Fertility and Life Satisfaction in Rural Ethiopia*

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Abstract

The link between fertility and subjective well-being, while largely investigated for developed countries, is still rather unexplored for poorer areas. Using a well-established panel survey, we investigate the empirical relationship between fertility and life satisfaction in rural Ethiopia, the largest landlocked country in Africa. Our results suggest that older men benefit the most in terms of life satisfaction from the investment in children, while the birth of a child is detrimental for women's subjective well-being during their reproductive age. We argue that this mismatch has two complementary explanations: on the one hand, in the short run young children represent a burden which traditionally falls on women's shoulders, rather than a source of (labour) support; on the other hand, in poor rural areas children can be thought by men as a valuable long-term investment, particularly in terms of labour support. Endogeneity issues are addressed by controlling for lagged life satisfaction in OLS regressions, through fixed effect estimation and the IV approach.

Keywords: fertility, life satisfaction, subjective well-being, poverty, development, parenthood, gender

JEL codes: D10, J13, I3, O10, O55

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1. Introduction

Over the last few decades, despite a general world fertility decline, fertility still remains very high in Sub-Saharan African countries and in most places it hovers way above the replacement level. High and persistent poverty is perhaps the most stable feature of these high fertility contexts. Thus, economists have long looked into the economic trade-off between childbearing and economic opportunity. The general finding from this large literature is that high fertility rates hold back proper investment in human capital, thereby hindering poverty alleviation. The result is a sort of Malthusian trap, a vicious cycle of poor financial resources, high number of children and underinvestment in human capital (Birdsall and Griffin 1988). Both the traditional economic theory of fertility (e.g. Becker 1960) and the old and recent results relying on the Value of Children approach (Bühler 2008; Hoffman et al. 1978; Nauck 2007) acknowledge that in developing countries a high number of children can be perceived by parents as a value, as long as children represent both a source of labour and old-age support. These mechanisms are likely to create over time cultural norms, that by themselves add a social value to having a large family (Voas 2003). Consequently, in poor rural areas the immediate detrimental effect of a high number of children on the economic well-being of the household may be overcome by the economic benefits from grown-up children in the medium and long term and by the social rewards associated with having obtained a large family (e.g. Bongaarts and Bruce 1995; Westoff and Bankole 2000). However, quite on the contrary, the traditional economic argument would prescribe a lower quantity of children and higher investment in human capital as a recipe for obtaining higher overall household well-being (Becker and Lewis 1973). Such an asymmetry is clearly demonstrated when comparing household poverty status derived from the standard basic needs approach (and used by the World Bank to estimate official poverty rates) with that of self-reported poverty status. The two measures differ widely, with the official poverty rate increasing monotonically with number of children, whereas self-reported poverty being largely neutral of family size (Kedir et al. 2005).

There are consequently good reasons for considering a more comprehensive and direct measure of well-being to understand the complex links between poverty and fertility. One alternative is to ask individuals directly about their subjective well-being. At least in developed countries, such measures are recognized as valid and reliable (Krueger and Schkade 2008; Urry et al. 2004) and increasingly adopted to portray utility and unrevealed preferences in the economic literature (e.g. Alesina et al. 2004; Ferrer-i-Carbonell and Frijters 2004; Frijters et al. 2012; Layard et al. 2008;). While explored rather extensively for developed countries (e.g. Aassve et al. 2012; Clark et al. 2008; Myrskylä and Margolis 2014; Nomaguchi and Milkie 2003; Pollmann-Schult 2014),

subjective well-being associated with childbearing is so far not considered for developing countries. In large part this is due to a general lack of data on subjective well-being measures and in particular to the existence of very few longitudinal surveys. Consequently the empirical relationship between subjective well-being and fertility in developing countries is largely unknown.

This study explores the link between fertility and subjective well-being in rural Ethiopia and it does so separately for men and women and for different age groups. High fertility in rural Ethiopia is a relevant issue: the total fertility rate in Ethiopia was still 5.3 in 2005-10 (UN, 2015), with a substantial differential between rural and urban areas; moreover, the country presents one of the highest population growth in the world[1]. The issue of high fertility was formerly addressed in 1993 by the National Population Policy of Ethiopia (NPPE), which emphasized the role of fertility and population for poverty reduction[2]. One of the objectives the NPPE established was shifting the total fertility rate from 7.7 to 4.0 by the year 2015; the deadline is here, but the aim has not been reached, in particular by rural Ethiopia.

Other than being highly relevant both from a demographic and development point of view rural Ethiopia is represented by the Ethiopian Rural Household Survey, which contains time repeated measurements of life satisfaction, life events and major socio-economic variables at individual level. As for fertility, we consider the number of children ever born and new births events, while subjective well-being is expressed by a question on individual life overall satisfaction. Fixed-effects and instrumental variables regression techniques enable us to detect the impact of both the number of children and recent births while mitigating endogeneity problems commonly encountered in this literature.

This study contributes to the demographic and economic literature in many important respects, considering that there are no similar studies investigating the empirical correlation between fertility and subjective well-being in a developing country. First, we consider the preferences of the men and women in the couple separately. As argued in Bardhan and Udry (1999), the adoption of a universal framework based on household utility maximization while providing insights into fertility decisions it nevertheless ignores the possibility that preferences are not the same within the couple. Second, subjective well-being captures material and immaterial aspects of well-being (i.e., satisfaction with the partner, psychological costs of childbearing, perceived health, relative income, etc.) which often are not fully explained by the observed socio-demographic and economic controls

[1]Ethiopia is the second-most populated African country, with a population growth of 2.7% in 2005-10 (UN, 2015). According to DHS data, the total fertility rate in rural Ethiopia (83% of the total population) was 5.5 children on average per woman in 2011 (latest available results) and 6.0 in 2005.

[2] Subsequent Ethiopian policies on poverty reduction, i.e. the Sustainable Development and Poverty Reduction Program (SDPRP) of 2002 and the Plan for Accelerated and Sustainable Development to end Poverty (PASDEP) of 2005 did not address the same issue in a direct way.

reported in most of the empirical analyses. Subjective well-being measurements provide policy-makers with insights on what individuals judge as important for their lives and thereby help identifying mechanisms that would enhance individuals' self-fulfilment and their freedom to reach the desired standards of living (Sen 2001). Third, we acknowledge the non-negligible role of financial and economic constraints in determining both fertility behaviour and subjective well-being. Specifically, we take into account in our empirical analysis the conventional objective indicators of poverty while constructing as well an index that captures the individual's perceived lack of access to basic needs.

We find a positive link between the number of children ever born and life satisfaction of men aged between 50 and 60 years, whereas having had at least a new child in the five years before the interview - negatively impacts life satisfaction of women in reproductive age. These findings are consistent with each other if children are considered by men as a valuable investment in a life-cycle perspective, whereby the decision to incur in the high cost of having a new birth at a young age is compensated by long-run benefits of different types, i.e. – for instance – reduced uncertainty, insurance against possible shocks, labour assistance in agriculture, financial support. Different results depending on parents' gender is something frequently found in the study of the relationship between subjective well-being and fertility (Aassve et al. 2014; Aassve et al. 2012; Keizer et al. 2010; Kohler et al. 2005). Concerning the special case of rural Ethiopia, it is likely that men value more the long-term investment in children than women, who are less assisted in household tasks by grown-up children (Caldwell 1986). On the contrary, women have the responsibility to raise children, after having borne the physical risk associated with pregnancy and delivery (e.g. Mekonnen and Mekonnen 2003); maternal healthcare assistance is the most challenging among the eight Millennium Development Goals for Ethiopia (UNSD data, MDG report 2011)..

Our findings provide a unique empirical contribution to the theorized relationships between poverty, fertility and well-being in poor areas. We highlight the importance of non-economic well-being measures also for developing countries, as well as the diverse consequences children may have on the father's and the mother's subjective well-being in a rural and developing area. The results suggest that local cultural norms and gender asymmetries regarding the value of children influence fertility behaviour and decision-making, independently from subjective and objective poverty levels. This implies that addressing the issue of Ethiopia's high population growth would need a massive change in fathers' attitudes toward childbearing, besides a substantial empowerment of women, whose preferences for a lower number of children are frequently eclipsed by those of their husbands (Mesfin 2002).

