

**The decision to invest in child quality over quantity:
Declining fertility and rising investment in private tutoring in Vietnam**

Extended Abstract for the PAA 2009 annual meetings
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Background

Over the past three decades, there has been considerable study of the relationship between household choices on the *quantity and quality of children* (Becker and Lewis 1973), including a variety of papers on household size and child educational attainment (Blake 1989; Eloundou-Enyegue and Williams, 2006; Knodel and Wongsith 1991; Li, Zhang and Zhu, 2008; Shapiro and Tambashe 2001).

Yet, there has been little research so far on the correlation between household size and household educational investment in their children in the form of expenditures for private tutoring (and more broadly private schooling). To our knowledge, the exceptions are the papers on Korea by Lee (2008) and Kang (2008).

Private tutoring merits attention for several reasons. First, expenditures on private tutoring may be an especially good measure of a household's decision to invest voluntarily in their children's human capital – compared with enrollment, for example, which may also reflect exogenous factors such as compulsory schooling laws. Second, private tutoring is now widespread in many countries, especially but not solely in East Asia; and there is increasing evidence that it does in fact improve students' academic performance (Bray and Kwok 2003; Dang and Rogers 2008). Third, there has been considerable debate about tutoring among policymakers in some countries (Bray, 2003). One crucial question is whether widespread availability and use of private tutoring exacerbates social and income inequality. Here, the link with demography is important: if use of tutoring is correlated with both smaller family size and higher family income, this heightens the risk that it could exacerbate inequality.

However, the literature on private tutoring contains some hints about the quantity-quality tradeoff in tutoring expenditures. Dang and Rogers (2008) review the literature on correlates of tutoring at the household level. In addition to finding that richer, more educated, and urban households are more likely to enroll their children in tutoring, they cite a number of studies indicating that smaller families are more likely to invest in tutoring. Nevertheless, while this evidence is consistent with a quantity-quality tradeoff, the tutoring literature has not focused on identifying the direction of causality. In fact, the endogeneity of family size also makes it difficult to correctly interpret any correlation between family size and other family welfare outcomes such as female labor supply or girl marital status.

Researchers have used different strategies such as instrumental variables and randomized experiments methods to address the endogeneity of family size. These instruments include unplanned (multiple) births (Rosenzweig and Wolpin, 1980), the gender mix of children combined with parental sex preference (Angrist and Evan, 1998; Chun and Oh, 2002), a combination of these two instruments (Angrist, Lavy and Schlosser, 2006; Iacovou, 2001), family planning infrastructure in the community (Joshi and Schultz, 2007; Rosenzweig and Schultz, 1985), and cultural belief in

auspicious years for giving birth (Vere, 2008). However, the evidence on family welfare outcomes, and in particular, the quantity-quality tradeoff is still mixed.¹

Research questions and data

This paper investigates the quality-quantity tradeoff theory of childbearing and its implications for the education of children. Specifically, it asks: Do lower fertility levels make it possible for households to invest more in their children's human capital, particularly in private tutoring (and private education more generally)? If so, how is this likely to affect educational outcomes?

We also contribute to the literature by collecting data on and using a large set of variables that could be used as instruments for family size, which are usually used scatteringly in the literature. These potential instruments can help control for economic and cultural factors that arguably affect a family's investment in their children's education only through the family size. These include

- i) whether parent was covered by government restriction on number of children
- ii) availability of birth control methods in the community
- iii) number of siblings/ birth order of parent
- iv) parental preference for ideal family size
- v) parental gender preferences for children
- vi) whether parents believe in Vietnamese lunar horoscope, which specifies certain years as being lucky or unlucky for giving birth
- vii) lagged fertility rates in the community

To collect data on these variables, we have designed a new nationally representative household survey in Vietnam, working together with several other researchers who have a related project on tutoring.² We also gather data on student and parent scores on achievement tests, student grades/rankings in school (this year and last), and household use of and expenditures on private tutoring, the extent of and reasons for private tutoring, as well as teacher tutoring activity and motivation. The sample consisted of 1,298 households, and was a subsample of the Vietnam Household Living Standards Survey 2006, which offer a rich set of additional demographic and socio-economic information.

¹ For example, Angrist, Lavy and Schlosser (2006) find no tradeoff in Israel; Black, Devereux, and Salvanes (2005) found that controlling for birth order reduces the impacts of family size to almost zero; Qian (2006) finds a non-monotonic relationship between number of children and educational attainment in China; and Lee (2008) finds a weak tradeoff in Korea that gets stronger with more children. See Schultz (2007) for a recent review.

