Journal of Comparative Economics 000 (2016) 1–15

Contents lists available at ScienceDirect

Journal of Comparative Economics

journal homepage: www.elsevier.com/locate/jce

Does population control lead to better child quality? Evidence from China's one-child policy enforcement☆

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ARTICLE INFO

Article history:
Available online xxx

JEL Classification:
J13
I2
O1

Keywords:
Quantity-quality trade-off
Family planning
Child education

ABSTRACT

Li, Bingjing, and Zhang, Hongliang—Does population control lead to better child quality? Evidence from China's one-child policy enforcement

Scholarly evidence on the quantity-quality trade-off is mixed in part because of the identification challenge due to endogenous family size. This paper provides new evidence of the causal effect of child quantity on child quality by exploiting regional differences in the enforcement intensity of China's one-child policy (OCP) as an exogenous source of variation in family size. Using the percentage of current mothers of primary childbearing age who gave a higher order birth in 1981, we construct a quantitative indicator of the extent of local violation of the OCP, referred to as the excess fertility rate (EFR). We then use regional differences in EFRs, net differences in pre-existing fertility preferences and socio-economic characteristics, to proxy for regional differences in OCP enforcement intensity. Using micro data from the Chinese Population Censuses, we find that prefectures with stricter enforcement of the OCP have experienced larger declines in family size and also greater improvements in children's education. Despite the evident trade-off between family size and child quality in China, our quantitative estimates suggest that China's OCP makes only a modest contribution to the development of its human capital. *Journal of Comparative Economics* **000** (2016) 1–15. Department of Economics, National University of Singapore, 1 Arts Link, 117570, Singapore; Department of Economics, Hong Kong Baptist University, Hong Kong.

1. Introduction

The relationship between child quantity and child quality has long been questioned in social science and public policy. Beginning with the seminal work by Gary Becker and his associates (Becker, 1960; Becker and Lewis, 1973; Becker and Tomes, 1976), economists have developed a rich theoretical framework to understand the interaction between child quantity and child quality by seeing both as utility-maximizing choices of households (see, e.g., Hazan and Berdugo (2002); Moav (2005). A direct implication of this framework is a trade-off between quantity and quality: an exogenous reduction

☆ We thank Jungmin Lee, Pak Wai Liu, Wallace Mok, Mark Rosenzweig, Junsen Zhang, and four anonymous referees for their helpful comments and suggestions. Hongliang Zhang acknowledges financial support from the Natural Science Foundation of China (No. 71403233). All remaining errors are ours.

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http://dx.doi.org/10.1016/j.jce.2016.09.004
0147-5967/

in family size increases parental investment per child and therefore improves child quality. Although a negative quantity-quality relationship has been widely observed (for surveys, see King (1987); Blake (1989)), the cross-sectional association cannot be interpreted as the causal effect of quantity on quality because of the endogeneity issues plaguing this relationship. First, child quantity and child quality are simultaneously determined parental choices, and both are affected by unobserved parental heterogeneity. Second, not only can family size affect child quality, but child quality can also affect family size. For both sources of endogeneity, the effect on the observed quantity-quality relationship is *a priori* ambiguous.[1]

To tackle the endogeneity problems, the literature exploits plausibly exogenous variation in family size caused by either the natural occurrence of twin births or the sibling sex composition, but yields mixed results. For example, on the one hand, an adverse effect of family size on children's outcomes is evidenced by Rosenzweig and Wolpin (1980) for India, by Stafford (1987) and Cáeres-Delpiano (2006) for the US, by Lee (2008) for South Korea, and by Millimet and Wang (2011) for Indonesia. On the other hand, Black et al. (2005), Angrist et al. (2010), and Fitzsimons and Malde (2014) find no causal link between child quantity and child quality in Norway, Israel, and Mexico, respectively.