2. The background

2.1 Traditional theories

High fertility levels in developing countries have been traditionally explained in the light of Becker's economic analysis of fertility or according to the Value of Children (VoC hereon) approach. The former relies on the assumption that the couple's demand for children depends on a rational valuation of the costs and benefits associated to children relative to other utility-enhancing goods as well as on parents' preferences (Becker 1960). Financially constrained households in developing countries may lower the cost of a child by adjusting optimally childcare and work time and/or benefitting from children's labour at a very young age. Hence the household selects the optimal mix of child "quantity" and "quality" given the opportunity cost of the time spent in childbearing – i.e., the forgone wage parents would have earned –, the loss of present consumption and the increase in future consumption due to the support received by the children later in life. The theory predicts that, if the parents are rational utility-maximizers, a decrease in the direct and indirect costs of a child would increase the quantity of children demanded; however, an increase in the household's income and/or in the expected returns from child schooling would shift parents' fertility choice towards a low quantity but high quality equilibrium, i.e. less but better educated children (Becker 1991).

Preferences for children admittedly depend also on cultural factors, like tradition, religion and values: the VoC approach provides insight on the "satisfactions" (values) and costs (disvalues) associated with children (Hoffman and Hoffman 1973)[3]. Numerous studies during the 1970s and the 1980s following this approach showed that social and cultural factors had an impact on the relevance of these values (e.g. Fawcett 1983). In poorer countries, the instrumental values of children – like help in housework, financial help or old age insurance – appeared more significant than immaterial values, such as rewarding interactions and psychological appreciation (Bulatao 1979a; Hoffman et al. 1978). From then on, the type of society and cultural conditions where the children were born always displayed an effect on the relative importance of certain values over others (Bulatao 1981; Nauck 2005; Nauck 2007). Relying on Friedman et al. (1994), one could argue that country-specific or cultural-specific values of children may fall under the umbrella term of "uncertainty reduction": in developed societies, children enhance marital solidarity and stability, in developing countries children provide social integration, wealth and insurance to parents, at different stages of their life.

[3] According to the original framework, parents have children in order to satisfy nine values or needs: affection and primary group ties, stimulation and fun, expansion of the self, acquisition of adult status and social identity, achievement and creativity, morality, economic utility, power and influence, social comparison.

Thus, Becker's economic approach to fertility and VoC theoretical framework share the idea that individuals evaluate costs and satisfactions from having children and that this evaluation drives reproductive choices.[4] If individuals indirectly assess possible changes in their well-being due to the birth of a child before the event happens, the values and disvalues of children will influence parents' subjective well-being during the life course. This is particularly salient in developing countries, where both instrumental and intrinsic values of children still play an important role in explaining fertility behaviour.

2.2 Subjective well-being and fertility

Over the last twenty years, numerous authors have claimed that parents are not happier than non-parents in *developed* countries and that an increasing number of children negatively affects various subjective well-being dimensions (Clark and Oswald 2002; Di Tella et al. 2003; Dockery 2010; Hansen 2012; Peiró 2006; Plagnol and Huppert 2010). Nevertheless, the negative effect of fertility on well-being is moderated by some factors: parity, gender, marital status, economic status, welfare state. First births make mothers happier than higher-order births (Kohler et al. 2005). Unmarried parents are usually less happy than married ones (Nomaguchi and Milkie 2003), whereas mothers seem happier in Nordic or "Social democratic" countries (Denmark, Netherlands, Finland, Norway and Sweden) than in "Conservative", "Liberal" and Eastern European or "Former socialist" countries (Aassve et al., 2015; Aassve et al., 2012). Applying fixed-effects models on the German Socio-Economic Panel data, Pollmann-Schult (2014) finds that parenthood by itself has persistent and positive effects on life satisfaction, but these effects are counterbalanced by financial and time costs of parenthood.

Moreover, the link between parenthood and subjective well-being changes over time: happiness increases in the years around the birth of a child and then decreases to before-child levels (Clark et al. 2008; Myrskylä and Margolis 2014). This shift is particularly significant for female well-being (Clark et al. 2008), while it does not hold for third or higher-order births (Myrskylä and Margolis 2014).

When the analysis is conducted over many countries, characterized by heterogeneous welfare states and stages of development, happiness decreases with the number of children born (Bjørnskov et al. 2008; Margolis and Myrskylä 2011; Stanca 2012). Such a negative effect is compensated by the increasing age of the parents, the help provided by the children when they grow up and the presence of effective public support for families (Margolis and Myrskylä 2011). As a potential explanation to

[4] This idea is far from being outdated: in fertility decision-making, Bulgarian parents still evaluate perceived child-related benefits, like the strengthening of family and social ties and support during old age (Bühler 2008).

the negative impact of children on life satisfaction, Stanca (2012) argues that all over the world, children affect negatively happiness through their negative impact on parents' financial satisfaction. The link between fertility and life satisfaction in developing countries is scarcely investigated. For the set of developing countries in their sample, Margolis and Myrskylä (2011) find that happiness decreases monotonically with number of children for the age group 20-39, then the relationship flattens out for people older than 39. Nevertheless what is valid for a large set of developing countries may not apply to very specific and deprived contexts. Relying on World Value Survey data, Peiró (2006) shows that in Nigeria having three children promotes parents' happiness, while lower or higher-order births do not have significant effects neither on financial satisfaction nor on life satisfaction.

2.3 Fertility in rural Ethiopia

Ethiopia may be considered as a country in the first stages of the demographic transition: infant mortality rates have decreased considerably (and it is now on average around 44 per one thousand live births in 2014), but fertility rates are still very high, with a total fertility rate of 5.2 children per woman in 2014. Latest available DHS data attest that in 2011 the total fertility rate was substantially higher in rural Ethiopia (5.5), equivalent to 83% of the total Ethiopian population, than in urban Ethiopia (2.6) and the same difference held for contraceptive use (23.4% in rural Ethiopia vs. 52.5% in urban Ethiopia). In the past, fertility declined in conjunction with adverse economic and political shocks, like famine and war (Lindstrom and Berhanu 1999), but these were fluctuations rather than stable changes.

Parents in rural Ethiopia have good reasons to keep their demand for children high: even though the number of children is positively associated with poverty, the cost of raising children is low and working children contribute to the income of their households, especially the ones engaged in agricultural activities (Aassve et al. 2006). But also the traditional value attributed to a large number of children, strengthening the parents' social status (Pankhurst, 1992), may play a role in the persistence of high fertility rates.

Indeed, interest in contraception arises after a certain family size has been reached; Short and Kiros (2002) argue that Ethiopian women would like to limit births after at least two sons and two daughters and that both men and women prefer a mixed sex distribution in their offspring, even though with a prevalence of male children. Consistently with this, also the combination of intra-household very high fertility and low child mortality has been found to promote contraception use, in order to reach optimal intermediate-levels fertility (Alvergne et al. 2013). Nonetheless, Ethiopian couples are not likely to use contraceptives if only the woman desires to limit fertility (Mesfin

2002). In the Southern region of Ethiopia more empowered women in terms of schooling, paid employment and age proximity with their husband prefer less children (Hogan et al. 1999). However, contraceptive use hasn't still entered the culture and habits of individuals in rural Ethiopia.

