



## Fertility choice and financial development

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### ABSTRACT

We study the consequences of broader access to credit and capital markets on household decisions over the number of children. A model of the net reproduction rate is estimated on data from 78 countries over the period 1995–2010. Liquidity constraints are approximated by private credit and household credit, while opportunities for financial investment are measured by domestic public debt. We use the Index of Financial Liberalisation (Abiad et al., 2009) as one of the instruments for financial variables. We find that improved access to credit increases fertility with an elasticity of around 30%, while the effect of the development of capital markets is negative (–10%). The regression model takes the role of social security into account. Quantile regression shows that our results are robust to outliers and parameter heterogeneity.

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### 1. Introduction

Fertility behaviour and financial development have seen dramatic changes in recent decades, both showing distinctive patterns: as financial development spreads worldwide, enhancing the possibility of credit and intertemporal trade for households and firms, fertility shows a clear downward trend which is a cause for concern, especially in developed countries which will be facing decreasing populations in the near future.

Do these two phenomena simply show a spurious temporal correlation or does one cause the other? Financial development may be one of the driving forces that change fertility behaviour. Raising children requires a significant transfer of parents' resources in the children's favour, which may be driven not only by altruism, but also by the expectation that some resources will be returned during the parents' old age: this exchange is not synchronous and requires coordination of individual actions that can be best achieved by means of specialised institutions. Since the basic function of financial markets is to facilitate intertemporal trade, making current consumption less dependent on current income, better organised and diversified financial markets would make such transfers easier and induce parents to have more children. Nevertheless, the development of financial markets reduces the demand for children for the purpose of receiving old age support. The impact of financial development on fertility is therefore undetermined and should be assessed empirically.

A glimpse at the figures involved can give an idea of the radical change that has taken place. At the world level, the fertility rate, i.e., the average number of children per woman over her lifetime, dropped from 4.91 in 1960–1965 to 2.56 in 2005–2008, with large differences between country groups. While more developed regions recorded a decrease from 2.67 to 1.64, the rate in less

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developed countries has declined from 6.73 to 4.39.<sup>1</sup> Unlike fertility, financial development is a multifaceted phenomenon; many of its indicators also reveal a similarly striking trend. For example, the ratio of private credit to GDP has risen from 0.39 to 1.14 in high income countries and from 0.13 to 0.31 in LDCs. Similar patterns are followed by other financial variables whose values measure the breadth of opportunities for financial investment.<sup>2</sup>

The transition from high to low fertility has been analysed in depth in the fields of economics and demography. In the literature, the onset of a demographic transition is often ascribed to the rise in income and education and to the reduction in mortality (Galor (2012) surveys the literature). Indeed, increasing income brings about both the rise in the opportunity cost of raising children and an income effect which implies greater investment in the education of fewer children. Since the demographic transition often occurred during periods of sustained economic growth, it is argued that technological progress increased the incentive for human capital investment, causing a decline in fertility. Another important phenomenon that accompanied the fertility transition was the significant reduction in infant mortality. Whatever is the reason for having children, lower mortality should allow a smaller number of births.

Although other causes of the demographic transition have been investigated, to date no comprehensive analysis of the role of financial development has been performed.<sup>3</sup> The objective of this paper is to produce general and reliable evidence on the effects of borrowing constraints and opportunities for financial investment on the choice of the number of children.

To elucidate the channels through which financial development affects fertility, we introduce a four-period life-cycle model of choice in which fertility is endogenous and the household cares for its children and for its parents too. In this setting young adults might choose to borrow some resources and, when older, to save and invest in the capital market. We assume two main types of imperfections of financial markets (Pollin, 1997; McKinnon, 1973): *borrowing constraints* – the difficulties encountered by individuals when trying to reach their optimal level of debt – and *saving constraints*, which pertain to the uneasiness encountered by individuals who wish to invest their savings in a private financial market. We show that in the context of fertility determination, this distinction has both theoretical relevance and a significant empirical counterpart. The model shows that the effect of relaxing the borrowing constraint on fertility depends on: (1) an investment effect, whose positive sign is due to the reduction of future resources and to a corresponding greater investment in children, and (2) an income effect. Hence, when children are normal goods in a household's preferences, fertility will unambiguously increase. Broader access to capital markets allows parents to rely less on children to fund their old age welfare. Nonetheless, larger savings imply lower debt in the early years of adulthood: in this case the household will command a smaller amount of resources for consumption and children. Both effects imply that fertility decreases with greater opportunities for financial investment.<sup>4</sup>

In the econometric analysis we use a panel of 78 countries over the period 1995–2010 built by merging the data on fertility, social and economic indicators with those that describe the level of financial development and structure. Household access to the credit market is approximated by two variables: the ratio of private credit to GDP and the ratio of household credit to GDP. To capture the opportunities for financial investment we use the ratio of domestic public debt to GDP. Government bonds are characterised by low risk and significant supply even in economies where more sophisticated forms of financial investment are scant. Confirmation of this picture comes from data produced by Beck et al. (2010) who shows that the market capitalization of public bonds has figures comparable with those of private bonds and stocks or life insurance premiums.

One of the main challenges we faced in the econometric analysis was the possible endogeneity of financial variables in the fertility equation. Demographic variables such as age are known to be important determinants of wealth allocation in the life cycle and of risk-taking attitudes. These effects would seriously undermine any attempt to estimate the causal effect of financial development on fertility. Here our approach is to apply instrumental variable methods. Indeed, we use the Index of Financial Liberalisation produced by Abiad et al. (2009) as instrumental variable for credit and saving availability. This index focuses on financial markets and measures the extent of liberalisation with respect to credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets and banking regulations. It records the evolution of the institutions that directly and indirectly affect the development of financial markets. Reasonably, since most of this change is due to policy interventions, it should be considered exogenous with respect to the dynamics of fertility.

Our empirical results indicate that both borrowing constraints and investment opportunities impact fertility, yet in opposite directions, as predicted by the theory. The estimate of the elasticity of net fertility to private credit is positive and its value is around 32%. The econometric results are confirmed when we use a better proxy of household borrowing constraints: the value of total claims of deposit money banks on households as ratio to GDP provided by Beck et al. (2012) for a cross-section of 44 countries over the period 1994–2005. Using this variable in error components 2SLS regressions we find that the elasticity of net fertility to household credit takes values in the interval 0.2–0.3. The effect of domestic public debt on fertility can be quantified with an elasticity that takes negative values close to 12%. These results were obtained with the estimation of a model that includes a proxy for the pension system, which is an alternative to the financial market in the allocation of saving. Robustness of the econometric results to the presence of outliers and to possible heterogeneity of the parameters across countries was checked by the estimation of a panel quantile regression.

<sup>1</sup> The figures on fertility rates are accessible at <http://data.un.org/>.

<sup>2</sup> The figures on financial structure are accessible at World Bank website and at Ross Levine's personal website.

<sup>3</sup> Cigno and Rosati (1992) investigate the effects of household access to capital markets on fertility in Italy, finding empirical support for a negative effect. Some evidence on this issue comes from the literature on microcredit programmes: these studies show some controversial effects of increased financial availability on fertility. Nonetheless, such financial empowerment programmes are generally aimed at very poor people living in LDCs; accordingly, the external validity of these studies is questionable.

<sup>4</sup> The model characterises the main relations between financial markets and fertility choice which guide the econometric analysis, but it does not provide a general equilibrium interpretation of the phenomenon which would deal with the endogeneity of the financial system. Such a model would greatly complicate the analysis and is beyond the scope of the paper. However, in the econometric model we take into account the possible endogeneity of the proxies for borrowing and saving constraints.

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