

Pension Coverage for Parents and Educational Investment in Children: Evidence from Urban China

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Abstract

When social security is established to provide pensions to parents, their reliance upon children for future financial support decreases, and their need to save for retirement also falls. In this study, the expansion of pension coverage from the state sector to the non-state sector in urban China is used as a quasi-experiment to analyze the intergenerational impact of social security on education investments in children. In a difference-in-differences framework, a significant increase in the total education expenditure is found to be attributable to pension expansion. The results are unlikely to be driven by other observable trends. They are robust to the inclusion of a large set of control variables and to different specifications, including one based on the instrumental variable method.

JEL classification: I29, J32

The old-age security motive for fertility is well recognized in the developing world. In countries where the capital market is underdeveloped and important social welfare institutions are lacking, individuals without insurance and old-age security have the incentive to invest in the future in the form of children (e.g., Cain 1983; Nugent 1987).¹ As the transfer from children to parents and the survival of parents are both positively correlated with the level of children's education (Cai et al. 2006; Lei et al. 2011; Lillard and Willis 1997; Zimmer et al. 2007), support in old age may also constitute a motive for providing children with human capital as part of an explicit or implicit intergenerational contract (Pollak 1988; Raut 1990).² This old-age security motive for investment in children's education is possibly more credible when the number of children a family can have is limited by strict family planning

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- 1 Consequently, the growth in social security and other transfer payments to the elderly is believed to have contributed to the decline in fertility (e.g., Hohm 1975).
- 2 Even parents who leave sizable bequests and do not need support in old age from children can indirectly save for old age by investing in children's education and then reducing bequests when elderly (Becker 1992).

policies, like those implemented in China. In this case, parents' choice is not on child quantity but on child quality.³

When social security is established to provide pensions to parents in old age, their reliance upon children for future financial support decreases. At the same time, their need to save for retirement also falls. The declining role of children in the support of elder parents and the decreasing need of parents to save may simultaneously influence parents' decisions to invest in their children's education, but in the opposite direction, the former implies a decline in the investment, but the latter may lead to an increase.

This paper is one of the first studies to assess the intergenerational impact of social security expansion on a family's education expenditures on children. For identification purposes, the one pension reform in urban China is used as a quasi-natural experiment. The reform entails an expansion of pension coverage from employees in the state sector to those in the non-state sector. Employees in the state sector—including those in government agencies, publicly financed social services (e.g., schools, youth organizations, and health care providers), and state-owned enterprises (SOEs)—have long been covered by social security. However, until 1999, non-state employers were not required to enroll their employees in the public pension program (State Council 1999, 2000).

In the empirical analysis, a difference-in-differences framework is applied, in which trends in expenditures for the education of children who have a parent employed in the state sector are used to gauge counterfactual trends for what education expenditures would have been for children with both parents in the non-state sector. First, it is demonstrated that other trends—such as those in medical insurance, wages, bonus income, housing ownership and values, working hours, household income per capita and household size—are indistinguishable between the two sectors. Moreover, it is illustrated that determinants of an individual working in the state or non-state sector do not change over time. A statistically significant increase in family education expenditures attributable to the pension reform is then proven. The result is robust to the inclusion of a large set of control variables and to different specifications, including one based on the instrumental variable method.

This paper contributes to the knowledge of motivation for parental investment in children. In Becker's classic model (1974), parents are altruistic.⁴ In later models of bequests (Bernheim et al. 1985) and parental investments in children (Raul 1990), parents are depicted as making strategic decisions based on expected service or transfers from children. Empirically, some studies support the altruistic motive hypothesis (e.g., McGarry and Schoeni 1995), while others question it or show a mixture of altruistic and exchange motives in parents (e.g., Cox 1990). This study provides new evidence in this inquiry.

This study also relates to the literature on the intergenerational effects of welfare reform on education. Studies of changes in the US national welfare system in the 1990s, aimed at promoting adult employment and reducing long-term dependence on public assistance, have generally yielded positive findings with regard to educational attainment in adolescents (Miller and Zhang 2012) and young children (Duncan and Chase-Lansdale 2001; Morris et al. 2005; Zaslow et al. 2002). These findings in the United States have advanced the understanding of the effects of social programs on education. One open question remains, however, as to whether these findings can generalize to developing countries, where parents' investment in their children's human capital may be motivated by old-age security. This study provides evidence on this issue from a less-developed country.

