



Relaxed population policy, family size and parental investments in children's education in rural Northwestern China



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ABSTRACT

This paper examines the quantity-quality (QQ) trade-off of children in rural Northwestern China, using data collected from Gansu Province on a set of households whose children were born between the mid-1980s and early 1990s, the period when China's one-child policy was temporarily relaxed. Under the relaxed policy, a second child was allowed if the first-born was a girl. Exploiting this policy change, this paper uses information on the sex of the first-born in a family to capture the causal effect of family size. In contrast to the results from ordinary least-squares regressions which suggest a strong QQ trade-off, the causal estimates based on the instrumental variable method indicate that rural parents hardly face such trade-off, at least in terms of their monetary investments in child education. The instrumental-variable estimation results remain similar when information on twin births is used for identification purpose.

1. Introduction

Reduction in fertility rates is thought to play a fundamental role in the economic growth of developing countries (e.g. World Bank, 1994; Li and Zhang, 2007). The underlying hypothesis is that reduction in fertility rates can induce more investments in children's human capital, by freeing up limited familial resources for such investments. Consistent with this hypothesis, high economic growth rates have been accompanied by both restrained population growth and increased educational attainment in East Asian economies, such as China, Hong Kong, Japan and South Korea, since the 1970s. Meanwhile, the development of the "new household economics" by Gary Becker (Becker and Lewis, 1973; Becker, 1981), in particular the theory of the quantity-quality (QQ) trade-off of children, lays out the microeconomic foundation of this hypothesis. This hypothesis is further supported by evidence from a series of empirical studies (e.g. Rosenzweig and Wolpin, 1980; Blake, 1981, 1989; Hanushek, 1992; Li et al., 2008; Rosenzweig and Zhang, 2009), which found a significantly *negative* association between individual children's educational attainment and the number of children in their family.

Not only does this hypothesis offer insights into the mechanism of intra-household allocation of educational resources, but it also has great relevance to population policy in developing countries, including

contemporary China. In particular, this hypothesis mirrors the rationale behind China's one-child policy enacted in 1979.¹ After two decades since its enactment, however, the policy has resulted in many unintended demographic problems, such as an escalating imbalance of the sex ratio (also known as the "missing women" problem), a distorted marriage market, and a rapidly aging population, etc. (Coale and Banister, 1994; Ebenstein and Sharygin, 2009; Ebenstein, 2011). These problems have led many observers to propose relaxations in the policy (e.g. Attané, 2002; Wang, 2005). In fact, China recently relaxed its one-child policy twice, first allowing the "only-child" couples to have a second child in 2014 and then allowing all couples to unconditionally have two children in 2016. Yet given the theory of the QQ trade-off of children and the findings that the one-child policy increased the human capital of the one-child generation (Choukmane et al., 2014; Yang, 2007), one might worry that the recent relaxations in the policy will cause significant reductions in parents' investments in child education (MacLeod, 2015). One might also wonder how further relaxations of the policy (e.g. to allow each couple to have more than two children) may affect children's human capital.

Clearly, the potential effects of relaxations in the population policy hinge on how parents respond to exogenous changes in family size (due to the change in policy). This paper attempts to shed some light on this issue. Exploiting the temporary relaxation of the one-child policy in

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¹ The official document that launched the one-child policy, "An Open Letter to Members of the Chinese Communist Party and Chinese Communist Youth League on Controlling Population Growth", argued that "rapid population growth results in difficulties in providing food, clothing, housing, transportation, *education*, medical care, and employment for the population" (Wang, 2005; italics added).

rural China between 1984 and 1991 as a natural experiment, this paper analyzes rural parents' investment behavior using a unique dataset collected from rural areas of Gansu, a poor northwestern province where the QQ trade-off is likely to occur. Methodologically, this paper overcomes two problems that may have led to misunderstandings of parents' behavior in the literature. First, presumably due to the lack of data on parental *investments*, previous studies in China have focused almost exclusively on children's educational *outcomes*, such as enrollment and years of schooling (e.g. Li et al., 2008; Lu and Treiman, 2008; Qian, 2009; Yang, 2007). These outcomes, usually observed sometime after parents' investment decisions were made, may be tainted by factors that are not under direct parental control, such as changes in school quality, enrollment rules, and labor market conditions. The influences of these confounding factors on children's educational outcomes are likely to disguise the true QQ trade-off *faced by the parents*. This paper circumvents this problem by focusing on a more direct measure of parental investment—monetary investments in child education.

Secondly and more importantly, parents' fertility decision and their decision on investments in child education are likely to be *jointly* made. Many factors, such as genetic endowments of the family, can affect both decisions. When these factors are unobservable to the researcher, conventional statistical methods, such as ordinary least-squares (OLS) regressions, may produce biased estimates of the causal effect of fertility (family size) on parental investment, thereby leading to misunderstanding of the QQ trade-off faced by the parents. Consistently estimating the causal effect of family size requires a source of exogenous variation in parents' fertility decisions. This paper obtains such variation by exploiting the relaxation of China's one-child policy in rural areas during 1984–1991. The policy was strictly enforced during the first five years since its inception in 1979. Yet international controversy and domestic resistance led the central government to officially relax the policy in most rural areas (rural Gansu included) in 1984, allowing couples to have a second child if the first-born was a girl (Short and Zhai, 1998). Such a relaxation implies that the sex of the first-born in a family has strong predictive power for the size of this family. To the extent that the sex of the first-born is exogenously determined, it serves as an instrumental variable (IV) for family size.

