The quantity-quality tradeoff: a cross-country comparison of market and nonmarket investments per child in relation to fertility

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Abstract

The aim of this paper is to show how various investments in children are related to fertility in a cross-national comparative context. Following the extended theoretical treatment of investment in child quality, we consider quality as produced not only by market goods and services but by inputs of time as well. We provide proxies that combine public and private market expenditure on children with the value of time devoted to childcare and other household services provided by mostly parents and grandparents at home and consumed by children. Our measures are based on the National Transfer Accounts (NTA), which disaggregates national accounts by age; as extended by the National Time Transfer Accounts (NTTA), which estimate the same quantities for unpaid household labour activities using time use surveys. We quantify total spending per child and a narrower concept of human capital investment per child, which includes expenditure on education and health as well as the value of nonmarket childcare. These child quality proxies are calculated in cross-sections for more than 25 countries across the globe and their relations with fertility are analyzed. Our preliminary results show a significant negative association between fertility and total human capital investment per child. Moreover a significant, but weaker relation is also found between fertility and total spending per child across the countries.

Introduction

In order to analyse the role of age structure of populations in macroeconomic issues, Lee and Mason (2011) have opened a new chapter in national accounting: National Transfer Accounts (NTA). NTA[1] explore how different generations acquire and use economic resources by building a systematic and comprehensive measure of economic flows across generations. The cross-sectional NTA data provide empirical evidence about the tradeoff between human capital investment and fertility across countries. The background of this relation is the theory of the quantity-quality tradeoff formulated by Becker, one of the major contributions to the economic analysis of fertility (Becker 1960, Becker and Lewis 1973, Becker and Barro 1988). According to Beckers's seminal theory, parents substitute quality for quantity when they decide how many children they have. This interaction explains the rapid decline in fertility during economic development, which has been accompanied by an increase in total spending and human capital investment per child. Lee and Mason (2010), Lee and Donehower (2011) as well as Mason et al (2015) show that higher public and private expenditure on education and health per child, considered as human capital investment, is associated with lower fertility on the country level.

The NTA measures used in these analyses, however, consider only market goods and services as investments in child quality, for they do not account for time costs by parents and grandparents. The unaccounted contribution of households, most importantly childcare, is an important component in child quality. In this paper we quantify these non-market costs of children and estimate proxies of child quality that combine market expenditure with the measures of time inputs. In doing this we follow the extended approach of investment in child quality (Becker and Lewis 1973, Willis 1973), which considers quality as produced by market goods and services along with the inputs of care and services attributable to the value of a households' nonmarket time. Hence child quality measures for the market and the household are combined. We estimate total spending per child; and – following Lee and Mason (2010) – a narrower concept of human capital investment, which is limited to investments having a greater impact on labour income in later life. We provide calculations for more than 25 countries and analyze the tradeoff between these different child quality proxies and fertility in a cross-national comparative context.[2]

Time inputs are measured with the newly introduced National Time Transfer Accounts (NTTA). NTTA give us comprehensive and systematic estimations of non-market economic flows across generations in a similar structure as NTA. The age-specific NTTA measures are estimated using time use surveys and a valuation procedure (Donehower 2014). The

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[1] The method of National Transfer Accounts was established by Lee (1994a,b). An NTA manual was published by Mason *et al*. (2009) and a revised manual by the Population Division of the United Nations (United Nations, 2013). A comprehensive introduction to the method, including theoretical foundations, comparative results and a wide range of country studies can be found in Lee and Mason (2011).