3. Data

3.1 The dataset

We use the last two waves of the Ethiopian Rural Household Survey (ERHS, years 2004 and 2009), a longitudinal survey on rural households belonging to four Ethiopian regions: Amhara, Oromya, Southern Nations, Nationalities and People's Region (SNNPR) and Tigray. The survey is composed of seven rounds between 1994 and 2009, but we select the last two as they are the only ones providing information on subjective well-being collected for the household head and his or her partner (if any). In a small minority of cases, other knowledgeable people in the household, like the household head's child, son or daughter in-law, sibling and brother or sister in-law, are interviewed in place of the household head. Respondents answering to well-being and other subjective questions are also providing information for the household and its members. Anyhow, given the subjective feature of our main variable of interest (i.e. life satisfaction), we keep only those observations where the same individual is interviewed in both waves.[5]

We cut the upper age at 60 as reported in 2009 for the whole sample, in order to collect better information on fertility histories, which are not directly addressed in the questionnaire; we build them retrospectively thanks to the past waves. Using age thresholds which are very common in the literature, we run the models separately for individuals during their reproductive years (below 45 for women, below 50 for men) and beyond their reproductive years (between 45 and 60 for women, between 50 and 60 for men).

3.2 The variables

Our dependent variable is cognitive evaluation of life, exemplified by the question: "Suppose we say that the top of a ladder represents the best possible life for you and the bottom represents the worst possible life for you. Where on the ladder do you feel you personally stand at the present time?" The bottom of the ladder is anchored to value 0 and the top to value 10. We treat the scale as cardinal, as life satisfaction scores can be almost equally treated as ordinal or cardinal (Ferrer-i-

[5] The data cleaning procedure led to a loss 16% of observations due to household-level attrition rate between the two waves and to a subsequent loss of 18% of observations in order to have the same individual answering to subjective well-being questions in both waves.

Carbonell and Frijters 2004) and simple linear models are as good as ordered latent response models, but computationally much easier (Van Praag and Ferrer-i-Carbonell 2006).

Our key independent variable is fertility, intended both as the number of children ever born and the presence of birth events between survey waves. The remaining covariates are individual characteristics and household characteristics. Among the former we have partnership (a dummy equal to 1 if the respondent has a co-resident partner), education (a dummy equal to 1 if the respondent went to school) and an index for physical limitations, built on five activities: standing up after sitting down, sweeping the floor, walking for five kilometres, carrying 20 litres of water for 20 metres and hoeing a field for a morning. The response answers to these items extend from 1 if the activity is easily performed, to 4, if the activity cannot be performed at all. By consequence the index, built as a sum of the tasks, spans from 5, if the individual can easily perform all the five activities, to 20. At the household level, we rely on a set of objective measures of economic status: household per capita food expenditure (in logarithm in the models), total land size, the number of open loans and the non-availability of any kind of shared or private toilet, including flush toilet, pit latrine and pan or bucket. The latter is also an indicator of health risks for the household, as the lack of toilet is a widely known source of diseases. Furthermore, we add a subjective measure of economic status, named "Adequacy perception index" and built as the mean of three items on reported adequacy in food, housing and health care for the household.

Other covariates are the household religion (Muslim, Non-Protestant Christian, Protestant and other religions), the presence of socio-political shocks (like imprisonment, land redistribution, forced migration) in the previous two years and the presence of household shocks (like theft of cash, crops, livestock in the household, death or illness of a member of the household) in the previous two years. Climate and agricultural shocks are not taken into account because of very limited variability in a rural community. A summary of the variables is displayed in Table 1.

[insert Table 1 here]

4. Econometric results

4.1 OLS and fixed effects estimates

We first model the relationship between fertility and life satisfaction through OLS regressions and panel fixed effects. Standard errors have been clustered at village level in all the estimates.

The model specification depends on the age range considered: when considering respondents in their reproductive age, i.e. women (men) aged less 45 (50), we intend fertility as both the number of children ever born and the presence of birth events between survey waves. For older respondents (women aged 45-60, men aged 50-60) fertility is defined as the number of children ever born.. Accordingly, we first estimate the following model for younger respondents with standard OLS at wave 2:

$$LifeSat_i = \beta_0 + \beta_1 N\_children_i + \beta_2 newborn_i + \sum_j \beta_j X_{ij} + \varepsilon_i \quad \text{(Eq. 1)}$$

where *N_children* is the number of children ever born, *newborn* is a dummy variable equal to one if the respondent reports a birth event in the last 5 years and *X* is the set of socio-economic and demographic variables described in the previous section.

Results are reported in columns 1-4 of Table 2a for men and Table 2b for women.

[insert Tables 2a and 2b here]

The econometric findings highlight that having a new child between the two waves (2004-2009) negatively affect women's cognitive evaluation of life while it has only a marginally significant effect for men. This result is robust to the inclusion of the *Adequacy perception index*, capturing the respondent's perceived lack of access to basic needs (column 3, Tables 2a-2b).

The negative effect of the newly born child is robust also to the addition of the lagged level of life satisfaction among the regressors (column 4, Tables 2a-2b). The introduction of this variable has two advantages: on the one hand, lagged life satisfaction captures the unobserved socio-economic and psychological factors influencing both the decision of having a child and later life satisfaction (e.g., satisfaction with the partner and - more generally - with the household, latent financial conditions, personality traits); on the other hand, it reduces the potential bias in the estimated effect of a new child deriving from respondents' heterogeneity in their initial life satisfaction levels (Kim and Hicks 2015). As a further robustness check we re-estimate the models in columns 3-4 of Tables 2a-2b by adding also the socio-demographic and economic controls measured at the previous wave; this check is aimed at further mitigating the potential endogeneity in the decision of having a new child deriving, for instance, from sample heterogeneity in terms of initial conditions. Regression results are reported in the Table 5 in Appendix and are consistent with the main findings.

We then exploit the panel feature of the data by re-estimating the model in Eq. 1 with panel fixed effects (wave 1 and 2) as specified in the following equation:

$$LifeSat_{it} = \beta_0 + \beta_1 N\_children_{it} + \sum_j \beta_j X_{ijt} + \alpha_i + \varepsilon_{it} \quad \text{(Eq. 2)}$$

The use of fixed effects regression is aimed at mitigating the potential bias in the new birth effect by netting out the individual unobserved (time invariant) characteristics (α_i) that affect the decision of having a new child, the reported levels of subjective well-being or both.

[insert Table 3 here]

Results are reported in Table 3 separately for men (columns 1-2) and women (columns 3-4). We dropped the dummy used in previous estimates to capture the effect of a new birth (i.e., *Birth event in the last 5 years*). Since fixed effects are equivalent to first-differences models when the time dimension of the panel is two as in our case, the effect of a new child is absorbed in the coefficient of the variable *N. children ever born*. Hence this coefficient can be interpreted as the effect on respondent's life satisfaction of the *change* in the number of children between two waves. As showed in columns 1-2 (Table 3), the negative effect of a new birth on women's life satisfaction is robust to the dynamic fixed effects estimation, while the marginally significant effect for men is not (columns 3-4, Table 3)[6].

We then regress life satisfaction on the number of children for older respondents, i.e. men aged 50-60 and women aged 45-60, by estimating the following equation:

$$LifeSat_i = \beta_0 + \beta_1 N\_children_i + \sum_j \beta_j X_{ij} + \varepsilon_i \qquad \text{(Eq. 3)}$$

OLS results reported in columns 5-6 of Tables 2a-2b give partial support to the above-mentioned theories since a positive relation between the number of children and life satisfaction is found to be significant only for men.

Interestingly, all our findings are robust to the introduction of the socio-economic variables capturing respondents' objective financial conditions, health status and the subjective perception of poverty. This evidence might suggest that changes in economic status do not alter the positive (negative) value old men (young women) place on children as the Beckerian theory would predict[7].

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[6] In columns 3-4 of Table 3 the positive effect of physical limitations on men's well-being might appear surprising. We argue that as the variable is built according to the individual's ability to perform physical activities, it is very likely that older men with limited movements are helped and taken care of by the other members of the household. For this reason they might experience higher well-being.

