Angrist and Evans (1998).

²⁷See for instance Currie and Schwandt (2014); Schneider (2015); Hoem (2000); Hondroyiannis (2010) for evidence of the impact of unemployment and economic uncertainty in general on fertility timing.

Table 1: **Relationship between fertility norm and birth timing - France**

	(1)	(2)	(3)	(4)	(5)
Hazard rate of having a first child					
tfr18	0.006 (0.016)	-0.025 (0.018)	-0.041* (0.022)	-0.054*** (0.019)	-0.040** (0.019)
Observations	3852	3852	3852	3852	3852
Log likelihood	1821.0	2594.6	3811.2	3524.5	134562.8
Hazard rate of having a second child					
tfr18	-0.014 (0.012)	-0.015 (0.014)	-0.010 (0.017)	-0.034** (0.016)	-0.019 (0.015)
Observations	1914	1914	1914	1914	1914
Log likelihood	1405.1	764.3	574.3	945.9	3118.0
Hazard rate to having a third child					
tfr18	0.185*** (0.023)	0.181*** (0.025)	0.172*** (0.026)	0.116*** (0.032)	0.112*** (0.030)
Observations	1284	1284	1284	1284	1284
Log likelihood	31557.2	297.7	939.9	1554.7	56205.2
geography and age	x	x	x	x	x
parental characteristics		x	x	x	x
education, nativity & sibship size			x	x	x
gender of earlier children			x	x	x
religion				x	x
marital & labor force status					x
birth timing of earlier children					x

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. Geography contains 22 dummies for region of residence and urban status. A polynomial of degree 2 in age is also included. Parental characteristics contain educational attainment of both parents as well as occupation of the father. Education contains a 6-level categorical variable for own educational attainment, while nativity refers to whether both parents were foreign born, only the mother or only the father. Religion includes a 5-level variable for religion and a 4-level variable for religiosity. Labor force status contains labor market participation as well as occupation. When applicable, I include a set of dummies for the gender composition of earlier born children and birth timing of earlier children.

In (4), I add religion and religiosity (which are two 6-level categorical variables). Finally in (5), I include marital and labor force status, as well as birth timing of previous parities. These variables are all clearly endogenous as well. However the rationale for including them is to test whether even taking into account all available determinants of fertility, the cultural effect still remains. Matrimonial status allows to control for the influence of family arrangements. As for religion, I include it to check to what extent the cultural effect goes through the religion channel. Religion may play a direct role for instance promoting sexual intercourse as a reproduction device only, thus forbidding the use of contraception and abortion, but also discouraging women’s work outside the household etc. Lehrer (2004) reviews these mechanisms, among which she underlines the important impact of pro-natalist ideology of religions such as catholicism that raises the perceived benefit of having an additional child. Numerous papers like Adsera (2006a,b, 2007) show that, in a secular society, religion predicts both a higher fertility norm and actual fertility. Additionally, de la Croix and Delavallade (2015) look at how different religions’ pronatalism is detrimental to growth via the fertility/education channel. Religiosity instead captures the possibility that level of practice, rather than type of faith, actually matters as suggested in Baudin (2015). When applicable, I also control for the timing of previous births in order to pick up potential biological correlations between the birth spacing across parities.

Because errors are likely to be correlated within countries of origin, I cluster the standard errors at the country of origin level in all specifications.

Table 1 shows the coefficients on the fertility norm using tfr18 for each birth parity. The main result is that a higher fertility norm does not increase the hazard rate of having a first or a second child, while it does very significantly for third births. If anything, women with a higher fertility norm tend to enter into motherhood later than comparable women with a low fertility norm. More precisely, using equation (10), I can compute the hazard ratio of having a first child for high fertility women relative to observably identical women with a low fertility norm:

$$\frac{\lambda(t| \text{high norm}, X)}{\lambda(t| \text{low norm}, X)} = e^{\beta(\text{high norm} - \text{low norm})} \quad (11)$$

The standard deviation of tfr18 in the sample is of 1.66, which corresponds roughly to the distance between the average woman from Germany, 1.38, and that from Morocco, 3.07. Now using -0.054 , the coefficient in specification (4), which is the largest in absolute value, implies that the hazard rate of having a first child for a woman from Germany is $e^{-0.054*1.66} = 0.914$ that of a woman from Morocco, which is a decrease of 8.6%. Looking at the hazard rate of having a third child instead, coming from a high fertility country very robustly increases it whatever the specification. Using the same type of computations, a woman from Morocco is between 20 (specification 5) and 36% (specification 1) more likely to have a third child than one

from Germany. Consistent with the discussion on whether or not to control for characteristics that could be influenced by cultural norms such as family arrangements, the more controls are included, the smaller the coefficient gets. I am therefore confident that what I propose is actually a range of magnitude between a lower and a higher bound for the cultural effect. Including controls for religion, number of siblings and number of years in France, the coefficient on norms decreases substantially but remains significant for third births. I interpret this result as a sign that the cultural effect I capture goes partly, though not exclusively, through religious affiliation.

Full tables showing the coefficients on all controls and their interpretation can be found in Appendix D.