[2] The following countries are included in our analysis: Austria, Belgium, Bulgaria, Canada, Colombia, Costa Rica, Denmark, Finland, France, Germany, Ghana, Hungary, India, Italy, Latvia, Lithuania, Mexico, Netherlands, Poland, Senegal, Slovenia, South Africa, Spain, Sweden, United Kingdom, United States.

accounts include the provision of childcare and other household goods and services, such as cooking, cleaning, making repairs etc. measured in time as well as in monetary terms. By calculating which age groups are the consumers of these services, they also include intergenerational transfers of unpaid household labour ("time transfers"). The figures give us an opportunity to measure the value of time devoted to childrearing as well as to other housework activities consumed by children in cross-sections. Our analysis is based on the NTTA data developed by the European AGENTA Project and the Counting Women's Work Project.[3]

Similarly to other studies that estimate the monetary value of childcare and unpaid household labour across countries (Gianelli et al 2011, Miranda 2011), our preliminary results[4] also suggest that the value of home production activities is between one-seventh and half of GDPs in the analyzed countries, from which a significant amount is consumed by children (see also Vargha et al 2015). In childrearing the size and value of non-market economic transfers approximate those of market economic transfers. The investment of parents – in particular mothers – in the human capital of their children through the provision of childcare and other household goods and services is sizeable in all analyzed countries. The value of childcare activities is on average around 5 per cent of the GDPs in these countries and the value of other household goods and services consumed by children is on average another 4 per cent.

Studying how much and by what means we invest in children, and how these investments are related to the number of children born, are important to assess the future productivity of societies. Sustainability of the public support systems as an issue often emerges in relation to population ageing. The main cause of this concern is the changing age structure; more precisely the rising share of the elderly and the declining share of the younger population and the unforeseen economic and social effects they might arise. Nevertheless economic growth, societal well-being and the sustainability of support systems do not depend only on the size of age groups of populations. They also depend on the aggregate value of their human capital generated by previous investments targeted at children. It is important to have a better understanding about the interaction of changing demographic and economic environments and their implications for policy. Our analysis aims to give insights to these issues.

Measuring child quality

In this section we briefly introduce the measures we use as proxies of child quality. As we have indicated, our objective is to combine market spending on children with its nonmarket counterpart. For our analysis we use cross-sectional NTA and NTTA data, the former including the market part and the latter the nonmarket part of the costs. The data provide us

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[3] Find more details about these projects on the following websites: AGENTA http://www.agenta-project.eu/en/index.htm; and CWW http://www.cww-dpru.uct.ac.za/.
[4] In this extended abstract we present only preliminary results based on calculations for 19 countries.

measures of the various expenditures found in the different countries in a given year by single years of age. We distinguish between *total spending per child* as well as *human capital investment per child*. The first one is the sum of total market and nonmarket costs of childbearing; while the latter is limited to health care, education and the value of childcare mostly provided by parents and grandparents at home (Table 1).

NTA include age-specific estimates of market economic activities, age profiles of labour income, consumption, public transfers, private transfers and asset-based reallocations. The population weighted aggregate numbers of these age profiles are consistent with the System of National Accounts. For total market costs per child we use the overall NTA life cycle deficit (LCD) age profile measured in the different countries, which is the difference of average consumption and labour income. Labour income in NTA includes all the income generated through the input of labour in production, including all types of labour-related taxes. Consumption consists of private consumption, as well as of consumption of goods and services provided by the public sector (such as public health care, education, general public goods).

In case of total spending per child we refer to children as those inactive young cohorts in a given country, whose market consumption exceeds their labour income. These cohorts have a lifecycle deficit as their consumption has to be financed through monetary flows from other generations. According to this definition different age groups represent children in each country, and the age limit depends on the country specific economic lifecycle pattern in the respective year.

For the narrower child quality measure, we consider only a part of total market spending as human capital investment per child following Lee and Mason (2010): investments in education and health of the youth. The age-specific measures of public education and publicly funded health care, as well as private spending on these domains are summed up; at age 0-17 for health and 0-26 for education. The reason for choosing only these age profiles for market human capital spending is that these investments have a greater impact on labour income in later life.

	Total spending (financed through monetary flows from other generations)	Human capital investment
Market	Public goods, education and health care expenditure for children	Public education (0-26) and public health care (0-18) expenditure
	Private spending on children (housing, clothing, food, education, health, etc.)	Private spending on education (0-26) and health (0-18)
Non-market	Value of childcare and other housework activities consumed by children at home (0-17)	Value of childcare provided at home (0-17)

Table 1: Measuring child quality proxies: total spending and human capital investment per child
Notes: Children in the case of total market spending are those inactive young cohorts in a given country, whose market consumption exceeds their labour income.