In addition, this study advances debate and discussion on the impact of pension provisions in developing countries in general and on pension reform in China in particular. Several studies analyzing the

3 As suggested by the influential quantity-quality model in Becker and Lewis (1973), parents may increase child quality when they have fewer children by allocating more resources to each child. This quality gain can happen in the absence of old-age motive.

4 Altruistic transfers from parents to children may also be made to offset inequality in children's earnings (Behrman et al. 1982).

gender-specific impact of old-age pensions in South Africa found that pensions both reduced the labor supply of prime-age individuals and positively affected the nutritional status of children (Bertrand et al. 2003; Duflo 2003). In contrast, much of the discussion on China has focused on the limitations of the pension system and ways to improve its efficiencies (e.g., Li 2011; Salditt et al. 2008; Zhao and Xu 2002). Evidence of policy impacts, however, is lacking, with the exception of a recent study that relates higher household savings to pension reform in state-owned enterprises (Feng et al. 2011).

The remainder of the paper is organized as follows: Section I provides a review of the cultural and institutional background for elderly support in China. Section II presents a simple conceptual framework linking pension coverage for parents and their decisions for investing in their children's education. Section III introduces data and reports summary statistics. Section IV discusses the empirical approach, section V presents the results, and section VI concludes.

I. Background: Elderly Support and the Pension System in Urban China

According to Confucian teaching, filial piety is the root of all virtue. The practice of honoring parents, including providing material means of supporting them in old age, is therefore inextricably ingrained in the moral fiber of Chinese society. Since 1950, taking care of the elderly has become more than just an informal social norm: it has been formally codified as a legal obligation for children.⁵ Not surprisingly, family was, and still is, the primary care provider of the nursing needs and financial support for the elderly.⁶

The traditional role of family in elder care is fraught with new challenges, largely the result of smaller family size and greater labor mobility. The Chinese "one-child" policy, effectively enforced during the past three decades, has reduced family size. Concerns have been raised about the viability of the family support system because the young can now go anywhere for job opportunities. Parents doubt that filial duty will remain a motivational force for their singletons, and they also worry about the burden of caring for four elderly parents placed upon young couples (Fong 2004).

Notwithstanding these concerns and the decline of multigenerational coresidence over time, several studies conclude that adult children in China are still responsive to the needs of their parents. Rural children will forgo migration opportunities and stay in their home villages when one or both of their elderly parents are sick (Giles and Mu 2007). Urban children provide more monetary transfers to parents when needed (Cai, Giles, and Meng 2006). More recently, a study based on the new China Health and Retirement Longitudinal Study emphasizes that living arrangements are such that care from a child, either co-resident or in a nearby community, is readily available for more than 70% of the elderly (Lei et al. 2011).

Compared to family support, private saving is a secondary option for the provision of elders. This option is likely to be viable only for high-income families because small-savers are predominant among the current elderly. In 1995, the value of financial assets was less than half the annual earnings for 53% of the urban population aged fifty-five or older (Jackson and Howe 2004). The percentage of households with wealth-to-income ratios of more than two at retirement is predicted to remain small in the future (Takayama 2002). However, with housing boom in urban cities since the early 2000s, housing is likely to become the biggest source of wealth for urban residents. While such assets may have limited liquidity, they still can be leveraged to finance consumption if needed.

5 The Marriage Law of 1950 states that children should support elderly parents, and the Constitution of 1954 emphasizes that children have a duty to support parents (see Fang, Wang, and Song 1992; World Bank 1994). The Marriage Law (2001) further emphasizes this responsibility and endows elderly parents with the right to sue children for support if they fail to provide assistance.

6 Under the mode of traditional filial piety in China, sons are responsible for the care of elderly parents. As shown in Ebenstein and Leung (2010), parents without a son are more likely to participate in old-age pension programs in rural areas.

The third source of old-age income is the social pension. Since the early 1950s, urban residents who worked in government, government-sponsored nonprofit institutions, and SOEs have been entitled to social security, including pension coverage. Economic restructuring in SOEs eventually relieved the enterprises from the burden of providing social security for their employees. This change was made possible by several policy reforms. In 1991, following experiments in a number of provinces and municipalities, the State Council outlined the first major pension reform.⁷ The idea was to promote the integration of pensions for enterprise workers at the provincial level. The social pooling remained a “pay-as-you-go” (PAYG) system, in which mandatory contributions from enterprises and payroll taxes from workers were collected to pay retirees.