The Chinese context attracts the most scholarly attention in the empirical quantity-quality trade-off literature because of the availability of high-quality twins' data and the country's distinct family planning policy. Using twinning among siblings as an instrument for the family size of non-twin children, Li et al. (2008) find that twinning increases the family size and decreases the education of non-twin siblings. Also exploiting twinning as an exogenous variation in family size but examining the human capital outcomes of both twins and non-twins, Rosenzweig and Zhang (2009) find that both the own and cross-sib effects of twinning are negative and demonstrate that they yield, respectively, the upper and lower bounds on the quantity-quality trade-off. Although China's national family planning policy is often referred to as the "one-child policy" (OCP), additional births are not always strictly prohibited, and there exist substantial geographical variations in OCP enforcement. In two previous studies, Qian (2009) and Liu (2014) both exploit differences in local statutory fertility control policies as exogenous variations for family size to test the quantity-quality trade-off in China, but yield contradictory results. Making use of regional differences in relaxation rules that allow rural couples to have a second child if the first child is a girl, Qian (2009) finds that an additional child increases school enrollment of firstborn girls. In contrast, using regional differences in eligibility criteria for having two children and fines on unsanctioned births, Liu (2014) finds that family size exerts an adverse effect on child quality when measured by child height.

An important difference between the current paper and prior research is that we use a *de facto* measure of local OCP enforcement intensity that takes into account not only the harshness of local statutory fertility policy, as is the studies of both Qian (2009) and Liu (2014), but also the stringency of policy compliance in practice. We construct a quantitative indicator of the extent of local violation of the OCP using the percentage of current Han mothers (i.e., women with at least one surviving child) of primary childbearing age who gave a higher order birth in 1981. This quantitative indicator, which we refer to as the "excess fertility rate" (EFR), is analogous to the general fertility rate in definition, except that both the numerator and denominator are restricted to current mothers. We then measure geographical variations in OCP enforcement intensity based on the differences in EFRs across localities, net differences in pre-existing fertility preferences and socio-economic characteristics. Note that this measurement of program intensity follows the spirit of Duflo (2001), who gauges regional differences in the intensity of Indonesia's school construction program in the 1970s by differences in the number of schools constructed, net differences in the number of children of primary school age.

Using the 1% sample of the 1982 and 1990 Chinese Population Censuses, we find that prefectures with stricter enforcement of the OCP experienced larger declines in family size, but also greater improvements in child education. Under the assumption that there are no omitted time-varying, region-specific determinants of children's education that are correlated with local OCP enforcement intensity, we use the interaction between local OCP enforcement intensity and census year as the instrument to estimate the causal effect of family size on the education of firstborn children aged 14–17. Our instrumental variable (IV) estimates show that having an additional sibling decreases the education level by 0.12 for boys and 0.07 for girls. When junior secondary school attendance is used as the outcome measure, our estimates indicate that an additional sibling lowers the probability of attending junior secondary school by 13.3 and 11.1 percentage points for boys and girls, respectively.

Using local OCP enforcement intensity as an instrument for family size to identify the quantity-quality trade-off is not without potential problems. First, OCP enforcement intensity may be correlated with unobserved concurrent region-specific shocks to children's education, such as local school provision and enforcement of nine-year universal education. To address this potential concern, we further investigate the relationship between the EFR and education of children in the 1990 census by mother's age. We find a significant negative relationship only for children whose mother is aged 45 or below in 1990 (i.e., aged 35 or below when the OCP was enacted in 1980), but no apparent relationship for children whose mother is aged 46 or above in 1990 (i.e., aged above 36 or above in 1980). That the EFR is not associated with the education of children of older mothers whose fertility was barely affected by the OCP is evidence suggesting that our IV estimates of the quantity-quality trade-off are not confounded by a spurious correlation between the EFR and improvement in child education across regions.

[1] First, omitted parental heterogeneity can result in a spurious (positive or negative) correlation between family size and child education if parental preferences for child quantity and child quality are correlated with each other. Second, owing to two competing mechanisms with opposite effects, the overall effect of child quality on family size is also ambiguous. A higher quality child raises parental expectation of the quality of subsequent births, which may increase fertility. However, a higher quality child also decreases the marginal utility of an additional birth, which may decrease fertility.

Please cite this article as: B. Li, H. Zhang, Does population control lead to better child quality? Evidence from China's one-child policy enforcement, Journal of Comparative Economics (2016), http://dx.doi.org/10.1016/j.jce.2016.09.004