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# Does the one-child policy improve children's human capital in urban China? A regression discontinuity design

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## ABSTRACT

**Qin, Xuezheng, Zhuang, Castiel Chen, and Yang, Rudai**—Does the one-child policy improve children's human capital in urban China? A regression discontinuity design

This paper is the first to examine the causal relationship between China's One-Child Policy (OCP) and the long-term accumulation of human capital by a regression discontinuity design. Based on the 2005 China Inter-census Survey data, we observe a strong policy shock upon the probability of being a single child among people born around the starting point of OCP, which in turn significantly increases their educational attainment in adulthood. The results strongly suggest that there exists a quantity-quality trade-off as renewed by Becker, and the trade-off is more pronounced in the economically less developed regions and among families with the same-sex children. The results shed light on the re-understanding of China's family planning initiative as well as the application of regression discontinuity designs. *Journal of Comparative Economics* 000 (2016) 1–17. School of Economics, Peking University, Beijing 100871, China; Department of Economics, University of Washington, Seattle, WA 98195, United States.

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## 1. Introduction

China's fast increasing aging population and old-age dependency ratio present a major demographic challenge to the nation's sustainable economic development and put its decades-long population control policy under scrutiny. In particular, the relaxation of the One-Child Policy (OCP), which requires the majority of parents to have only one child, has become an issue of heated debate in recent years. Many studies argue that the continuation of this rigorous policy will exacerbate the problem of shrinking labor force and thus have a negative impact on China's economic development (Ma, 2010; Zhou and Yin, 2011), while the opposite point of view suggests that the sudden relaxation of this family planning initiative would hamper the long-term economic growth with escalating population burden (Liu and Lu, 2008; Huang and Sun, 2013). In theory, the controversy between the two opposing views stems from the fundamental query of whether there exists a trade-off between population size and the average level of human capital accumulation. If the increase in fertility is accompanied by a substantial reduction in the per-capita human capital stock, then the relaxation of the birth control policy can hamper China's long-term innovation capability and its economic growth; however, if the trade-off is modest or non-existent, then

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the ease of population restriction, along with the improvement of technology, may not be disadvantageous to China's long-term economic development.

The query is commonly known as the quantity-quality (Q-Q) trade-off, which has been well discussed in the human capital literature since the seminal works of [Becker \(1960\)](#); [Becker and Lewis \(1973\)](#); [Willis \(1973\)](#) and [Becker and Tomes \(1976\)](#). According to the classic Q-Q trade-off theory, households make independent decisions on the number (quantity) of children and the human capital (quality) investment in each of their children, which are negatively correlated under the plausible presumptions that parents are impartial to any of the children, have limited resources to invest in them (binding budget constraints) and have difficulties in borrowing money externally (credit market failures). Under such presumptions, the negative relationship between quantity and quality can be seen as a result of “price effect” and “income effect”: on the one hand, with the improvement of economic conditions (e.g., increasing provision of public education), the shadow price<sup>1</sup> of the quality of children will decrease holding their quantity constant, causing the quality to rise; on the other hand, since the income elasticity of quality is arguably larger than that of quantity,<sup>2</sup> when the household budget constraints are relaxed over time (e.g., through a rise of wage rates), the average quality of children will increase while their quantity will initially remain unchanged and then decline eventually due to the higher shadow price of quantity (raising an additional child becomes more “expensive”). In the empirical studies, the quality of children or their level of human capital is usually measured by educational attainment or health status. Most empirical tests find negative effects of family size on the quality ([Glick et al., 2005](#); [Rosenzweig and Zhang, 2009](#); [Hatton and Martin, 2010](#); [Liu, 2014](#)), whereas others find no effects ([Black et al., 2005](#); [Park and Chung, 2012](#)) or even positive effects ([Qian, 2009](#); [Lordan and Frijters, 2013](#)).

The discrepancy between the theoretical prediction and the empirical findings may be due to the violation of the important presumptions. For example, based on the census data in Norway, [Black et al. \(2005\)](#) show that the effect of family size on children's education becomes negligible when the children's birth order is controlled. [Qian \(2009\)](#) uses the China Health and Nutrition Survey (CHNS) data to find that the school enrollment rate of the first-born child tends to increase with family size, and the effect is larger within households where children are of the same sex. These findings may suggest that parents treat their children unequally, e.g., they may set a higher standard of educational attainment for the first-born child or pay more attention to the education of sons than daughters. [Park and Chung \(2012\)](#) use a sample from the Matlab Health and Socioeconomic Survey (MHSS) in Bangladesh to find that the Q-Q trade-off is only significant for the first- and second-born children in a family. Based on a sample from the Young Lives Project (YLP) in Peru, [Lordan and Frijters \(2013\)](#) find that the relationship between family size and health outcome (height) is negative only when the pregnancy is unplanned whereas the relationship turns positive for the planned child-births. These findings further suggest that the conditions for the Q-Q trade-off can be more complicated than presumed, especially considering the endogeneity (self-selection) of parental fertility choices.

The empirical studies aiming to test the Q-Q trade-off hypothesis are constantly challenged by the endogeneity problems, which may arise from two sources: on the one hand, the quantity and quality of children are often affected simultaneously by some unobserved factors (e.g. parents' socioeconomic status or their gender preferences for children); on the other hand, reverse causality may also exist – the increase of offspring's quality can encourage parents to raise more children in return. In order to control for such endogeneity, instrumental variables (IVs) are frequently used. The commonly used IVs in the related literature generally fall into two categories – the birth of twins ([Glick et al., 2005](#); [Li et al., 2008](#); [Angrist et al., 2010](#); [Hatton and Martin, 2010](#)) and the implementation of birth control policies ([Qian, 2009](#); [Park and Chung, 2012](#); [Cameron et al., 2013](#)), both of which are correlated to family size but arguably exogenous to the fertility decisions. Since population control policies are implemented with various intensities (generally mild) among different countries, researchers often choose the birth of twins as IV. However, this IV also has its pitfalls: first, although the birth of twins will accidentally increase the family size, such incidents can be jointly determined with the quality of children by the unobserved genetic factors; second, parental preferences for later-born children may also change after the birth of twins, e.g., the short-term economic pressures of having an unplanned twin can change the parents' long-term plans of having more children and also their attitudes towards the human capital investment in the twins. In summary, the IV method is mainly limited by its strong requirement of “exclusion restrictions”, i.e., the IVs must be uncorrelated to the unexplained portion of the outcome variable (the level of human capital in our case).

Compared to the IV-based tests on the Q-Q trade-off hypothesis, there is a paucity of empirical studies on this topic relying specifically on regression discontinuity (RD) designs. The basic idea behind the RD designs is to find an observable discontinuity in a treatment variable (the conditional probability of having a single child in our case) and an outcome variable (children's educational attainment), both of which relate to an assignment variable (children's date of birth) and jump discontinuously at a cutoff point of the assignment variable. Near the cutoff point, the treatment can be seen as if it

<sup>1</sup> The shadow price of quality is the cost of a unit increase in quality holding the quantity constant; similarly, the shadow price of quantity is the cost of an additional child holding the quality constant ([Becker and Lewis, 1973](#)).

<sup>2</sup> Because the “payback period” and the opportunity cost of investing in an existing child is smaller than that of nourishing a new child, it is more cost-effective for the parents to “buy” child quality than to “buy” child quantity with a marginal increase in income, which in turn gives rise to the higher income elasticity of child quality.

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