With concerns about PAYG system sustainability for a rapidly aging population, further reform of the pension system for enterprise workers was initiated in the mid-1990s.⁸ As a result, a mandatory system consisting of social pooling and individual accounts was established. The social pooling pillar, based on PAYG, and the individual accounts, purported to be fully funded, were financed with contributions from both individuals and employers.⁹ Voluntary pensions outside the mandatory system—including enterprise annuity plans, individual savings, and other pension plans organized by industries or localities—were also encouraged (Barr and Diamond 2010).

Although employees of SOEs were covered by the system described above, coverage for workers outside the state sector was very limited. To facilitate SOE reforms, as well as to improve the financial balance of the pension program, the next step in pension reform was to expand the pension pool and encourage contributions from employers and workers in the non-state sector (Zhao and Xu 2002). In 1999, the State Council called for acceleration of the inclusion of non-state enterprise workers into the pension pool (State Council 1999), and included in the non-state enterprises were collective, foreign-invested, private, and other types of enterprises. Since then, pension coverage in non-state enterprises has increased, even though it remains far lower than in the state sector due to non-compliance (Zhao and Xu 2002).

Public employees are covered by a different system that depends not on worker contributions but rather on benefits based on a short period of earnings at the end of a career (Barr and Diamond 2010). Compared to the pension program for enterprises, the system for public employment has undergone little change.

In sum, employees in the state sector, including SOEs and the public sector, have always been entitled to pension coverage, even though the structure of the pension program for SOE employees has gone through many changes. Only in the early 2000s were workers in non-state sectors brought into the public pension system.

II. The Link between Pension and Education Expenditure

Investment in children’s human capital is largely made by parents. As pointed out in Becker and Murphy (1988), even altruistic parents have to consider the trade-off between consumption and the human capital of children; parents must reduce their own consumption (including leisure) to acquire the time and resources they spend on childcare, education, training, and health.

7 See the 1991 State Council Resolution on the Reform of the Pension System for Enterprise Workers.

8 The two crucial policy documents are the 1995 State Council Circular on Deepening the Reform of the Old-Age Pension System for Enterprise Employees and the 1997 State Council Document No. 26.

9 In 2001, individual contribution rates in Fuzhou, Shanghai, Shenyang, Wuhan, and Xian, the five cities under study in this paper, were 2%, 6%, 8%, 5%, and 6%, respectively. In 2005, they all reached 8%. While individual contribution phased in, during 2001–2005 employer contribution decreased slightly in three cities (Shanghai, Shenyang, and Wuhan). In 2005, employer contribution rates varied across cities from 20% in Shenyang and Xian to 25% in Fuzhou.

Consider in a simple version of a two-period model that parents have a time-separable concave utility function defined over their family consumption in period one (C_1) and over their own consumption and their child’s level of well-being in period two (C_2 and V):

$$U_1(C_1) + \beta U_2(C_2, \alpha V(e)) \tag{1}$$

where $\beta \in (0,1)$ is the discount factor and α is the weight the parents place on the child’s welfare. The child’s level of well-being is assumed to be a function of his or her education (e), and $C_1 \geq 0, C_2 \geq 0$, and $e \geq 0$.

In period one, the parents use their monetary income (y) for family consumption, child education (e), mandatory pension contributions (\bar{m}), and saving (s). In period two, their consumption is determined by their saving, pension income (P), and net transfer from their child (T). Assume the return on saving is R . Let the pension income be based upon the mandatory contributions (\bar{m}), augmented by a parameter (τ), mainly to capture the fact that employers contribute to the pension fund as well. It follows that $P = \tau \bar{m}$ and $\tau > R$. The transfer is a linear function of the child’s education, that is, $T = \gamma e$.