4.2 US sample

Because the US Census does not contain information about parental education or religion for instance, I run fewer specifications. In (1), I include only dummies for age and Census region (9-level categorical variable). in (2), I add own education (6-level variable) as well as nativity. When applicable, I also control for the gender composition of earlier born children. Finally in (3), I include marital and labor force status and, when applicable, the timing of earlier births.

Table 2 shows that results are overall very similar to the French case in that the positive effect of $tfr18$ on the hazard rate of having a child start to kick in a robustly significant fashion after two children only. If anything, the hazard rate of having a second child decreases with $tfr18$, but this effect is at most weakly significant. The main difference resides in the fact that the raw correlation between $tfr18$ and the hazard rate of having a first child is positive and significant, but it become insignificant and very close to zero as soon as educational attainment is controlled for. The important implication of this replication exercise on US data is that the pattern uncovered in the previous subsection is not due to particularities of the host country, nor to characteristics of the origin countries as they also differ widely.

In terms of magnitude, Table 2 indicates that a one standard deviation change in $tfr18$, which is 1.39 in this sample and corresponds to the difference between the average woman from Denmark and that from Jamaica, increases the hazard rate of having a third child by 9 (specification 3) to 14.5% (specification 1). This magnitude is smaller than in the French case because i) the standard deviation in $tfr18$ is smaller in the US sample and ii) the estimated coefficients are also smaller. The latter may be related to the larger proportion of mixed couples in the US sample, which is likely to dilute more the cultural effect as will be shown in the heterogeneity analysis in the next subsection.

Table 2: Relationship between fertility norm and birth timing - US

	(1)	(2)	(3)
Hazard rate of having a 1st child			
tfr18	0.047*** (0.018)	-0.002 (0.025)	0.022 (0.021)
Observations	2672	2672	2672
likelihood	311.3	1150.6	1934.7
Hazard rate of having a 2nd child			
tfr18	-0.016 (0.017)	-0.021 (0.018)	-0.037* (0.019)
Observations	1786	1786	1786
likelihood	103.6	193.6	1571.3
Hazard rate of having a 3rd child			
tfr18	0.097*** (0.021)	0.073*** (0.019)	0.063*** (0.022)
Observations	1395	1395	1395
likelihood	119.6	366.6	1001.7
geography and age	x	x	x
education & nativity		x	x
gender of earlier children		x	x
marital & labor force status			x
birth timing of earlier children			x

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. Geography contains 9 dummies for Census region and a polynomial of degree 2 in age is also included. Education contains a 6-level categorical variable for own educational attainment, while nativity refers to whether both parents were foreign born, only the mother or only the father. When applicable, I include a set of dummies for the gender composition and birth timing of earlier born children.

Table 3: **Heterogeneous effect of the fertility norm - France**

	HR 1st child	HR 2nd child	HR 3rd child
<i>Nativity</i>			
foreign-born mother	-0.057*** (0.022)	-0.053* (0.030)	0.155*** (0.052)
foreign-born father	0.023 (0.042)	-0.071 (0.057)	0.155 (0.101)
both parents foreign-born	-0.045 (0.032)	-0.011 (0.015)	0.184*** (0.029)
<i>Education</i>			
up to secondary	-0.008 (0.050)	-0.043 (0.038)	0.127*** (0.049)
vocational	-0.064 (0.033)	-0.009 (0.019)	0.193*** (0.038)
high school grad	-0.067 (0.029)	-0.032 (0.035)	0.178*** (0.054)
2 years in college	-0.071* (0.037)	-0.051 (0.056)	0.211*** (0.070)
> 2 years in college	-0.016 (0.028)	0.075* (0.043)	0.209*** (0.066)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. All specifications include geography, age, parental characteristics, nativity, own education and sibship size. When applicable, gender of earlier children is included.

4.3 Heterogeneity analysis

In this subsection, I consider the possibility that fertility norms do not affect all individuals in the same fashion. The rationale for that is twofold: first, it could be that the absence of cultural effect that I find for first and second births is actually the average of a positive and a negative effect for different subsamples of the population; second, I want to explore for which type of individuals in my sample is the cultural effect stronger. To this end, I estimate again specification (3) of Table 1 for each birth parity but this time interacting `tfr18` with own education and nativity successively. Table 3 reports the coefficient on `tfr18` for each category of the interacted variable.

For first and second births, it appears that the lack of cultural effect is not driven by contradicting effects across individuals with different nativity status or educational attainment. Indeed, most often, the coefficient is not significantly different from zero. However it is sometimes negative and significant. Yet, there is no case of significant coefficients of opposite signs,

which thus invalidates the hypothesis of contradicting effects in different subsamples. Additionally, the large cultural effect documented for third births does not seem to be concentrated on some subsamples. It is slightly larger for women whose parents are both foreign-born, which is consistent with a dilution of cultural transmission in mixed couples. The cultural effect is also present at all level of educational attainment, although it seems slightly less strong for those with at most secondary education. Stichnoth and Yeter (2016) find consistent results on German data for the heterogeneity in nativity status. Nevertheless, their results suggest a larger effect for less educated individuals. Further research is needed along these lines.