[7] We checked also the impact of children's gender (not shown in the article). Consistently with the evidence on parents' lack of specific preferences on children's gender in Ethiopia (Short and Kiros 2002 - see section 2.3), none of our findings change significantly when accounting for the differential role of the children's gender on parents' subjective well-being. This robustness check has been run by i) replacing the number of children variable in the regressions in columns 5-6 of Tables 2a-2b with two different variables capturing the number of daughters and the number of sons, and ii) replacing the dummy variable for a newly born child in columns 1-4 of Tables 2a-2b with two dummy variables separately accounting for whether the respondent's had a male or a female child in the last five years (the omitted variable being no new-borns). Regression results are available from the authors upon request.

4.2 Dealing with endogeneity: IV estimates

The results presented in the previous section shed light on the correlation between life satisfaction and fertility. The main findings suggest the existence of a negative link between a newborn child and young respondents' life satisfaction, while for older respondents the number of children positively impacts their subjective well-being.

The first result is not likely to be driven by omitted variable bias since it is robust to the introduction of lagged life satisfaction as a proxy of other potential unobserved variables influencing life satisfaction and fertility decisions as well as to a fixed effects estimation controlling for individual's unobserved time invariant characteristics.

The second finding might be admittedly subject to reverse causality problems and omitted variable bias. As far as the first is concerned, the relationship between fertility levels and life satisfaction can be modelled not only in a direction going from the first to the second as we do in our regressions, but also in the opposite way, i.e. happy households make more children (Kim and Hicks 2015). With respect to omitted variable bias, the observed correlation between life satisfaction and number of children can be driven by past or present unobserved characteristics influencing both variables which would lead to a spurious correlation between the two; such unobserved variables may be, for instance, personality traits, satisfaction with the partner, past marital history or household composition.

In order to deal with these endogeneity issues, we perform an instrumental variable regression of the models in column 5 of Tables 2a and 2b (Eq. 3). Specifically, we estimate the following equations for older respondents (men aged 50-60, women aged 45-60) with the 2SLS method[8]:

$$N\_children_i = \beta_0 + \beta_1 FirstChildMale_i + \sum_k \beta_k X_{ik} + \eta_i \quad \text{(Eq. 4)}$$

$$LifeSat_i = \beta_0 + \beta_1 \overline{N\_children}_i + \sum_j \beta_j X_{ij} + \varepsilon_i \quad \text{(Eq. 5)}$$

In the first stage (Eq. 4) we instrument the *number of children ever born* with a dummy variable equal to one if the firstborn's gender is male (*FirstChildMale*) and control for k ($k<j$) socio-demographic characteristics which are plausibly fixed in time (i.e., gender, schooling and religion). Then, in the second stage (Eq. 5) we regress life satisfaction on the predicted values of the number of children from the first stage ($\overline{N\_children}$) and control for the larger set of the j socio-demographic and economic characteristics used in the previous specifications.

The use of this variable as an instrument is consistent with the related literature on fertility (e.g., Angrist and Evans 1998, Cruce and Galiani 2007; Lee 2008). The exclusion restriction is plausibly

[8] The estimation is implemented through the "cmp" routine in Stata.

valid, since it is hard to think of channels through which the firstborn's gender affects life satisfaction of individuals who have overcome their reproductive age, other than through the number of children. In this respect, we rely also on the lack of significance of the firstborn's gender when added as an additional control in a regression of life satisfaction on the number of children. The relevance of the chosen instrument is supported by the cultural belief that male children are stronger and more resistant to negative shocks, the higher expected dowry and marriage costs for a daughter (Short and Kiros 2002), patrilineal inheritance rules and the historical social value attributed to a woman giving birth to many male children (Pankhurst 1992). Such a cultural background gives support to the hypothesis that preference for male children affects fertility decisions – couples with a first male child are supposedly less willing to go for more children. This hypothesis is supported by our data since a negative and significant correlation between number of children ever born and firstborn's gender is observed. In our data the average number of children of respondents aged 50-60 is 6.01 if the firstborn's gender is male and 7.1 if it is female and the difference is significant under the two-sample Wilcoxon rank-sum test (z= 2.988; p-value= 0.0028). Results from the first and second stage IV estimates are reported in Table 4.[9] Especially when controlling for the Adequacy perception index (columns 3-4 and 7-8), they confirm the positive and significant impact of the number of children ever born on male respondents' life satisfaction (columns 7-8), thereby underlying the robustness of the main result to the controls for endogeneity.

[insert Table 4 here]

5. Discussion

As a matter of fact, in many regions poverty is still accompanied by high fertility rates. Having many children in developing countries is itself a consequence of poverty and at the same time one of its determinants. What comes first in terms of causality is not the core of our investigation; what

[9] In order to ascertain the extent to which weak instrument problems can affect our estimates, we perform the following statistical tests in the specifications in columns 3-4 and 7-8 in Table 4: i) we run the Kleibergen and Paap (2006) *rk* LM test to determine whether the minimal correlation between endogenous variables and the instrument is statistically different from zero; as argued by Bazzi and Clemens (2013), "the LM test for identification provides a lower hurdle than the tests for weak instruments"; ii) we implement the Kleibergen-Paap (2006) Wald test (robust to heteroskedasticity and clustering at village level) and compare the results with the critical values which were originally tabulated by Stock and Yogo (2005) for the Cragg-Donald statistic (see Baum et al., 2007 and Bazzi and Clemens, 2013). As far as the first check is concerned, the Kleibergen and Paap *rk* LM significantly rejects the null of under-identification: the *rk* statistic is 5.41 (p-value = 0.02) and 5.73 (p-value = 0.02) in the specifications in columns 3-4 and 7-8 in Table 4 respectively. Secondly, in these specifications the Kleibergen-Paap Wald test reports a *rk* statistic equal to 4.90 (p-value = 0.03) and 6.61 (p-value = 0.01) respectively; the last figure is larger than (close to) the Stock and Yogo critical value of 5.53 (6.66) when restricting the bias of the IV estimator to 25 (20) percent of the OLS bias. Results from all these diagnostics suggest that the common problems associated with instrument relevance (i.e. weak instruments) are likely to be mitigated in our identification strategy.

motivates it hinges on the observed dynamics that allegedly chain poor households into a population-poverty trap (Birdsall and Griffin 1988). A natural question is therefore why households in developing regions still have a preference for a large family size. Is high fertility just a product of life-cycle optimization algorithm implemented by rational utility-maximizing parents having perfect foresight? Or is there something intrinsically valuable in children that sustain such high fertility rates in poor areas?

The answer to the first question is yes if one embraces the traditional economic theory of fertility which is based on the role of children as investment goods (Becker 1960; Becker 1991). However, for those believing to the second hypothesis, children can be interpreted as "intrinsic goods" with both an instrumental and immaterial value (Bulatao 1979a; Bulatao 1981; Hoffman et al. 1978; Nauck 2005; Nauck 2007). In other words, children would be valued by parents not only for the higher expected utility they provide but also for other non-material contributions to their well-being. In this respect, the growingly adopted subjective well-being indicators are nowadays extremely helpful to understand more deeply the complex links between poverty and fertility beyond the standard economic measures as household income and socio-economic status. Thanks to the increasing availability of panel data on life satisfaction collected in developed countries, fertility in the latter is growingly being investigated through the lens of subjective well-being and with rigorous econometric techniques (see, among others, Clark et al. 2008; Myrskylä and Margolis 2014; Pollmann-Schult 2014). The paucity of similar datasets for developing countries where fertility, poverty and subjective well-being are crucial aspects of development calls for studies that ambitiously challenge this gap. To our knowledge, this paper is one of the first efforts in that direction.

By exploiting the two most recent waves of the Ethiopian Rural Household Survey (ERHS), we analyse the link between subjective well-being and fertility in rural Ethiopia. We approach the issue separately for men and women and for different age groups and consider how the number of children ever born and new births events relate to life satisfaction. Our results are consistent with the traditional fertility theories, as well as with the local cultural norms demanding for a large family size. Specifically, we find that a new birth has detrimental effect on women's life satisfaction during reproductive age, while a high number of children is associated with higher men's life satisfaction at old age. Importantly, these effects are robust when controlling for objective and subjective poverty indicators and other socio-economic controls: when introduced stepwise in the regressions of life satisfaction on fertility, they do not affect the correlation between the former and the latter. All our findings are also robust to endogeneity checks including IV and fixed effects regressions and the introduction of lagged life-satisfaction levels among the regressors.