² Vietnam is an ideal place to study these quantity-quality tradeoffs for three reasons. One is that Vietnam has seen a very rapid decline in fertility and rapid advances in education: the total fertility rate decreased steadily from 6 births per woman in the 1970s to 4 births per woman in the late 1980s and to around 2 births per woman currently (World Bank, 2008); and average years of schooling for adult population increases from 4 in 1990 to 6.6 in 1998 and 7.8 in 2006 (World Bank, 2008; VLSS, 1998; VHLSS, 2006). So this should be promising terrain for a study linking fertility and education investment. Second, the private-school system is virtually non-existent, so household financial investment in education shows up in tutoring expenditures, rather than in moving children to private schools. As a result, the prevalence of tutoring is quite high. Third, Vietnam has rich panel household data, with matched surveys in 2002, 2004, and 2006, and we were able to survey a subset of those panel households.

Empirical methodology

Our empirical approach includes three sections. In each case, we first test for multivariate correlations between family size and the education-related dependent variable, and then instrument for family size.

1. Impacts of family size on school enrolment and tutoring use

Question: Is a smaller number of children in the family associated with more enrolment and higher levels of tutoring use?

$$E_{ij} = \alpha + \beta FamSize_i + \gamma Z_{ij} + v_i + \varepsilon_{ij} \quad (1a)$$

$$\Delta E_{ij} = \beta \Delta FamSize_i + \gamma \Delta Z_{ij} + \Delta \varepsilon_{ij} \quad (1b)$$

where the dependent variable E_{ij} is a variable indicating 3 states: 1 if enroll in school, 2 if enroll without tutoring, 3 if enroll with tutoring; Z_{ij} is a vector of child, household, community and school characteristics; and there are household random effects v_i . We first estimate this using actual family size, then run an IV ordered probit model instrumenting for family size.

2. Impacts of family size on intensity of tutoring use (conditional on school enrolment)

Question: Is a smaller number of children in the family associated with higher levels of tutoring use (conditional on school enrolment)? Here, we estimate the following equation,

$$T_{ij} = \alpha + \beta FamSize_i + \gamma Z_{ij} + v_i + \varepsilon_{ij} \quad (2a)$$

$$\Delta T_{ij} = \beta \Delta FamSize_i + \gamma \Delta Z_{ij} + \Delta \varepsilon_{ij} \quad (2b)$$

where the dependent variable T_{ij} is the time or expenditure spent on tutoring for child j in household i ; Z_{ij} is a vector of child, household, community and school characteristics; and there are household random effects v_i . We first estimate this using actual family size, then run an IV tobit model instrumenting for family size.

3. Impacts of family size on learning outcomes (conditional on school enrolment)

Question: Is a smaller number of children in the family associated with better academic achievement (conditional on school enrolment)?

$$A_{ij} = \alpha + \beta FamSize_i + \gamma Z_{ij} + v_i + \varepsilon_{ij} \quad (3a)$$

$$\Delta A_{ij} = \beta \Delta FamSize_i + \gamma \Delta Z_{ij} + \Delta \varepsilon_{ij} \quad (3b)$$

where the dependent variable A_{ij} can be GPA or test score; Z_{ij} is a vector of child, household, community and school characteristics; and there are household random effects v_i . We first estimate this using actual family size, then run an IV model instrumenting for family size.

We have just begun to implement this empirical strategy on the data we collected, and therefore we do not have results to report yet. However, Table 1 presents some preliminary first-stage regressions in which we regress the number of children in the household (in various age ranges) on some potential instruments. These results suggest to us that our IV strategy may bear fruit: the proposed instruments have the expected relationship with family size and fertility, and the relationship remains strong even with control variables included.

Table 1: First-stage regressions of family size on the potential instruments

	Dependent variable: Number of children					
	Age 0-14	Age 0-18	Age 0-14	Age 0-18	Age 0-14	Age 0-18
	OLS (1)	OLS (2)	OLS (3)	OLS (4)	FE (5)	FE (6)
Number of parents' siblings	0.033** (2.05)	0.064*** (3.58)	0.050*** (3.00)	0.081*** (4.32)	0.036* (1.71)	0.070*** (3.03)
N	1187	1187	926	926	926	926
Parental birth order	0.104*** (5.80)	0.106*** (5.34)	0.109*** (5.96)	0.117*** (5.83)	0.117*** (5.14)	0.135*** (5.14)
N	1187	1187	926	926	926	926
Existence of family planning center in the commune	-0.046* (-1.74)	-0.090*** (-3.06)				
N	8019	8019				
Distance to nearest family planning center (in minutes)	0.001*** (7.69)	0.002*** (8.58)				
N	7814	7814				
Number of years the family planning center in operation	-0.004* (-1.86)	-0.005* (-1.95)				
N	3201	3201				
Control variables	No	No	Yes	Yes	Yes	Yes
Commune fixed-effects	No	No	No	No	Yes	Yes

Note: 1. * $p < .1$, ** $p < 0.05$, *** $p < 0.01$; robust t statistics in parentheses

2. Control variables include grandparents' educational levels, log of real household expenditure per capita, and a dummy variable indicating whether the household is living in an urban area.