5 Discussion and robustness

5.1 Discussion

One potential concern regards the sample variation across birth parities. Indeed, the large cultural effect I estimate on third births is de facto based on the selected sample of women who had at least two children. The sample could therefore be composed of compliers (following the cultural prescription of their origin country) and defiers (acting orthogonally to their cultural background). In order to make the correlation between birth timing and cultural proxies insignificant for first and second births, while leaving it large and significant for third births, the share of defiers in the sample would need to be large for early birth orders and then drop sharply at the third birth. I rule out this possibility by running the regressions on first and second births on a sample restricted to women who had at least two children, so supposedly composed of a majority of compliers. Results remain unchanged.²⁸ Moreover, if defiers seldom have more than two children irrespective of their fertility norm, it may be because they put a larger weight on the economic optimum of having few children, in which case it is totally what I intend to measure.

Another potential inconsistency comes from the fact that the literature documents a much smaller cost for second births as compared to first births. However, I find the same lack of correlation between fertility norms and birth timing for first and second births. One reason for that is that there are potential contradicting effects concerning the timing of the second birth. You may want to anticipate the second birth if you want to complete your fertility at two children and go back to work as soon as possible. Alternatively you may follow the same strategy to secure enough remaining fertile time in order to achieve a much larger completed fertility. This could explain why I do not find any correlation between cultural proxies and timing of second birth despite the much lower cost associated to that decision, as compared to

²⁸Tables available upon request.

first births.

5.2 Country-of-origin specific controls

One obvious threat to the identification strategy is the existence of country-of-origin specific factors correlated to $tfr18$ that could systematically affect fertility choices without being cultural in nature. Table 4 presents eight country-of-origin specific variables, all time-invariant except for GDP per capita, which we take when the individual was age 18, that are correlated to $tfr18$ to some extent, as shown in the first column, and could have some direct influence on fertility behavior. For instance, various measures of distance may influence the way migrants self select into migration, their economic success in the host country as well as their perspective of return. I take geographic distance from Mayer and Zignago (2011), genetic distance from Spolaore and Wacziarg (2009), which they use as a proxy for cultural distance, and linguistic distance based on pronunciation comparison from Isphording and Otten (2014). GDP per capita in the country of origin when age 18 may capture aspirations or habit consumption. Average education is the share of people with at least some college in the second generation migrant population from that origin country in France. It may proxy for social capital, which could influence the quantity and quality of job opportunities migrants from a given country have access to through their diaspora.

Table 4: **Fertility norm and timing of 3rd birth with country-of-origin controls - France**

	corr. w/ tfr18	(1)	(2)	(3)	(4)	(5)	(6)
tfr18		0.185*** (0.028)	0.207*** (0.028)	0.106** (0.045)	0.176*** (0.027)	0.183*** (0.029)	0.160*** (0.055)
geographic dist.	0.45	-0.054 (0.053)					-0.030 (0.040)
genetic dist.	0.40		-0.315** (0.131)				-0.159 (0.164)
linguistic dist.	0.53			0.023* (0.014)			0.022 (0.014)
gdp (in K\$)	-0.55				0.003 (0.015)		0.007 (0.013)
average educ.	-0.26					0.692 (0.968)	0.881 (0.922)
Observations		1283	1283	1283	1283	1283	1283
Log likelihood		507.896	338.857	180.537	217.115	13768.443	602.454

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. Geography, age, parental characteristics, education, nativity, sibship size included in all specifications.

I add each of these variables one at a time and then altogether to specification (3) from Table 1 for the hazard ratio of having a third birth. As I need some cultural effect to start with in order to test its robustness, I discard first and second births to focus on third births. Table 4 reports the coefficients on tfr18 and the extra variables included. The main message from this Table is that including further country-of-origin controls, either separately or altogether, does not eliminate the effect of tfr18 on the hazard rate of having a third birth. The coefficient on tfr18 actually increases compared to its original value of 0.172 in four out of six specifications. It decreases only in specifications (3) and (6), that is when, respectively, linguistic distance and all controls are included. When included separately, only genetic and linguistic distance enter significantly, respectively at the 5 and 10% confidence level. Genetic distance enters negatively, while linguistic distance has a positive coefficient. This could be because on the one hand migrants from genetically distant countries are more selected and are therefore more inclined to work rather than having large families, and on the other hand those from a linguistically similar country have an advantage on the labor market and therefore a higher opportunity cost of having children.

5.3 Alternative measures of norms

In this subsection, I evaluate the sensitivity of the results to the use of alternative measures of cultural norms. More specifically, I use specification (3) in Table 1 and I replace $tfr18$ by the TFR in the country of origin when women were born, $tfr0$, in 1960, $tfr60$ and finally by the mean age at first birth $ma1b$. Each alternative measure changes the implicit identifying assumptions: $tfr0$ assumes that the relevant cultural norm is the behavior of people in the country of origin at the time they were born, implying some sort of transmission from the parents to the children's generation; $tfr60$ allows to derive results that are directly comparable to the seminal contribution by Fernández and Fogli (2006, 2009), but it assumes that cultural norms are strictly time-invariant (rather than slow-moving); moreover $ma1b$ allows to make sure that age at first birth is not another culturally transmitted norm operating in parallel of the completed fertility norm and which would have a better explanatory power for low birth parities.