The asymmetric effect of fertility on life satisfaction depending on parents' gender would suggest that men tend to enjoy a higher number of children in the long run while the short-run burden of a newly born child is mainly sustained by women. This can be due to heterogeneous fertility preferences within the couple, confirmed by Ethiopian women's unmet need for contraception (Mesfin 2002), and to the harsh condition of the woman in a developing country. Women not only bear the physical risk associated to having children – which are substantial in Africa (Haab and Cornelius 1997) – but also take on the major effort to raise them while carrying on their normal household or agricultural activities. The former is particularly relevant in Ethiopia, which is still striving to improve maternal health (Mekonnen and Mekonnen 2003; Woldemicael and Tenkorang 2010), the most problematic among the eight Millennium Development Goals for this country. In fact, Ethiopia shows the lowest proportion of births attended by skilled healthcare personnel among all the African countries: for both the period 1990-1999 and the period 2000-2009, only around 5% of births were attended by skilled healthcare personnel (UNSD data, MDG report 2011).

Interestingly, if we consider Ethiopia as a common case, whose evidence may be valid for other similar contexts, the value of children in developing countries has not substantially changed in the last decades. Already in 1986 Caldwell claimed that mainly men rip the benefits of the investment in childbearing, because children, once employed for household labour, rather contribute to agricultural activities instead of helping women with household chores. Furthermore, the marginal increase in labour force and income deriving by an additional child may not be available to the woman. From this perspective, it is not surprising that high fertility has heterogeneous consequences on mothers and fathers in Ethiopia and that women benefit less from having children.

In addition to this, it has to be acknowledged the significant weight male household heads put on large families in a context - rural Ethiopia – where a high number of children is associated with a high social status and where lineage has been for a long time a salient component of fertility behaviour (Pankhurst 1992).

Due to the lack of questions on life satisfaction in the previous waves of the dataset, we could not disentangle the cohort effect from the effect of the perceived value of children for older men: it also might be that older men had more children than their current younger counterparts when they were young, perhaps because of unobserved contextual and normative local dynamics in the past. Consequently, older men are more able to enjoy their children at the moment of their later age. If this can be thought as a limitation of our study, it however makes the way to further research on this aspect of fertility and well-being in developing countries through the use of panels with several waves. It has to be underlined, however, that this limitation only refers to the analysed relationship

between children ever born and subjective well-being; hence it does not weaken our result on the impact of a newly born child on life satisfaction.

Concluding, our findings imply that the value of children in Ethiopia transcends an economic benefit and that high fertility has heterogeneous consequences on the mother's and the father's subjective well-being. One of the past Ethiopian policies, the NPPE, tried to address the issue of the vicious cycle between poverty and high fertility by setting the goal of a decrease in the TFR until the threshold of 4.0 in 2015. However, as long as local cultural traditions endorse large family size and men attribute high instrumental and immaterial value to their grown-up children, fertility rates are not likely to decrease shortly in rural Ethiopia (contraception use is mostly decided by husbands, who usually prefer a larger number of children).

This implies that addressing the issue of high fertility in Ethiopia would need a massive change in fathers' attitudes toward childbearing and an improvement in women's conditions in terms of schooling, job participation and partnership quality; these three characteristics are associated with a preference for less children (Hogan et al. 1999). Female empowerment could also avoid that women's preferences for a lower number of children are eclipsed by those of their husbands. At the government level, expanding the social security system could partially diminish the fathers' need for children as old-age insurance providers, while improving the access to formal health care services would improve the woman's subjective well-being after the birth of a child.

References

Aassve, A., Mencarini, L., & Sironi, M. (2015). Institutional change, happiness and fertility. *European Sociological Review,* first published online August 19, 2015 doi:10.1093/esr/jcv073.

Aassve, A., Goisis, A., & Sironi, M. (2012). Happiness and childbearing across Europe. *Social Indicators Research*, *108*(1), 65-86.

Aassve, A., Engelhardt, H., Francavilla, F., Kedir, A. M., Kim, J., & Mealli, F., et al. (2006). Poverty and fertility dynamics: a comparative analysis. *Population Review*, *45*(2), 1-23.

Alesina, A., Di Tella, R., & MacCulloch, R. (2004). Inequality and happiness: Are Europeans and Americans different? *Journal of Public Economics*, *88*, 2009–2042.

Alvergne, A., Lawson, D. W., Clarke, P. M. R., Gurmu, E., & Mace, R. (2013). Fertility, Parental Investment, and the Early Adoption of Modern Contraception in Rural Ethiopia. *American Journal of Human Biology*, *25*, 107–115.

Angrist, J. D., & Evans, W. N. (1998). Children and their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size. *American Economic Review*, *88*(3), 450–477.

Bardhan, P., & Udry, C. (1999). *Development Microeconomics.* Oxford: Oxford University Press.

Baum, C. F., Schaffer, M. E., & Stillman, S. (2007). Enhanced Routines for Instrumental Variables/GMM Estimation and Testing. *Stata Journal*, *7*(4), 465-506.

Bazzi, S., & Clemens, M. A. (2013). Blunt Instruments: Avoiding Common Pitfalls in Identifying the Causes of Economic Growth. *American Economic Journal: Macroeconomics*, *5*(2): 152-86.

Becker, G. S. (1960). An economic analysis of fertility. In G. B. Roberts (Ed.), *Demographic and Economic Change in Developed Countries* (pp. 209-231). Princeton, New Jersey: Princeton University Press.

Becker, G. S. (1991). *A treatise on the family* (Enlarged Edition). Harvard University Press.

Becker, G. S., & Lewis, H. G. (1973). On the Interaction between the Quantity and Quality of Children. *Journal of Political Economy*, *81*(2), S279-S288.

Birdsall, N. M., & Griffin, C. C. (1988). Fertility and poverty in developing countries. *Journal of Policy Modeling*, *10*(1), 29-55.

Bjørnskov, C., Dreher, A., & Fischer, J. (2008). Cross-country determinants of life satisfaction: Exploring different determinants across groups in society. *Social Choice and Welfare*, *30*(1), 119–173.

Bongaarts, J., & Bruce, J. (1995). The causes of unmet need for contraception and the social content of services. *Studies in Family Planning*, *26*(2), 57–75.

Bühler, C. (2008). On the structural value of children and its implication on intended fertility in Bulgaria. *Demographic Research*, *18*(20), 569-610.

Caldwell, J. C. (1986). Routes to low mortality in poor countries. *Population and Development Review*, *12*(1), 171-220.

Clark, A. E., Diener, E., Georgellis, Y., & Lucas, R. E. (2008). Lags and leads in life satisfaction: a test of the baseline hypothesis. *The Economic Journal*, *118*, F222–F243.

Clark, A. E., & Oswald, A. J. (2002). *Well-being in panels*. University of Warwick, working paper.

Cruces, G., & Galiani, S. (2007). Fertility and female labor supply in Latin America: New causal evidence. *Labour Economics*, *14*(3), 565–573.

Di Tella, R., MacCulloch, R. J., & Oswald, A. J. (2003). The macroeconomics of happiness. *Review of Economics and Statistics*, *85*(4), 809–827.

Dockery, A. M. (2003) Happiness, Life Satisfaction and the Role of Work: Evidence from Two Australian Surveys. In E. Carlson (Ed.), *Full Employment Imperative* (pp. 77-95). The Callaghan, NSW: University of Newcastle, Centre of Full Employment and Equity.

Ferrer-i-Carbonell, A., & Frijters, P. (2004). The effect of methodology on the determinants of happiness. *The Economic Journal*, *114*(497), 641-659.

Friedman, D., Hechter, M., & Kanazawa, M. (1994). A Theory of the Value of Children. *Demography*, *31*(3), 375-401.