The parameter γ , assumed to be exogenous in the model, essentially measures parents’ perceived private return to education and can be positive, zero, and negative. The case that $\gamma \leq 0$ is not unlikely to occur for two reasons. First, the educated young people have higher labor mobility and thus may be less attached to their parents, giving less old-age support particularly in terms of instrumental care. Second, being an only child as a result of the one-child policy is associated with being less trustworthy and less conscientious (Cameron et al. 2013). Higher mobility of the more educated and the behavior traits of the young may leave parents with less expectation for old-age support from their children, resulting in γ possibly being zero or even negative.

The budget constraints for parents are

$$C_1 + e + s + \bar{m} = y \tag{2}$$

and

$$C_2 = Rs + T + P \tag{3}$$

The maximization solution yields the following equations:

$$\beta\gamma U_2^1 + \beta U_2^2 \alpha V' = U_1' \tag{4}$$

$$U_2^2 \alpha V' + \gamma U_2^1 = R U_1^1 \tag{5}$$

where the partial derivatives of the utility functions are denoted by superscripts. This intertemporal first-order condition in equation (4) dictates the trade-off between C_1 and e is such that the utility loss of one unit reduction in C_1 is equal to the present value of the utility gains from one unit increase in e for time two. The utility gains include the net gain from the consumption change due to transfer ($\beta\gamma U_2^1$) and the gain due to an increase in the child’s welfare ($\beta U_2^2 \alpha V'$). Similarly, equation (5) shows the utility trade-off between saving and education expenditure.

The effects of expanding pension coverage (change in \bar{m}) on e is studied by applying the implicit function theorem to equation (4) and obtaining the following comparative statics:

$$\frac{de}{d\bar{m}} = - \frac{\beta\alpha\tau U_2^{12} V' + \beta\gamma\tau U_2^{11} + U_1''}{2\beta\alpha\gamma U_2^{12} V' + \beta\alpha^2 U_2^{22} V' V'' + \beta\alpha U_2^2 V'' + \gamma^2 \beta U_2^{11} + U_1''} \tag{6}$$

In this equation, U_2^{12} denotes how parents’ marginal utility of consumption changes with a child’s welfare. It is reasonable to assume it is nonnegative ($U_2^{12} \geq 0$). Given the concavity of the utility functions, it is clear that. $U_2^{11} < 0$, $U_1'' < 0$, $U_2^{22} < 0$, and $V'' < 0$. With this general framework, three cases

are examined, each of which uniquely defines parental motives in investing in the education of their child:

Case 1. Parents only have exchange motives. The child's well-being carries zero weight in their parents' utility function ($\alpha = 0$), but, if possible, the parents will rely on the child's transfer for consumption in the later period ($\gamma > 0$). Given equation (5), it is easy to see that when the perceived return to education is not as high as the market interest rate ($\gamma < R$), parents will not invest in their child's education, that is $e = 0$. This decision will not be affected by pension coverage.

When $\gamma > R$, parents would choose to invest in their child's education ($e > 0$). The comparative statics in equation (4) reduces to:

$$\frac{de}{d\bar{m}} = -\frac{\beta\gamma\tau U_2^{11} + U_1''}{\gamma^2\beta U_2^{11} + U_1''} \quad (7)$$

Therefore, it follows that $\frac{de}{d\bar{m}} < 0$. This prediction implies that if nonaltruistic parents invest in their child's education at all, an access to future pension income would reduce parents' education expenditure.

Case 2. Parents are altruistic and have no exchange motives. So they value their child's well-being ($\alpha > 0$) but don't expect to receive positive transfer from children in period two ($\gamma \leq 0$). In this case, the sign of $\frac{de}{d\bar{m}}$, as given in equation (6), is undetermined. The model thus cannot predict how education spending changes with the expansion of pension coverage if parents act purely altruistically.

Case 3. Parents care about their child's welfare ($\alpha > 0$), but they also depend on the child for consumption in period two ($\gamma \geq 0$). The change in e with respect to the change in \bar{m} is the same as given in equation (6). Hence the sign of $\frac{de}{d\bar{m}}$ is also undetermined.

In summary, the model unambiguously predicts that nonaltruistic parents decrease education expenditure for their child in response to new pension availability. Parents with altruistic motives may either increase or reduce the education expenditure. Even though the model doesn't make definite predictions regarding the behavior of altruistic parents, the model clearly predicts that parents having exchange motives only will decrease education expenditure in response to pension coverage expansion. If empirical evidence shows that education expenditure *increases* as a result of parents getting pension coverage, it would indicate that parents must have altruistic motives when investing in their child's education.