Results are shown in Table E1. The pattern remains the same as in Table 1. For the first two births, the coefficient on the cultural proxy is either insignificant or of the "wrong" sign, such as the positive coefficient on $ma1b$ for second births, which means that a higher mean age at first birth in the country of origin tend to accelerate the two children regime. For third birth instead, the coefficient is positive and significant when using $tfr0$ and $tfr60$, although slightly smaller than when using $tfr18$. One reason for this decrease in magnitude may be the *impressionable years hypothesis*, which states that people tend to form expectations between 18 and 15, making $tfr18$ a stronger predictor than $tfr0$. Another reason is that $tfr60$ is time-invariant, which does not allow to exploit the within-country of origin variation. Finally, when using $ma1b$, I find a negative and significant coefficient, which means that the higher the mean age at first birth in the country of origin (in other word, the lower the fertility norm), the lower the hazard rate of having a third child. In terms of magnitude, a one standard deviation increase in $ma1b$ amounts to a decrease by 21% of the hazard rate of having a third child, which is in line with what I find using $tfr18$.

5.4 Partner's characteristics

In this subsection, I exploit the fact that the TeO survey asks a large set of questions about partners. Indeed, another threat to the identification of a fertility norm could be that it captures instead some tendency of second generation migrants who are most distant from the host country culture to intramarry or to pick less educated partners. In order to discard this possibility, I focus on a subsample of women whose partners are present in the household. I therefore control for a second order polynomial in their age, their nativity status (native,

second or first generation migrant) and their educational attainment. Additionally I look at the heterogeneity of the cultural effect in this subsample along the own education, own and partner's nativity dimensions.

Results are shown in Tables F1 and F2. The general pattern present in Table 1 is still there: no robust positive correlation between norm and fertility for the first two births, while a robustly significant positive coefficient for the third birth. In terms of magnitude, the coefficient in the two first specifications is larger in the partner's subsample than in the baseline sample. This could be because people in stable unions tend to be more influenced by cultural norms. From specification (3) to (5) however, the coefficient on $tfr18$ is smaller in the partner's subsample. This could be because I include partner's characteristics and that indeed the fertility norm was previously capturing some tendency of high fertility origin women to pick first or second generation migrants rather than native partners but also less educated partners. That said, I still find a very significant coefficient on $tfr18$, suggesting that some of the cultural effect, however not all of it, is going through intramarriage. The results of the heterogeneity analysis are very much in line with those in the baseline. The cultural effect seems weaker for women who have only one foreign-born parent, pick a native partner and who are less educated.

6 Conclusion

In this paper, I have built a model of decision-making featuring a trade-off between an economic cost - benefit analysis and the influence of a cultural norm. I have shown that decisions characterized by a small cost of deviation from the economic optimum were most likely to be influenced by culture. I have brought this hypothesis to the data using birth timing decisions of second generation migrant women to France and the US. I exploit the fact that there are larger costs involved in the decision of timing of the first birth in terms of human capital acquisition and labor market outcomes as compared to that of subsequent births. I indeed find that cultural proxies, as measured by the TFR in the country of origin, do not influence the timing of the first two births while it robustly increases the likelihood of having a third by a large amount.

This work allows to reconcile rational decision-making with cultural influence. It also opens a large area of public policy interventions that would nudge people away from inadequate cultural beliefs. Finally it suggests that cultural norms are subject to natural selection as the costliest to sustain should tend to disappear.

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A Non-autarkic case

Now let me relax the assumption that migrants live in a social autarky. Consider instead that they are at a social distance $d_{HL}(= d_{LH})$ of the host country native population. The problem they face now becomes:

$$U_{i,L,H} = b_L f - c_L f^2 - \sigma_i (F_H^1 - f)^2 \quad \text{where} \quad F_H^1 = \frac{1}{2 - d_{HL}} \times \frac{b_H}{c_H} + \frac{1 - d_{HL}}{2 - d_{HL}} \times \frac{b_L}{c_L} \quad (12)$$

The optimal choice of migrants is then:

$$f_{L,H}^* = \frac{b_L + \sigma_i F_H^1}{c_L + \sigma_i} = \frac{c_L + \frac{\sigma(1 - d_{HL})}{2 - d_{HL}}}{c_L + \sigma} \times \frac{b_L}{c_L} + \frac{\sigma/(2 - d_{HL})}{c_L + \sigma} \times F_H \quad (13)$$

The optimal choice of fertility of migrants is still a convex combination of the two norms (home and host country), but now the weight put on the host country level depends negatively on the social distance between the two country. The comparative statics given by expressions (9) with respect to c_L and F_n still hold. Therefore the model's implications tested in this paper are not sensitive to the relaxation of the cultural autarky assumption. Furthermore, I can uncover an extra direction of comparative statics, deriving with respect to the cultural distance parameter, d_{HL} :

$$\frac{\partial^2 f^*}{\partial F_H \partial d_{HL}} > 0 \quad (14)$$

The idea is that the effect of the home country cultural norm will fade away faster the lower the social distance. I have tried to test this implication as well, but it turns out that cultural distance (as measure by genetic distance for instance) is very much correlated to the cultural norm itself. A problem of collinearity therefore arises and does not allow me to identify the heterogeneity of the cultural effect along the cultural distance dimension. Somehow it is a direct corollary of the cultural diffusion channel developed in Spolaore and Wacziarg (2014) that a high TFR should be correlated with a large cultural distance.