Frijters, P., Johnston, D., & Shields, M. (2012). The Optimality of Tax Transfers: What does Life Satisfaction Data Tell Us? *Journal of Happiness Studies*, *13*(5), 821–832.

Haab, C., & Cornelius, D. (1997). *World Population Data Sheet*. Washington: Population Reference Bureau.

Hansen, T. (2012). Parenthood and happiness: A review of folk theories versus empirical evidence. *Social Indicators Research*, *108*(1), 26–64.

Hoffman L. W. & Hoffman M. L. (1973). The Value of Children to Parents. In J. T. Fawcett, (Ed.) *Psychological Perspectives on Population* (pp. 19–76). New York: Basic Books.

Hogan, D. P., Berhanu, B., & Hailemariam, A. (1999). Household Organization, Women's Autonomy, and Contraceptive Behavior in Southern Ethiopia. *Studies in Family Planning*, *30*(4), 302-314.

Kedir, A. M., Aassve, A., & Woldegebriel, H. (2005). Simultaneous Random Effect Models Of Poverty And Childbearing In Ethiopia. *Ethiopian Journal of Economics*, *14*(2), 1-32.

Keizer, R., Dykstra, P. A., & Poortman, A-R. (2010). The Transition to Parenthood and Well-Being:The Impact of Partner Status and Work Hour Transitions. *Journal of Family Psychology*, *24*(4), 429–438.

Kim, J., & Hicks, J. (2015). Happiness begets children? Evidence for a bi-directional link between well-being and number of children. *The Journal of Positive Psychology*, doi: 10.1080/17439760.2015.1025420

Kleibergen, F., & Paap, R. (2006). Generalized Reduced Rank Tests Using the Singular Value Decomposition. *Journal of Econometrics*, *133*(1), 97-126.

Kohler, H. P., Behrman, J. R., & Skytthe, A. (2005). Partner + children = happiness? The effects of partnerships and fertility on well-being. *Population and Development Review*, *31*(3), 407–445.

Krueger, A. B., & Schkade, D. A. (2008). The reliability of subjective well-being measures. *Journal of Public Economics*, *92*(8-9), 1833-1845.

Layard, R., Mayraz, G., & Nickell, S., (2008). The marginal utility of income. *Journal of Public Economics*, *92*(8-9), 1846-1857.

Lee, J. (2008). Sibling size and investment in children's education: an Asian instrument. *Journal of Population Economics*, *21*(4), 855–875.

Lindstrom, D. P., & Berhanu, B. (1999). The Impact of war, famine, and economic decline on marital fertility in Ethiopia. *Demography*, *36*(2), 247-261.

Margolis, R., & Myrskylä, M. (2011). A Global Perspective on Happiness and Fertility. *Population and Development Review*, *37*(1), 29-56.

Mekonnen, Y., & Mekonnen, A. (2003). Factors Influencing the Use of Maternal Healthcare Services in Ethiopia. *Journal of Health, Population and Nutrition*, *21*(4), 374-382.

Mesfin, G. (2002). The role of men in fertility and family planning program in Tigray region. *Ethiopian Journal of Health Development*, 16(3), 247–255.

Myrskylä, M., & Margolis, R. (2014). Happiness: Before and After the Kids. *Demography*, *51*(5), 1843-1866.

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.

Nauck, B. (2005). Changing Value of Children: An Action Theory of Fertility Behavior and Intergenerational Relationships in Cross-Cultural Comparison. In W. Friedlmeier, P. Chakkarath & B. Schwarz (Eds.), *Culture and Human Development: The Importance of Cross Cultural Research for the Social Sciences* (pp. 183–202). New York: Psychology Press.

Nomaguchi, K. M., & 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.

Pankhurst, H. (1992). *Gender, Development, and Identity: An Ethiopian Study*. New Jersey: Zed Books.

Peiró, A. (2006). Happiness, satisfaction, and socio-economic conditions: Some international evidence. *Journal of Socio-Economics*, *35*(2), 348–365.

Plagnol, A. C., & Huppert, F. A. (2010). Happy to help? Exploring the factors associated with variations in rates of volunteering across Europe. *Social Indicators Research*, *97*(2), 157–176.

Pollmann-Schult, M. (2014). Parenthood and Life Satisfaction: Why Don't Children Make People Happy? *Journal of Marriage and Family*, *76*(2), 319–336.

Sen, A. (2001). *Development as freedom* (2nd ed.). Oxford New York: Oxford University Press.

Short, S., & Kiros, G-E. (2002). Husbands, wives, sons, and daughters: Fertility preferences and the demand for contraception in Ethiopia. *Population Research and Policy Review*, *21*(5), 377-402.

Stanca, L. (2012). Suffer the little children: Measuring the effects of parenthood on well-being worldwide. *Journal of Economic Behavior & Organization*, *81*, 742-750.

Stock, J. H., & Motohiro, Y. (2005). Testing for Weak Instruments in Linear IV Regression. In J. H. Stock & D. W. K. Andrews (Eds.), *Identification and Inference for Econometric Models: Essays in Honor of Thomas J Rothenberg* (pp. 80-108). New York: Cambridge University Press.

Urry, H. L., Nitschke, J. B., Dolski, I., Jackson, D.C., Dalton, K.M., & Mueller, C.J., et al. (2004). Making a life worth living: neural correlates of well-being. *Psychological Science*, *15*(6), 367-372.

United Nations. (2011). *The Millennium Development Goals Report 2011*. New York, NY.

United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*, DVD Edition.

Van Praag, B. M. S., & Ferrer-i-Carbonell, A. (2006) *An almost integration-free approach to ordered response models*. Tinbergen Institute Discussion Papers 06-047/3, Tinbergen Institute.

Voas, D. (2003). Conflicting Preferences: A Reason Fertility Tends to Be Too High or Too Low. *Population and Development Review*, *29*(4), 627–646.

Westoff, C. F., & Bankole, A. (2000). Trends in the demand for family limitation in developing countries. *International Family Planning Perspectives*, *26*(2), 56–62.

Woldemicael, G., & Tenkorang, E. Y. (2010) Women's Autonomy and Maternal Health-Seeking Behavior in Ethiopia. *Maternal and Child Health Journal*, *14*(6), 988-998.

Table 1. Descriptive Statistics: mean or frequency of model variables by gender and age group, second wave (2009)

	Women		Men	
AGE GROUPS ACCORDING TO AGE REPORTED IN 2009	Age<45 N=297	Age 45-60 N=247	Age<50 N=284	Age 50-60 N=195
INDIVIDUAL CHARACTERISTICS				
Life satisfaction at wave 2 (range: [0,10]), Mean (SD)	4.6 (1.7)	4.2 (1.9)	4.7 (1.7)	4.4 (1.6)
Life satisfaction at wave 1 (range: [0,10]) , Mean (SD)	4.4 (1.8)	4.2 (1.8)	4.7 (1.8)	4.6 (1.8)
N. children ever born (range: [0,19]), Mean (SD)	6.4 (3.0)	5.7 (3.4)	5.5 (2.8)	6.7 (3.0)
Birth event in the last 5 years, (%)	51.0		64.8	
Has a co-resident partner, (%)	78.1	45.3	94.7	94.9
Went to school, (%)	44.1	21.1	79.9	53.9
Physical limitations (range: [5,20]) , Mean (SD)	5.5 (1.6)	7.2 (3.3)	5.4 (1.6)	6.4 (2.7)
HOUSEHOLD CHARACTERISTICS				
Household per capita food expenditure, Mean (SD)	15.6 (15.7)	19.0 (30.6)	15.4 (17.4)	13.6 (13.1)
Total land size, Mean (SD)	2.9 (14.0)	1.8 (5.8)	3.9 (19.0)	2.4 (9.0)
No toilet in the household, (%)	30.6	30.8	29.6	25.1
Adequacy perception index (range: [1,3]), Mean (SD)	1.73 (0.46)	1.72 (0.41)	1.70 (0.48)	1.69 (0.44)
At least a socio-political shock in the last 2 years, (%)	6.1	6.1	6.3	6.7
At least a household shock in the last 2 years, (%)	38.4	45.3	37.0	40.0
Religion of the household, (%)				
Christian (Orthodox, Catholic, other non-Protestant)	43.1	54.2	40.9	49.2
Muslim	30.6	26.3	24.7	23.6
Protestant	23.6	17.0	31.3	24.6
Other religion	2.7	2.5	3.1	2.6