Nonmarket consumption is added to these figures using NTTA data calculated for each country. Similarly to Household Satellite Accounts, the age-specific measures of the production and consumption of unpaid household labour activities are estimated using time use surveys and applying a detailed valuation procedure (Donehower 2014). Either national or harmonized[5] time use surveys are used for constructing the accounts, depending on the availability of the data. The time measures are valued using an input approach for each country. At this point we use only the direct costs of childbearing provided at home and not its opportunity costs.

In the case of non-market human capital investment per child we consider only the value of childcare activities (such as physical care and supervision of child especially relevant at younger ages; and teaching, reading to a child). For total non-market spending per child we consider not only the value of childcare activities, but the value of other household goods and services consumed by children as well (such as cooking, cleaning, making repairs etc). Both measures are calculated at age 0-17. We rescale both market and nonmarket figures for the cross-country comparisons. All measures are normalised on the average annual labour income of individuals in the 30–49 age range in each country.

The total fertility rate is used for our proxy of quantity. Like Lee and Donehower (2011) and Mason et al (2015), we take the average total fertility rate for the most recent five-year interval preceding our combined NTA-NTTA data, using the United Nations quinquennial data.[6] Our explorations are descriptive and we do not make any causal inferences about the association between fertility and investment per child.

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[5] The two harmonized dataset originally used is the Multinational Time Use Study (MTUS) and the Harmonized European Time Use Survey (HETUS). MTUS offers harmonised episode and context information on time use surveys and encompasses over 60 datasets from 25 countries from around the world. The MTUS data and documentation can be found at: http://www.timeuse.org/mtus. HETUS is an effort by the EU to harmonise European time use surveys. It is currently maintained by Statistics Sweden. All important information, documentation and metadata can be found on its website: https://www.h2.scb.se/tus/tus/default.htm.
[6] UN 2015 Revision of World Population Prospects: http://esa.un.org/unpd/wpp/Download/Standard/Fertility/

Preliminary Results

Our preliminary results are based on the combined NTA-NTTA data about total spending per child for 25 countries. We have been also able to quantify human capital investment per child so far for 22 countries.[7] We plot the total fertility rate (TFR) and total spending per child (those inactive young cohorts in a given country, whose market consumption exceeds their labour income) on Figure 1. There is a high variation among the countries in the amount that is spent per child, and there is a weak significant association between fertility and total spending per child.

There is a stronger negative association, however, between fertility and total human capital investment per child (Figure 2). Looking at the market and nonmarket components separately, our preliminary data suggest that the relation between nonmarket human capital spending per child and fertility is stronger than between market human capital investment and fertility. For the final version of the paper we will have more countries and explore these relations in more detail.