B Summary statistics

Table B1: Summary statistics for control variables - French sample

	low fertility	high fertility		low fertility	high fertility
# obs	2615	1237	<i>Labor force status</i>		
Age	30.32	32.01	employed	0.64	0.62
# siblings	2.89	5.02	unemployed	0.09	0.10
<i>Education</i>			student	0.17	0.14
up to secondary	0.20	0.24	other inactive	0.10	0.13
vocational	0.21	0.21	<i>Religion</i>		
high school grad	0.28	0.25	Atheist	0.30	0.26
2 years in college	0.14	0.14	Christian	0.40	0.18
> 2 years in college	0.17	0.17	Muslim	0.27	0.49
<i>Mother's education</i>			Jewish	0.01	0.02
≥ high school grad	0.26	0.22	Buddhists and others	0.02	0.04
<i>Father's education</i>			Unkown	0.01	0.02
≥ high school grad	0.29	0.23	<i>Religiosity</i>		
<i>Nativity</i>			≥ once a week	0.03	0.05
foreign-born mother	0.27	0.21	≥ once a month	0.05	0.05
foreign-born father	0.20	0.08	for religious celebrations	0.17	0.18
both parents foreign-born	0.53	0.71	for ceremonies in the family	0.33	0.24
<i>Marital status</i>			never	0.11	0.21
not in a relationship	0.48	0.49	unknown	0.31	0.27
Live in towns ≤ 50,000 inhab.	0.29	0.14			

Table B2: Summary statistics for control variables - US sample

	low fertility	high fertility
# obs	1440	1064
Age	39.48	43.65
<i>Education</i>		
high school dropout	0.10	0.19
high school grad	0.34	0.34
some college, no degree	0.22	0.22
associate's degree	0.09	0.07
bachelor's degree	0.16	0.12
master's degree or more	0.09	0.06
<i>Nativity</i>		
foreign-born mother	0.31	0.24
foreign-born father	0.36	0.33
both parents foreign-born	0.33	0.44
<i>Labor force status</i>		
in the labor force	0.70	0.64
<i>Marital status</i>		
divorced or widowed	0.17	0.20
never married	0.26	0.24

Table B3: Summary statistics for origin country data - French sample

origin	# of obs.	tfr1960	tfr0	tfr18	ma1b
Algeria	708	7.65	6.82	4.06	24.90
Morocco	421	7.07	5.43	3.07	24.90
Tunisia	208	7.04	5.32	2.84	24.50
Senegal	135	6.95	7.06	5.50	19.30
Mauritania	16	6.78	6.25	5.28	21.90
Mali	83	6.70	7.06	6.84	18.60
Ivory Coast	40	7.35	6.90	5.27	19.20
Togo	17	6.52	6.99	5.32	19.20
Benin	18	6.28	6.88	6.26	19.80
Cameroon	33	5.65	6.46	5.91	19.70
Congo (Brazzaville)	28	5.88	5.72	5.18	19.80
Democratic Rep. of Congo	27	6.00	6.90	6.77	20.20
Vietnam	113	6.35	4.87	2.48	22.60
Cambodia	92	6.97	5.97	3.55	21.80
Turkey	227	6.30	3.83	2.40	21.80
Portugal	467	3.16	2.42	1.53	25.80
Spain	409	2.86	2.55	1.62	28.40
Italy	456	2.37	2.16	1.46	28.00
Greece	11	2.23	1.88	1.39	26.60
Germany	103	2.37	1.97	1.38	28.10
United Kingdom	27	2.69	1.95	1.76	26.50
Belgium	74	2.54	2.05	1.66	27.50
Netherlands	13	3.12	2.53	1.70	28.40
Hungary	11	2.02	2.01	1.76	23.40
Poland	71	2.98	2.58	1.97	23.80
Total	3852	5.20	4.39	2.83	24.98
Standard deviation		(2.18)	(2.08)	(1.66)	(2.69)

Source: World Bank, World Fertility Report 2012 (United Nations publication)