Analyzing data on 1512 households whose children were born between the mid-1980s and early 1990s in rural Gansu, our IV estimates indicate that an exogenous increase in family size, in particular, a 50% increase (say, from two to three children) leads to a 52–56% increase in parents' total monetary investment in child education, which implies little QQ trade-off faced by the parents. Such results remain similar when other IVs for family size, e.g. indicators of twin births, are used.² In comparison, OLS regressions estimate that parents increase their total investment only by 34% in response to a 50% increase in family size. Translated into the elasticity of parental investment *per child* with respect to family size, the OLS estimate suggests that a 50% increase in family size is associated with a 16% reduction in parental investment per child – a significant QQ trade-off faced by the parents.

The rest of this paper is structured as follows. The next section reviews the recent literature. Section 3 describes the evolution of the one-child policy, the study area and data analyzed in this paper. Section 4 develops our empirical framework. Section 5 reports and discusses our empirical findings. The final section draws conclusions and points out some directions for future research.

2. Recent literature

Inspired by Becker's theory of the QQ trade-off of children, many

² This paper does not focus on twin births because they account for only 1.7% of the total number of births in the data used in this paper.

empirical studies have been conducted to estimate the impact of family size since the early 1980s. While early studies (e.g. Blake, 1981, 1989; Hanushek, 1992) commonly found a significantly negative impact of family size on children's educational attainment, studies conducted in the past two decades provided less conclusive findings. Since Schultz (2008) provides a thorough review of empirical studies done by 2007, to avoid unnecessary repetition, this section focuses on studies conducted in the past decade, with an emphasis placed on the identification methods adopted in these studies.

Four empirical approaches have been devised to obtain exogenous variations in family size in the recent literature. The first approach, pioneered by Rosenzweig and Wolpin (1980), exploits twinning as a natural experiment. Rosenzweig and Wolpin used the frequency of twin births per completed pregnancy as an exogenous determinant of a woman's completed fertility and found that this shock to fertility has a negative impact on schooling per child in India. In a similar vein, using twin births as an IV for family size, Li et al. (2008) and Zhang and Rosenzweig (2009) both found a significantly negative impact of family size on children's educational attainment in China. However, also using twinning to instrument family size, Black et al. (2005) and Angrist et al. (2010) found little family-size impact on child education, respectively, in Norway and Israel.

The second approach, proposed by Angrist and Evans (1998) in their seminal study on the impact of fertility on female labor supply, isolates exogenous variation in fertility due to parents' gender preference. Exploiting American couples' preference for a balanced sex-mix of children, they used the sex-composition of the first two births in a family to create IVs (i.e. indicators of "two girls", "two boys" or "same sex") for family size. Although Angrist and Evans' study was not on child education, their identification strategy inspired a number of later studies that were. Adopting a similar sex-mix IV strategy, Conley and Glauber (2006) found in the United States that an increase in family size reduces the likelihood of private school attendance and increases grade retention for second-born boys, but has little effect for first-born boys. Two studies in developing countries employed a similar strategy but found different results. While Jensen (2005) found a negative family-size impact on children's years of schooling in India, Angrist et al. (2010) found only negligible family-size impacts in Israel.

Adapting the sex-mix identification strategy to fit the form of prenatal son-preference in South Korea, where high-order births may be subject to sex-selective abortions, Kang (2011) used the sex of the first-born (i.e. a dummy for the first-born being a girl) as an IV for family size. He found a non-negligible negative family-size effect on parental educational investments for girls but not for boys. Also examining the case of South Korea, Lee (2008) applied the "girl-first" IV strategy to educational investments data aggregated at the household level, and tested the QQ trade-off by deriving the elasticity of parental investment per child with respect to family size from a household-level model (see Section 4 for more details). His IV estimates translated into a statistically negative elasticity (of parental investment per child with respect to family size), which suggests a significant QQ trade-off faced by the parents. His results also show that conventional OLS regressions tend to overestimate the QQ trade-off by yielding a more negative elasticity.

The third approach uses exogenous costs of childbearing to instrument family size. Dang and Rogers (2016), for example, used the distance to the nearest family planning center in rural Vietnam as an IV for family size and found that families in rural Vietnam invest less money in the education of children who have more siblings. Liu (2014) exploited another kind of cost of childbearing in the context of rural China, i.e. fines exercised by local governments for having out-of-quota births, to instrument family size (along with the "girl-first" IV) but found little family-size effect on child education. He did, however, find a significantly negative impact of family size on child health (measured by height-for-age z-scores).

The fourth approach exploits exogenous shocks to fertility due to

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