III. Data and Summary Statistics

The data used in this paper are from the China Urban Labor Survey I and II (CULS1 and CULS2) conducted in 2001 and 2005, respectively, by the Institute for Population and Labor Economics at the Chinese Academy of Social Sciences. The survey covers five major cities: Fuzhou, Shanghai, Shenyang, Wuhan, and Xi'an. The proportional population sampling approach is used for both waves. Within each city, an average of ten registered urban households in each of seventy and fifty neighborhood clusters (*shequ*) were surveyed in 2001 and 2005, respectively.¹⁰ Each household head was asked questions about family members. Family members above age sixteen who were no longer in school were interviewed individually. The sample includes 3,499 households from the 2001 survey and 2,505 households from the 2005 survey.

10 The number of neighborhood clusters drawn is proportional to the population size of street districts (*jiedao*). On average, three neighborhood clusters are randomly sampled for each street district.

In the final analysis sample, which contains observations of children aged 1–18, there are 988 observations in 2001 and 850 in 2005. About 63% of young children aged 1–5 are enrolled in daycare. The school enrollment rate is 98% for children aged 6–15, and 95% for the 16–18 group. With such high enrollment rates, it would be difficult to detect an impact on education, if any, based on such extensive measures of school outcomes as enrollment rates or dropout rates. With the intensive measures of education input—that is, the actual amount of money spent on education and related activities for each child—more variations can be explored in examining the impact on investment in education. For this purpose, an education expenditure module is included in the household survey, where information on tuition, school fees, and expenditures on interest classes (*xingqu ban*, which are instructional programs for a variety of subjects ranging from Olympic math and English to chess and dancing) is collected for each child who is either in daycare or in school.

Yearly education expenditures did not change much between 2001 and 2005, with an average of about 2,600 yuan (table 1).¹¹ Tuition and school fees averaged about 2,110 yuan and accounted for 81% of total education expenditures in 2001; the amount was 1,935 in 2005, and its share in the total expenditure dropped to 77%. The decrease in tuition and school fees was likely driven by policy, namely the “one fee system” adopted in fall 2004 by three cities (Shanghai, Wuhan, and Shenyang), designed to curb excessive fee collection made by public schools.¹² Under this system, public primary and junior high schools in 2005 could charge students one time for two items: school fees and textbook and notebook fees. The fee amount was not set by schools but determined uniformly by the Education Bureau in each province based on a formula adjusted to school levels.

Even though school fees regulated and set by the government decreased, the amount of money spent annually on tutors or interest classes and extracurricular activities increased from 486 yuan to 591 yuan. In addition, proportionally more children had tutors or engaged in extracurricular activities in 2005 (54%) than in 2001 (49%). In the light of the income increase occurring during this period,¹³ more spending on these educational activities outside of school is not surprising. Besides the income effect, additional spending may also reflect a peer effect in that with only one child, parents “compete” to invest in their children in order to enhance labor and marriage market competitiveness (Wei and Zhang 2011). In addition, both elite urban private schools and the public embrace the belief that extracurricular activities can help foster self-confidence in children and stimulate their interest in learning (Lin 2007).

With regard to pension coverage for parents, the numbers show that 55% of the mothers and 67% of the fathers were enrolled in an employer-based pension program in 2001, with an increase to 61% and 70%, respectively, in 2005. More parents worked in the non-state sector in 2005 than in 2001, with a significant increase in private enterprises.

The samples in these two survey rounds are very similar with respect to child age and gender. The children are about twelve years old on average and half of them are girls. The parent samples are also comparable over the two years in terms of age and years of schooling. Parents in the 2005 sample appear to be less likely to have had a rural Hukou at age sixteen¹⁴ and are more likely to live in the current city.

11 The exchange rate between the yuan and the US dollar was 8.27. The expenditure of 2,600 yuan is equal to 314 US dollars.

12 This practice was a mandate following a regulation jointly issued by the Ministry of Education, the National Development and Reform Committee, and the Ministry of Finance in March 2004. The regulation document was titled “Opinions Regarding Implementing the ‘One Fee System’ during the Mandatory Schooling Phase Nationally.” This document can be accessed through the website of the Ministry of Education at: <http://202.205.177.9/edoas/website18/48/info21948.htm> (accessed March 1, 2012).