Table B4: Summary statistics for origin country data - US sample

origin	# of obs.	tfr1960	tfr0	tfr18	ma1b
Puerto Rico	201	4.66	3.78	2.71	.
Canada	398	3.81	3.20	2.71	26.40
Mexico	455	6.78	6.45	4.82	20.80
El Salvador	62	6.73	6.34	5.38	20.50
Cuba	40	4.18	3.92	2.23	.
Dominican Rep	21	7.55	5.98	3.90	21.20
Jamaica	21	5.42	5.09	3.81	19.20
Colombia	17	6.81	5.58	3.49	22.40
Ecuador	11	6.69	5.71	4.40	21.60
Denmark	11	2.57	2.52	2.32	27.40
Norway	20	2.85	2.82	2.47	26.50
Sweden	12	2.17	2.29	2.10	27.20
United Kingdom	195	2.69	2.40	2.20	26.50
Ireland	120	3.78	3.59	3.38	.
Belgium	14	2.54	2.36	2.14	27.50
France	31	2.85	2.59	2.19	28.10
Netherlands	21	3.12	2.37	2.38	28.40
Greece	55	2.23	2.31	1.96	26.60
Italy	318	2.37	2.36	2.12	28.00
Portugal	35	3.16	3.01	2.49	25.80
Austria	24	2.69	2.38	1.93	25.60
Former Czechoslovakia	21	2.09	2.42	2.60	22.90
Germany	223	2.37	2.11	1.76	28.10
Hungary	40	2.02	2.40	2.14	23.40
Poland	110	2.98	2.91	2.88	23.80
Yugoslavia	22	2.75	2.82	2.61	23.50
Former USSR / Russian Fed	83	2.52	2.70	2.55	22.60
China	35	5.76	5.57	3.60	.
Japan	49	2.00	2.25	2.27	27.50
South Korea	17	6.16	3.73	1.69	27.10
Philippines	16	7.15	6.40	5.69	23.10
Vietnam	11	6.35	5.97	3.56	22.60
India	15	5.87	5.31	4.14	19.50
Pakistan	19	6.60	6.60	6.51	22
Total	2504	3.94	3.92	2.96	25.06
Standard deviation		(1.70)	(1.74)	(1.39)	(2.87)

Source: World Bank, World Fertility Report 2012 (United Nations publication)

C Test of the proportional hazard assumption

Figure C1: Kaplan-Meier Vs predicted Cox estimates

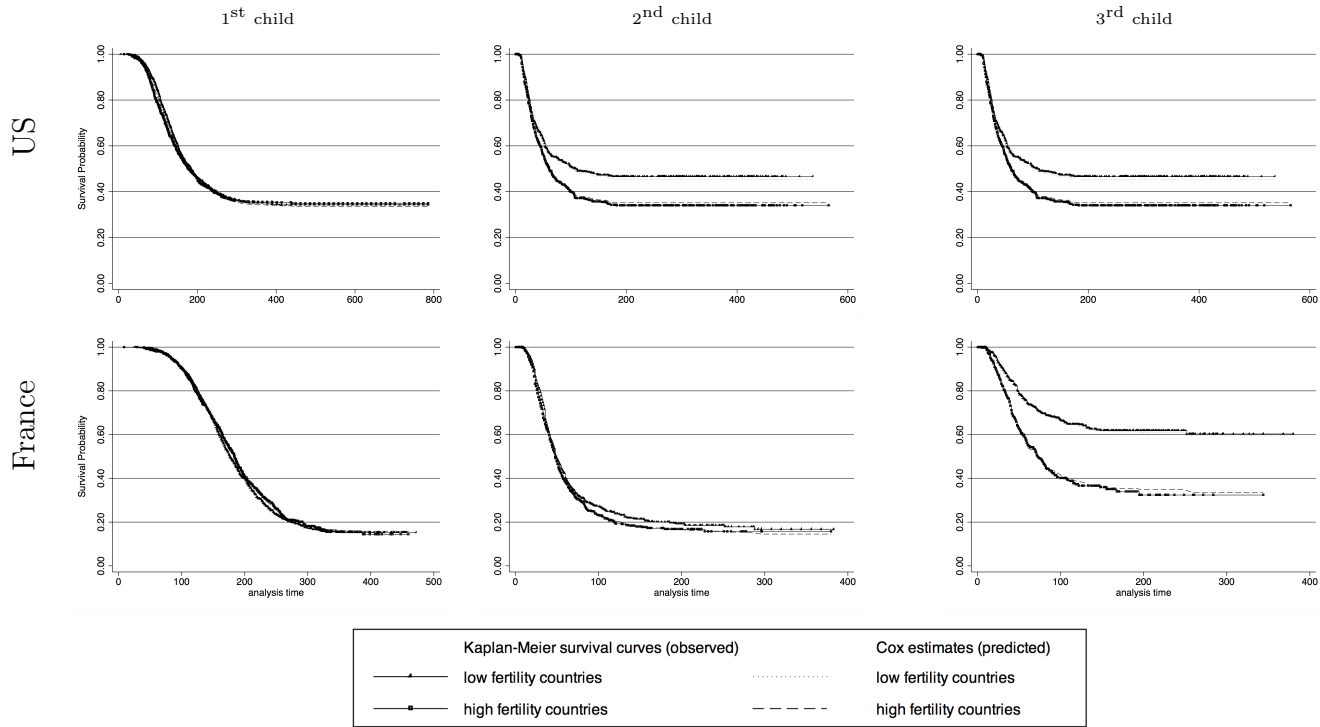


Figure C plots Kaplan-Meier observed survival curves and compares them with the Cox predicted curves for low and high fertility individuals separately (as defined by individuals having a tfr_{18} below or over 2.8), for each birth parity, both in the French and US sample (six panels in total). Observe that the Cox estimates do not differ substantially from the Kaplan-Meier survival curves in any of the panels, suggesting the proportional hazard assumption is not violated.