Standard Deviations in parentheses

Table 2a. OLS regression of women's cognitive evaluation of life (0-10 point scale) on fertility, second wave (2009)

	(1) Age<45	(2) Age<45	(3) Age<45	(4) Age<45	(5) Age 45-60	(6) Age 45-60
N. children ever born	0.012	0.018	0.014	-0.000	0.054	0.052
	(0.039)	(0.037)	(0.034)	(0.032)	(0.042)	(0.041)
Birth event in the		-0.520*	-0.511**	-0.511**		
last 5 years		(0.197)	(0.172)	(0.180)		
Has a co-resident partner	0.253	0.345	0.237	-0.003	0.695**	0.579*
	(0.285)	(0.260)	(0.236)	(0.246)	(0.244)	(0.250)
Went to school	0.155	0.168	0.017	-0.084	0.293	0.275
	(0.199)	(0.185)	(0.175)	(0.165)	(0.288)	(0.279)
Physical limitations	-0.031	-0.034	-0.038	0.013	-0.010	0.003
	(0.046)	(0.048)	(0.049)	(0.048)	(0.037)	(0.039)
Non-Protestant Christian	-0.125	-0.166	-0.174	-0.165	-0.108	-0.070
Ref. cat.: muslim household	(0.354)	(0.343)	(0.306)	(0.293)	(0.322)	(0.298)
Protestant	-0.172	-0.099	-0.298	-0.232	-0.206	-0.024
	(0.466)	(0.442)	(0.339)	(0.340)	(0.504)	(0.508)
Other religion	-0.779	-0.824	-0.783	-0.622	-0.271	-0.083
	(0.550)	(0.617)	(0.590)	(0.549)	(0.759)	(0.680)
Log per capita household	0.016	-0.061	-0.029	-0.065	0.377**	0.315*
food expenditure	(0.101)	(0.096)	(0.094)	(0.088)	(0.128)	(0.137)
N. open loans	0.021	0.035	0.058	0.022	-0.009	0.000
	(0.215)	(0.217)	(0.165)	(0.157)	(0.178)	(0.178)
Total land size	0.004	0.006†	0.006*	0.003	0.017	0.021†
	(0.003)	(0.003)	(0.003)	(0.003)	(0.011)	(0.011)
No toilet in the household	-0.595*	-0.648**	-0.485*	-0.284	-0.648†	-0.664*
	(0.248)	(0.246)	(0.227)	(0.221)	(0.341)	(0.318)
At least a socio-political	-0.032	0.035	0.122	0.239	-0.090	-0.109
shock in the last 2 years	(0.450)	(0.465)	(0.424)	(0.399)	(0.451)	(0.434)
At least a household shock	-0.029	-0.099	-0.116	-0.231	0.102	0.114
in the last 2 years	(0.207)	(0.195)	(0.185)	(0.171)	(0.218)	(0.212)
Adequacy perception index			1.009***	0.846***		0.974***
			(0.177)	(0.171)		(0.327)
Life satisfaction at wave 1				0.259***		
				(0.049)		
Region dummies	YES	YES	YES	YES	YES	YES
Observations	291	290	288	281	242	239
R-squared	0.240	0.257	0.317	0.383	0.271	0.312

Robust standard errors clustered at village level in parentheses; ***p ‹ .001, ** p<0.01, * p<0.05, †p<0.1

Table 2b. OLS regression of men's cognitive evaluation of life (0-10 point scale) on fertility, second wave (2009)

	(1) Age<50	(2) Age<50	(3) Age<50	(4) Age<50	(5) Age 50-60	(6) Age 50-60
N. children ever born	-0.010	-0.008	-0.018	-0.022	0.108**	0.107**
	(0.043)	(0.043)	(0.039)	(0.038)	(0.037)	(0.036)
Birth event in the		-0.336†	-0.318†	-0.296†		
last 5 years		(0.178)	(0.161)	(0.161)		
Has a co-resident partner	0.631†	0.820*	0.866*	0.755*	0.990†	0.873†
	(0.350)	(0.378)	(0.368)	(0.370)	(0.548)	(0.439)
Went to school	0.779**	0.789**	0.674**	0.546*	0.258	0.183
	(0.280)	(0.274)	(0.225)	(0.229)	(0.225)	(0.191)
Physical limitations	-0.017	-0.022	-0.019	0.008	-0.058	-0.036
	(0.087)	(0.088)	(0.088)	(0.084)	(0.039)	(0.036)
Non-Protestant Christian	0.111	0.081	0.057	0.025	-0.186	-0.172
Ref. cat.: muslim household	(0.305)	(0.308)	(0.308)	(0.294)	(0.335)	(0.326)
Protestant	0.039	0.121	0.042	0.021	-0.219	-0.308
	(0.425)	(0.424)	(0.379)	(0.369)	(0.496)	(0.490)
Other religion	-0.420	-0.393	-0.344	-0.340	-1.637**	-1.384*
	(0.474)	(0.482)	(0.457)	(0.444)	(0.601)	(0.639)
Log per capita household	0.079	0.053	0.049	0.019	0.171	0.148
food expenditure	(0.107)	(0.112)	(0.109)	(0.112)	(0.130)	(0.130)
N. open loans	-0.200	-0.199	-0.090	-0.130	-0.396**	-0.310*
	(0.164)	(0.167)	(0.141)	(0.133)	(0.124)	(0.129)
Total land size	0.007**	0.008**	0.007***	0.007***	0.013**	0.009**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)
No toilet in the household	-0.581*	-0.597*	-0.371	-0.189	-0.252	-0.093
	(0.244)	(0.246)	(0.228)	(0.232)	(0.207)	(0.183)
At least a socio-political	0.402	0.438	0.434	0.338	-0.660	-0.757*
shock in the last 2 years	(0.316)	(0.330)	(0.292)	(0.277)	(0.409)	(0.390)
At least a household shock	-0.093	-0.095	-0.117	-0.150	0.127	0.171
in the last 2 years	(0.203)	(0.207)	(0.192)	(0.189)	(0.230)	(0.208)
Adequacy perception index			1.144***	1.061***		1.285***
			(0.174)	(0.175)		(0.232)
Life satisfaction at wave 1				0.226***		
				(0.056)		
Region dummies	YES	YES	YES	YES	YES	YES
Observations	283	283	282	282	193	193
R-squared	0.100	0.107	0.194	0.241	0.276	0.383

Robust standard errors clustered at village level in parentheses; ***p ‹ .001, ** p<0.01, * p<0.05, †p<0.1

Table 3. Fixed effects regressions of cognitive evaluation of life (0-10 point scale) on fertility, first and second waves (2004, 2009)

	(1)	(2)	(3)	(4)
	Women, age<45		Men, age<50	
N. children ever born	-0.263*	-0.284*	-0.057	-0.101
	(0.109)	(0.109)	(0.134)	(0.124)
Has a co-resident partner	-0.185	-0.111	0.019	0.077
	(0.454)	(0.453)	(0.407)	(0.442)
Went to school	-0.194	-0.206	0.225	0.250
	(0.285)	(0.258)	(0.395)	(0.361)
Physical limitations	0.065	0.003	0.110*	0.124*
	(0.075)	(0.080)	(0.055)	(0.050)
Log per capita household food expenditure	0.292*	0.231†	-0.049	-0.078
	(0.129)	(0.121)	(0.104)	(0.106)
N. open loans	-0.382†	-0.366	-0.333†	-0.244
	(0.224)	(0.222)	(0.170)	(0.169)
Total land size	-0.002	-0.002	-0.001	-0.002**
	(0.002)	(0.002)	(0.001)	(0.001)
No toilet in the household	-0.086	-0.021	0.012	0.151
	(0.247)	(0.244)	(0.231)	(0.215)
At least a socio-political shock in the last 2 years	-0.205	-0.249	-0.540†	-0.496†
	(0.436)	(0.445)	(0.289)	(0.280)
At least a household shock in the last 2 years	-0.320	-0.278	-0.145	-0.118
	(0.193)	(0.179)	(0.169)	(0.153)
Adequacy perception index		0.885***		0.965***
		(0.210)		(0.260)
Observations	551	541	552	544
R-squared	0.065	0.120	0.041	0.129
Observations	293	293	284	284