13 The average household income in the sample was 29,029 yuan (3,510 US dollars) in 2001 and 32,829 yuan (3,970 US dollars) in 2005.

14 Hukou status (rural vs. urban) at age of sixteen may account for variations in the quality of education the parents had because urban schools are generally better than rural schools (e.g., Paine and Fang, 2007). The residence place at age

Table 1. Summary Statistics

	2001		2005	
	Mean	SD	Mean	SD
Educational expenditures				
Total education expenditure	2596.215	(3364.62)	2529.50	(2591.22)
__Tuition and fees	2109.75	(3041.66)	1935.47	(2267.26)
__Tutors and interest classes	486.465	(1455.73)	590.77	(1114.30)
Has a tutor or enrolled in an interest class	0.54	(0.50)	0.49	(0.50)
Parent pension coverage				
Mother with pension coverage	0.55	(0.48)	0.61	(0.49)
Father with pension coverage	0.674	(0.42)	0.70	(0.46)
Parent employment type				
Mother in non-state sector	0.448	(0.50)	0.612	(0.49)
__Collective enterprises	0.093	(0.29)	0.056	(0.23)
__Private enterprises	0.334	(0.47)	0.482	(0.50)
__Foreign enterprises	0.024	(0.15)	0.057	(0.23)
Mother is self-employed	0.021	(0.14)	0.075	(0.26)
Father in non-state sector	0.369	(0.48)	0.497	(0.50)
__Collective enterprises	0.085	(0.28)	0.043	(0.20)
__Private enterprises	0.253	(0.44)	0.363	(0.48)
__Foreign enterprises	0.025	(0.16)	0.051	(0.22)
Father is self-employed	0.031	(0.17)	0.091	(0.29)
Child characteristics				
Age	12.615	(4.09)	11.543	(5.12)
Gender	0.505	(0.50)	0.508	(0.50)
Parent characteristics				
Mother's age	39.463	(5.31)	39.087	(6.25)
Father's age	41.898	(5.25)	41.617	(6.13)
Mother's years of schooling	11.181	(2.70)	11.595	(2.50)
Father's years of schooling	11.597	(2.97)	11.798	(2.60)
Mother had a rural Hukou before age 16	0.19	(0.39)	0.141	(0.34)
Father had a rural Hukou before age 16	0.145	(0.35)	0.111	(0.31)
Mother didn't live in this city before age 16	0.258	(0.44)	0.145	(0.35)
Father didn't live in this city before age 16	0.202	(0.40)	0.114	(0.32)
Mother has a local Hukou	0.926	(0.26)	0.92	(0.27)
Father has a local Hukou	0.938	(0.24)	0.94	(0.25)
Maternal grandmother's years of schooling	4.586	(4.44)	5.231	(4.04)
Maternal grandfather's years of schooling	3.995	(4.23)	4.873	(4.24)
Paternal grandmother's years of schooling	6.798	(4.53)	7.306	(4.71)
Paternal grandfather's years of schooling	6.291	(4.61)	6.966	(4.61)
Number of observations		988		850

Source: Authors' analysis based on data described in the text.

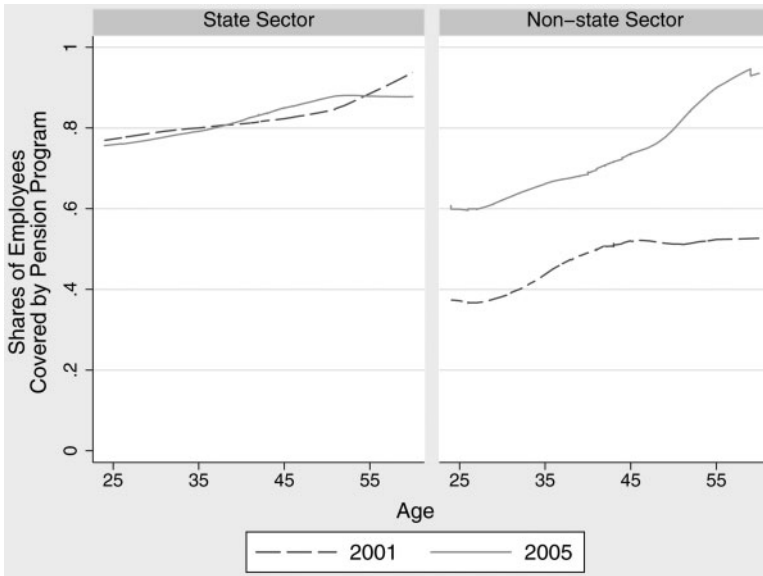
In both years, 92–94% of the parents have a local Hukou of the city they live in. The differences in parent characteristics are not statistically significant between the two samples.