D Full baseline tables

Table D1: Relationship between fertility norm and timing of first birth, full table - France

	(1)	(2)	(3)	(4)	(5)
	Hazard rate of having a first child				
tfr18	0.006 (0.016)	-0.025 (0.018)	-0.041* (0.022)	-0.054*** (0.019)	-0.040** (0.019)
<i>baseline: foreign-born mother</i>					
Foreign-born father			-0.073 (0.076)	-0.076 (0.077)	-0.025 (0.073)
Both parents foreign-born			-0.138** (0.058)	-0.170*** (0.048)	-0.163*** (0.044)
<i>baseline: up to secondary</i>					
vocational			-0.282*** (0.102)	-0.285*** (0.106)	-0.321*** (0.099)
high school grad			-0.613*** (0.115)	-0.622*** (0.120)	-0.607*** (0.120)
2 years in college			-0.765*** (0.129)	-0.775*** (0.135)	-0.760*** (0.131)
> 2 years in college			-0.928*** (0.113)	-0.930*** (0.113)	-0.945*** (0.133)
# of siblings			0.025*** (0.009)	0.024*** (0.009)	0.030*** (0.007)
<i>baseline: Atheist</i>					
Christian				-0.266 (0.466)	-0.321 (0.410)
Muslim				-0.121 (0.522)	-0.269 (0.468)
Jewish				0.350 (0.492)	0.133 (0.394)
Buddhist and other				-0.380 (0.469)	-0.167 (0.407)
unknown				-0.162 (0.283)	-0.015 (0.219)
<i>baseline: unknown</i>					
≥ once a week				0.570 (0.526)	0.516 (0.481)
≥ once a month				0.409 (0.476)	0.403 (0.426)
for religious celebrations				0.344 (0.459)	0.352 (0.411)
for ceremonies in the family				0.324 (0.489)	0.283 (0.430)
never				0.295 (0.496)	0.403 (0.456)
Observations	3852	3852	3852	3852	3852
Log likelihood	1821.0	2594.6	3811.2	3524.5	134562.8
geography and age	x	x	x	x	x
parental characteristics		x	x	x	x
marital & labor force status					x

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. Same controls as in Table 1.

Table D2: Relationship between fertility norm and timing of third birth, full table
- France

	(1)	(2)	(3)	(4)	(5)
	Hazard rate to having a third child				
tfr18	0.185*** (0.023)	0.181*** (0.025)	0.172*** (0.026)	0.116*** (0.032)	0.112*** (0.030)
<i>baseline: foreign-born mother</i>					
Foreign-born father			-0.138 (0.146)	-0.183 (0.158)	-0.036 (0.153)
Both parents foreign-born			-0.146 (0.111)	-0.266** (0.105)	-0.206** (0.084)
<i>baseline: up to secondary vocational</i>					
high school grad			-0.462** (0.194)	-0.369** (0.169)	-0.198 (0.123)
2 years in college			-0.375** (0.182)	-0.229 (0.189)	0.029 (0.153)
> 2 years in college			-0.575*** (0.169)	-0.411** (0.179)	-0.261 (0.167)
# of siblings			0.005 (0.009)	0.002 (0.009)	-0.009 (0.010)
<i>baseline: two boys</i>					
girl then boy			-0.216* (0.119)	-0.189 (0.120)	-0.173 (0.125)
boy then girl			0.018 (0.104)	-0.010 (0.133)	0.044 (0.125)
two girls			0.256** (0.107)	0.278** (0.129)	0.249** (0.104)
<i>baseline: Atheist</i>					
Christian				0.056 (1.026)	-0.336 (0.999)
Muslim				0.736 (1.151)	0.236 (1.116)
Jewish				1.208 (0.985)	0.790 (1.008)
Buddhist and other				-0.835 (1.077)	-0.711 (0.975)
unknown				0.596 (0.516)	0.242 (0.631)
<i>baseline: unknown</i>					
≥ once a week				0.463 (0.915)	0.556 (0.896)
≥ once a month				0.182 (1.020)	0.518 (0.993)
for religious celebrations				-0.219 (1.035)	0.053 (0.972)
for family ceremonies				-0.189 (1.024)	0.170 (0.969)
never				-0.245 (1.102)	0.190 (1.053)
timing to 1 st birth				-0.006*** (0.001)	-0.006*** (0.001)
timing to 2 nd birth				-0.013*** (0.002)	-0.011*** (0.001)
Observations	1284	1284	1284	1284	1284
Log likelihood	31557.2	297.7	939.9	1554.7	56205.2
geography and age	x	x	x	x	x
parental characteristics		x	x	x	x
marital & labor force status					x

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. Same controls as in Table 1.

In this Section, I comment on the coefficients on the control variables for the hazard rate to have a first and third birth (the table for second births is available upon request but does not feature any result that is not presented here). First, being born to a mixed couple seems to increase the hazard rates of both first and third birth, which might be a bit counterintuitive but might hide an heterogeneous effect along the cultural dimension. Indeed, when I include an interaction term between nativity status and the cultural norm as in Section 4.3, I find that being born to a mixed couple has a delaying effect only for individuals with a low enough fertility norm. The effect changes sign for high enough levels of the norm.

Second, educational attainment is a key determinant of fertility. Here I choose to show only own education but parental education does matter as well even when controlling for own. The usual result holds that highly educated women tend to postpone first births and to be less at risk of experiencing a third.