Robust standard errors clustered at village level in parentheses; ***p ‹ .001, ** p<0.01, * p<0.05, †p<0.1

Table 4. IV regressions of cognitive evaluation of life (0-10 point scale) on fertility, second wave (2009)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Women, age 45-60				Men, age 50-60			
	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
N. children ever born		0.000		-0.077		0.193†		0.302**
		(0.215)		(0.224)		(0.106)		(0.114)
The very first alive child born	-1.004*		-0.895†		-0.796*		-0.698†	
was male	(0.491)		(0.519)		(0.383)		(0.382)	
Went to school	-0.048	0.302	-0.033	0.294	0.435	0.199	0.364	0.055
	(0.531)	(0.283)	(0.539)	(0.280)	(0.381)	(0.229)	(0.392)	(0.195)
No toilet in the household	-0.999†	-0.708†	-1.011*	-0.810*	-0.761	-0.192	-0.729	0.049
	(0.529)	(0.395)	(0.507)	(0.395)	(0.575)	(0.222)	(0.574)	(0.219)
Non-Protestant Christian	0.389	-0.094	0.307	-0.043	-0.176	-0.192	-0.139	-0.190
Ref. cat.: muslim household	(0.584)	(0.315)	(0.569)	(0.289)	(0.652)	(0.346)	(0.641)	(0.391)
Protestant	-0.015	-0.208	-0.075	-0.019	-0.640	-0.150	-0.529	-0.177
	(0.628)	(0.493)	(0.626)	(0.512)	(0.758)	(0.496)	(0.713)	(0.524)
Other religion	-0.745	-0.286	-0.752	-0.108	-0.986	-1.527*	-0.781	-1.162†
	(0.928)	(0.722)	(0.966)	(0.639)	(1.577)	(0.601)	(1.562)	(0.665)
Adequacy perception index			0.026	1.031***			0.496	1.265***
			(0.584)	(0.354)			(0.445)	(0.224)
Has a co-resident partner		0.650**		0.465†		0.936†		0.751†
		(0.236)		(0.240)		(0.524)		(0.410)
Log household per capita food expenditure		0.381**		0.317*		0.185		0.179
		(0.126)		(0.132)		(0.127)		(0.127)
N. open loans		-0.019		-0.023		-0.391**		-0.287**
		(0.174)		(0.172)		(0.115)		(0.110)
Total land size		0.017		0.022*		0.012**		0.008*
		(0.011)		(0.011)		(0.004)		(0.004)
Physical limitations		-0.011		0.004		-0.059		-0.037
		(0.035)		(0.036)		(0.037)		(0.033)
At least a socio-political shock in the last 2 years		-0.077		-0.078		-0.660†		-0.770*
		(0.432)		(0.413)		(0.384)		(0.357)
At least a household shock in the last 2 years		0.116		0.150		0.121		0.163
		(0.223)		(0.219)		(0.218)		(0.198)
Region dummies	NO	YES	NO	YES	NO	YES	NO	YES
Observations	245	245	242	242	193	193	193	193

Robust standard errors clustered at village level in parentheses. Instrumented variable: N. children ever born. ***p ‹ .001, ** p<0.01, * p<0.05, †p<0.1.

APPENDIX

Table 5. OLS regression of cognitive evaluation of life (0-10 point scale) on fertility, second wave (2009) with lagged controls.

	(1) Women, Age<45	(2) Men, Age<50	(3) Women, Age<45	(4) Men, Age<50
N. children ever born	-0.034	0.005	-0.030	-0.000
	(0.036)	(0.042)	(0.036)	(0.042)
Birth event in the	-0.607**	-0.328†	-0.581**	-0.329†
last 5 years	(0.208)	(0.169)	(0.215)	(0.170)
Has a co-resident partner	0.158	0.753	0.0717	0.653
	(0.348)	(0.588)	(0.355)	(0.524)
Went to school	-0.093	0.451	-0.135	0.446
	(0.186)	(0.303)	(0.185)	(0.310)
Physical limitations	0.016	0.005	0.027	0.0333
	(0.073)	(0.078)	(0.074)	(0.084)
Non-Protestant Christian	-0.278	-0.371	-0.232	-0.323
Ref. cat.: muslim household	(0.267)	(0.274)	(0.265)	(0.266)
Protestant	-0.276	-0.600	-0.221	-0.575
	(0.403)	(0.403)	(0.402)	(0.403)
Other religion	-0.616	-0.599	-0.490	-0.578
	(0.899)	(0.549)	(0.896)	(0.526)
Log per capita household	-0.057	-0.116	-0.061	-0.121
food expenditure	(0.110)	(0.123)	(0.109)	(0.127)
N. open loans	-0.0611	-0.0631	-0.0815	-0.0986
	(0.157)	(0.151)	(0.152)	(0.150)
Total land size	0.008*	0.006**	0.006	0.007**
	(0.004)	(0.002)	(0.004)	(0.002)
No toilet in the household	-0.283	-0.173	-0.216	-0.0849
	(0.230)	(0.258)	(0.231)	(0.258)
At least a socio-political	0.067	0.222	0.111	0.155
shock in the last 2 years	(0.460)	(0.280)	(0.431)	(0.270)
At least a household shock	-0.222	-0.028	-0.259	-0.052
in the last 2 years	(0.165)	(0.177)	(0.160)	(0.174)
Adequacy perception index	0.858***	1.272***	0.833***	1.180***
	(0.215)	(0.198)	(0.212)	(0.209)
Life satisfaction at wave 1			0.135*	0.188**
			(0.065)	(0.065)
Has a co-resident partner at wave 1	0.039	0.116	-0.009	0.063
	(0.268)	(0.511)	(0.260)	(0.496)
Went to school at wave 1	0.186	0.321	0.182	0.234
	(0.226)	(0.244)	(0.227)	(0.273)
Physical limitations at wave 1	-0.009	0.025	0.006	-0.002
	(0.072)	(0.072)	(0.075)	(0.072)
Log per capita household	-0.055	0.275*	-0.050	0.251†
food expenditure at wave 1	(0.0747)	(0.136)	(0.074)	(0.134)
N. open loans at wave 1	-0.262	0.273†	-0.177	0.287†
	(0.278)	(0.162)	(0.294)	(0.166)
Total land size at wave 1	0.004**	0.002**	0.004*	0.002***
	(0.002)	(0.001)	(0.001)	(0.001)
No toilet in the household at wave 1	-0.027	0.119	0.0370	0.113
	(0.261)	(0.230)	(0.262)	(0.236)
At least a socio-political	0.105	0.251	0.192	0.338
shock in the last 2 years at wave 1	(0.316)	(0.297)	(0.321)	(0.308)
At least a household shock	-0.310	-0.0557	-0.246	-0.058
in the last 2 years at wave 1	(0.200)	(0.240)	(0.208)	(0.235)
Adequacy perception index at wave 1	0.893***	0.412	0.680**	0.108
	(0.205)	(0.276)	(0.248)	(0.285)
Region dummies	YES	YES	YES	YES
Observations	248	260	248	260
R-squared	0.416	0.269	0.427	0.296

Robust standard errors clustered at village level in parentheses; ***p ‹ .001, ** p<0.01, * p<0.05, †p<0.1.