The locally weighted regression lines for rates of pension coverage shows that the coverage rates for the state sector exhibit little systematic change from 2001 to 2005 (figure 1). They average around 80%, with older employees having higher coverage rates. For the non-state sector, the average rates jump from about 40% to a little over 60%. The increase applies to employees of all ages. It also applies to workers in all types of enterprises in the non-state sector (figure 2). On average the workers in the

of sixteen, together with the current Hukou status, captures whether parents have local roots and thus have access to a family support system locally.

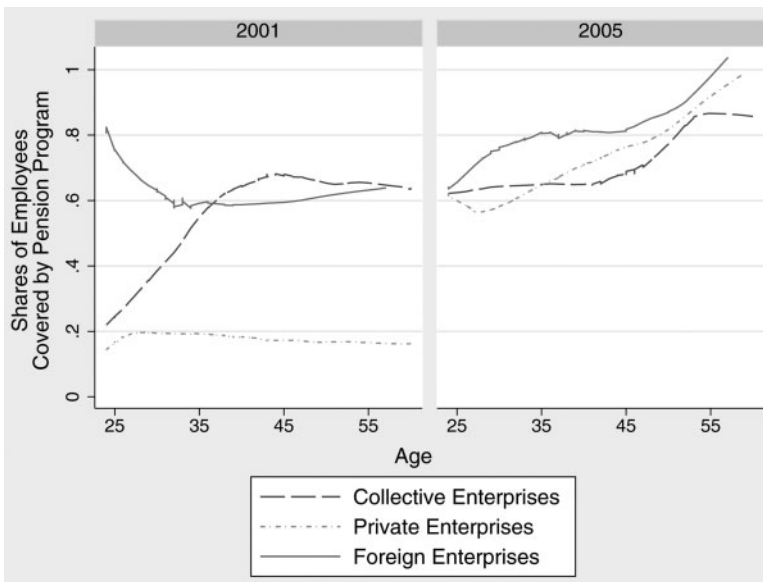
foreign-invested firms had the highest pension coverage of 64% to begin with, and it further increased to 79% in 2005. The workers in the private enterprises enjoyed the largest increase in pension coverage from about 20% to 70%. A moderate increase from 62% to 70% is observed among workers in collective enterprises.

Figure 1. Pension Coverage by Sector and Year



Source: CULS1 and CULS2. State sector includes government agencies, publicly financed social services (e.g., schools, youth organizations, and health care providers), and state-owned enterprises (SOEs). The non-state sector includes collectively owned or controlled enterprises, privately owned or controlled enterprises (with 8 or more employees), and foreign-owned or controlled enterprises.

Figure 2. Change in Pension Coverage for the Non-state Sector



Source: CULS1 and CULS2.

IV. Empirical Framework

As outlined in the conceptual framework, pension availability may have opposing effects of investments in children's education; therefore, its net effect is inherently an empirical question. In this section, the empirical strategies for identification are explained, followed by a discussion of the data.

Main Identification Strategy

Considering that the pension coverage rate was never close to 100%, it is very possible that there were effects that operated through the *expectation* of being able to enroll in the public pension system, such as reductions in savings and increases in expenditures for those in the non-state sector during the period. The focus here is on reduced-form/intent-to-treat estimates. The net effect of pension expansion on parents' investments in their children's education is estimated in a difference-in-differences (DD) framework:

$$E_{ict} = \beta_1 NonState_{ict} + \beta_2 Year2005 + \beta_3 NonState_{ict} \times Year2005 + X'_{ict} \beta_4 + H'_{ict} \beta_5 + D_{c \times t} + \varepsilon_{ict} \quad (8)$$

where E_{ict} denotes the education investments in child i in city c at time t . The variable $NonState_{ict}$ is a binary variable indexing whether two parents are currently or last employed in the non-state sector.¹⁵ The post pension reform trend (*Year 2005*) is estimated using children whose parent(s) is employed in or retired from the state sector. The treatment effect of pension reform is measured by the coefficient (β_3) on the interaction between $NonState_{ict}$ and the post reform trend. X'_{ict} is a vector of child characteristics, including age, gender, and school level.¹⁶