Third, unlike Fernández and Fogli (2006), I find an effect of personal experience, as measured by the number of siblings, only for the timing of the first birth, and its magnitude is relatively small, as compared to that of the fertility norm for third births. The coefficient on number of siblings is insignificant and very close to zero for third births.

As for religion, I find no significance whatsoever. Christians and Muslims seem to postpone childbearing of the 1st birth, while Muslims and Jewish (who are mainly from Tunisia in my sample) seem to be more likely to have a third birth. That said, I include religion and religiosity at the same time, which could be very correlated and therefore prevent the precise estimation of their association to fertility. Even though never significant, the coefficients on high religiosity are positive and of a size that would imply a substantial impact. Finally, as expected, women with already two girls are way more likely to experience a third birth. Timing of previous births has a significant though relatively small effect on the timing of the third.

E Alternative measures of norms

Table E1: Fertility norm and birth timing, alternative measures of norms - France

	TFR at birth	TFR in 1960	Mean age at 1 st birth
Hazard rate of having a 1st child			
β	-0.029	-0.019	0.007
(sd)	(0.019)	(0.021)	(0.018)
Observations	3852	3852	3852
likelihood	-13932.7	-13934.2	-13935.3
Hazard rate of having a 2nd child			
β	-0.002	-0.003	0.034**
(sd)	(0.015)	(0.015)	(0.011)
Observations	1914	1914	1914
likelihood	-12357.8	-12357.8	-12354.0
Hazard rate of having a 3rd child			
β	0.156***	0.159***	-0.089***
(sd)	(0.029)	(0.030)	(0.028)
Observations	1284	1284	1284
likelihood	-2852.8	-2851.4	-2864.9

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. Geography, age, parental characteristics, education, nativity, sibship size included in all specifications. When applicable, I include a set of dummies for the gender composition of earlier born children.

F Partner's characteristics

Table F1: Fertility norm and birth timing, controlling for partner's characteristics - France

	(1)	(2)	(3)	(4)	(5)
	Hazard rate of having a first child				
tfr18	0.009 (0.016)	-0.020 (0.019)	-0.059*** (0.018)	-0.073*** (0.026)	-0.062** (0.028)
Observations	2520	2520	2520	2520	2520
Log likelihood	4979.865	1335.423	4858.288	3797.284	12935.310
	Hazard rate of having a second child				
tfr18	0.029** (0.012)	0.016 (0.019)	-0.006 (0.017)	-0.025 (0.021)	-0.024 (0.019)
Observations	1593	1593	1593	1593	1593
Log likelihood	9151.130	1748.183	641.233	5781.024	1331.789
	Hazard rate to having a third child				
tfr18	0.215*** (0.022)	0.196*** (0.021)	0.167*** (0.024)	0.124*** (0.029)	0.116*** (0.026)
Observations	1100	1100	1100	1100	1100
Log likelihood	31992.507	2012.600	1388.788	3695.510	36612.852
geography and age	x	x	x	x	x
parental characteristics		x	x	x	x
education, nativity & sibship size			x	x	x
partner's characteristics			x	x	x
gender of earlier children			x	x	x
religion				x	x
marital & labor force status					x
birth timing of earlier children					x

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. Geography contains region of residence and urban status. A polynomial of degree 2 in age is also included. Parental characteristics contain educational attainment of both parents as well as occupation of the father. Education contains a 6-level categorical variable for own educational attainment, while nativity refers to whether both parents were foreign born, only the mother or only the father. Partner's characteristics include a polynomial of degree 2 in age, nativity status and educational attainment. Religion includes a 5-level variable for religion and a 4-level variable for religiosity. Labor force status contains labor market participation as well as occupation. When applicable, I include a set of dummies for the gender composition of earlier born children and birth timing of earlier children.

Table F2: **Heterogeneous effect of the fertility norm using partner's characteristics**
- France

	HR 1st child	HR 2nd child	HR 3rd child
<i>Own nativity</i>			
foreign-born mother	-0.048*	-0.044	0.119***
	(0.029)	(0.029)	(0.035)
foreign-born father	-0.060	0.053	0.114
	(0.060)	(0.057)	(0.097)
both parents foreign-born	-0.065**	0.005	0.210***
	(0.029)	(0.019)	(0.035)
<i>Partner's nativity</i>			
native	-0.045**	-0.029	0.121***
	(0.018)	(0.022)	(0.031)
2 nd generation migrant	-0.020	0.096***	0.227***
	(0.043)	(0.034)	(0.064)
1 st generation migrant	-0.105*	-0.013	0.214***
	(0.054)	(0.022)	(0.031)
<i>Education</i>			
up to secondary	-0.037	-0.045	0.141**
	(0.048)	(0.037)	(0.067)
vocational	-0.096***	0.032	0.139***
	(0.023)	(0.025)	(0.042)
high school grad	-0.075**	-0.040	0.187***
	(0.027)	(0.032)	(0.061)
2 years in college	-0.045	-0.072	0.223***
	(0.039)	(0.059)	(0.076)
> 2 years in college	-0.030	0.056	0.234***
	(0.030)	(0.042)	(0.067)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. S.E. clustered at the country of origin level in parenthesis. All specifications include geography, age, parental and partner's characteristics, nativity, own education and sibship size. When applicable, gender of earlier children is included.