3. Each cell represents a separate regression.

References

- Angrist, Joshua D. and William N. Evan. (1998). "Children and Their Parent's Labor Supply: Evidence from Exogenous Variation in Family Size". *American Economic Review*, 80(3): 313-336.
- Angrist, Joshua, Victor Lavy, and Analia Schlosser. (2006). "New Evidence on the Causal Link between the Quantity and Quality of Children". IZA Discussion paper No. 2075.
- Becker, Gary, and H. G. Lewis. (1973). "On the Interaction between the Quantity and Quality of Children." *Journal of Political Economy* 81: S279-288.
- Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes. (2005). "The More the Merrier? The Effect of Family Size and Birth Order on Children's Education." *Quarterly Journal of Economics*, 120(2): 669-700.
- Blake, Judith. (1989). *Family Size and Achievement*. CA: University of California Press.
- Bray, Mark. (2003) "Adverse Effects of Private Supplementary Tutoring: Dimension, Implication and Government Responses." International Institute for Educational Planning. Paris: UNESCO.
- Bray, Mark and Percy Kwok (2003). "Demand for Private Supplementary Tutoring: Conceptual Considerations, and Socio-economic Patterns in Hong Kong". *Economics of Education Review*, 22: 611-620.
- Chun, Hyunbae and Jeungil Oh. (2002). "An Instrumental Variable Estimate of the Effect of Fertility on the Labor Force Participation of Married Women." *Applied Economics Letters*, 9: 631-634.
- Dang, Hai-Anh and Halsey Rogers. (2008). "The Growing Phenomenon of Private Tutoring: Does It Deepen Human Capital, Widen Inequalities, or Waste Resources?" *World Bank Research Observer* 23(2): 161-200.
- Eloundou-Enyegue, Parfait M. and Lindy B. Williams. (2008). "Family Size and Schooling in Sub-Saharan African Settings: A Reexamination". *Demography* 43(1): 25-52.
- Iacovou, Maria. (2001). "Fertility and Female Labour Supply." Institute for Social and Economic Research Working Paper, No 2001-19.
- Joshi, Shareen and T. Paul Schultz. (2007). "Family Planning As an Investment in Development: Evaluation of a Program's Consequences in Matlab, Bangladesh". IZA Discussion paper No. 2639.
- Kang, Changhui. (2008). "Family Size and Educational Investments in Children: Evidence from Private Tutoring Expenditures in South Korea". Working paper. Department of Economics, Chung-Ang University.
- Knodel, John and Malinee Wongsith (1991). "Family Size and Children's Education in Thailand: Evidence from a National Sample." *Demography* 28: 119-131.
- Lee, Jungmin. (2008). "Sibling Size and Investment in Children's Education: An Asian Instrument". *Journal of Population Economics* 21: 855-875.
- Li, Hongbin, Junsen Zhang, and Yi Zhu. (2008). "The Quantity-Quality Trade-off of Children in a Developing Country: Identification Using Chinese Twins". *Demography* 45(1): 223-243.
- Qian, Nancy. (2006). "Quantity-Quality: The Positive Effect of Family Size on School Enrollment in China". Working paper, Department of Economics, Brown University.
- Rosenzweig, Mark R. and Kenneth I. Wolpin. (1980). "Life Cycle Labor Supply and Fertility: Causal Inferences from Household Models." *Journal of Political Economy*, 88(2): 328-348.
- Shapiro, David and B. Oleko Tambahe. (2002.) "Gender, Poverty, Family Structure, and Investments in Children's Education in Kinshasa, Congo". *Economics of Education Review*, 20: 359-375
- Schultz, T. Paul. (2007). "Population Policies, Fertility, Women's Human Capital and Child's Quality". IZA Discussion paper No. 2815.
- Rosenzweig, Mark R. and T. Paul Schultz. (1985). "The Demand for and Supply of Births: Fertility and Its Life Cycle Consequences." *American Economic Review*, 75(5): 992-1015.
- Vere, James. P. (2008). "Dragon Children: Identifying the Causal Effect of the First Child on Female Labour Supply with the Chinese Lunar Calendar". *Oxford Bulletin of Economics and Statistics* 70(3): 303-325.
- World Bank. (2008). World Bank Development Indicators Online.