Fig 1: Total spending (market + nonmarket) per child versus fertility in 25 countries around 2000
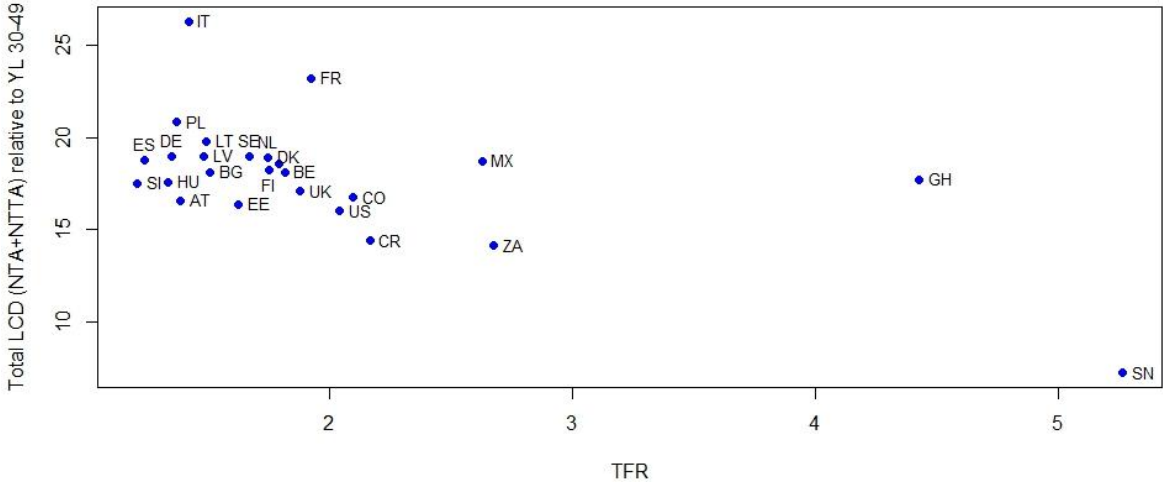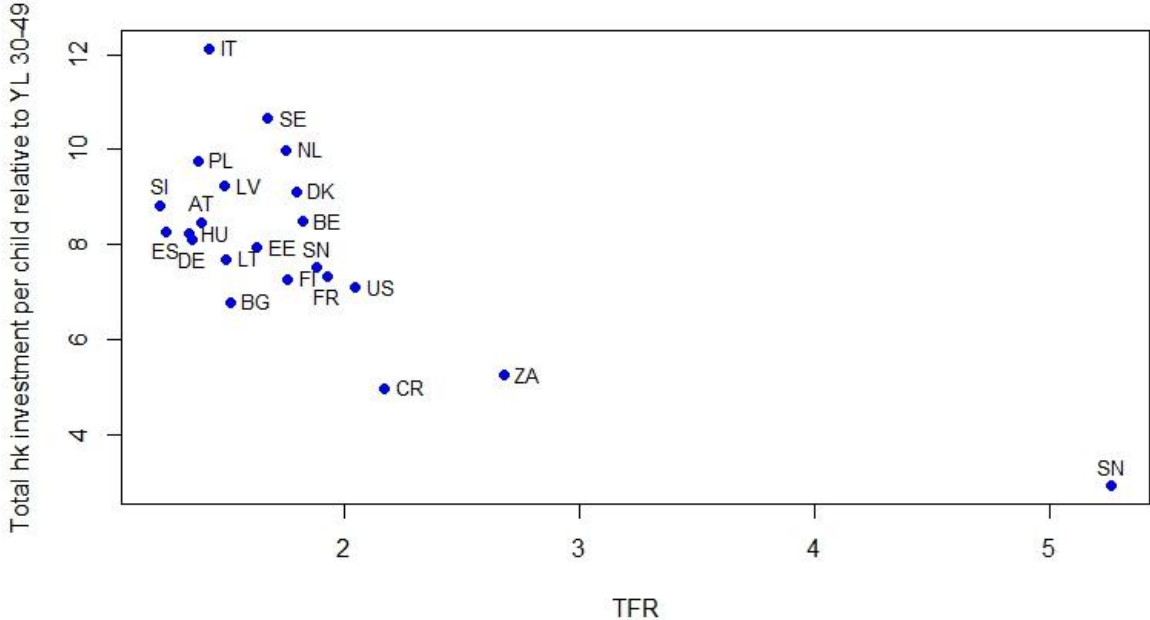

Source: Authors' calculations using NTTA estimates from AGENTA & CWW; NTA from ntaccounts.org & AGENTA; TFR from UN.
Notes: For estimating total spending per child, see text. Total fertility rates (TFR) are from the United Nations 2015 Revision of World Population Prospects and cover the five-year closest to the date of the combined NTA-NTTA estimate. Children in the case of total spending are those inactive young cohorts in a given country, whose market consumption exceeds their labour income. Values are normalised on the average annual labour income of individuals in the 30–49 age range in each country.

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[7] The reason for excluding three countries (Colombia, Ghana and Mexico) is that childcare, education or health measures by age are not yet available for these countries.

Fig 2: Human capital investment (market + nonmarket) per child versus fertility in 22 countries around 2000

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