A vector of parental characteristics and family background is denoted by H'_{ict} . The inclusion of parents' family background as controls is important in mitigating a potential omitted variable bias in the estimation. For example, if the academic ability of a child is positively correlated with the amount of investment made by parents, an upward bias would result if ability is inheritable and high-ability parents are more likely to work for employers who enroll in the public pension program. In addition, parents' local roots may be related to which sector they work in and their child care decisions. Therefore, parents' Hukou status and residence location at the age of sixteen, their current Hukou status, and their own parents' education are all included as control variables, additional to their age and education. In addition, the city-specific year dummies ($D_{c \times t}$) are included to control for city-specific policy changes during this period. For example, the contribution rates for pensions changed during this time and varied across cities. The idiosyncratic error term is denoted by ε_{ict} .

An Alternative Identification

To provide additional robustness checks to the estimation results of equation (8), the 2005 Chinese National Intercensal Population Survey¹⁷ is used, in addition to CULS, and the instrumental variable method to estimate the following equation is applied,

15 The non-state sector includes three types of enterprises: collectively owned or controlled enterprises, privately owned or controlled enterprises (with 8 or more employees), and foreign-owned or controlled enterprises. The expansion of urban employee pension program applied to employees in these types of enterprises. The state sector includes government agencies, social service units (e.g., schools, youth organizations, and health care providers), and state-owned or controlled enterprises. We exclude observations with two self-employed parents. For children with one self-employed parent, the sector is defined by the sector of the parent who is not self-employed.

16 The vast majority of the children are the only child of their family. In our sample, the average number of siblings is 0.084. Given the small variation in the number of siblings, we don't include this variable in the regressions. But the results are robust to including the variable.

17 We have access to 20% of the observations in the total sample, and they account for 0.95% of the Chinese population.

$$E_{ic} = \gamma_1 Pension_i + X'_{ic}\gamma_2 + H'_{ic}\gamma_3 + D_c + \varepsilon_{ic} \quad (9)$$

in which pension coverage for parent of child i , denoted by $Pension_i$ is directly included as a covariate. It is a binary variable equal to 1 if at least one parent has enrolled in the pension program; 0 otherwise. Two instrumental variables for $Pension_i$ are constructed, and they are the predicted probabilities of enrolling in the public pension program for the mother and the father. The predicted probabilities are the average enrollment rates for each age/education/gender/employer type¹⁸/city cell calculated from the 2005 population survey. This instrument varies by age, education, gender, employer ownership type, and city, and each of these factors is controlled for linearly in equation (9). The identification comes only from their interactions, which are assumed to be exogenous to parental decisions on investment in education.¹⁹ One obvious disadvantage of using this method in this study is that 2005 data can only be used with a much smaller sample; therefore, this approach is only used as a robustness check.

V. Results

The SOE reforms that de-link the social services from individual employers also changed other employee benefits. Therefore it is important to first check that trends in other observable factors than pension coverage do not differ between the two sectors.

Trends in Related Employee Benefits and Other Variables in the Two Sectors

The medical reform in 1997 involves establishing a unified “urban employee basic health insurance scheme” and widening coverage of health insurance for the urban employed (Liu 2002). If the effects from the SOE reforms last until the study period, then it is possible that other employment benefits besides pension are different in the two sectors over time during 2001–2005. Further, the possibility of differing expectations of employers across state and non-state sectors in terms of hours of work may affect how much time parents can invest in after-school programs and activities. The availability and cost of childcare facilities may also be different for employees of the two sectors, which may drive differential needs of grandparents as care givers. If any of these factors exhibits different trends over time in the two sectors, the assumption for identification, that is conditional on covariates; that pension coverage is the only systematic factor that has a differential impact on children who have parents in the non-state sector, will be violated. Although this assumption is not directly testable, the same double-difference framework can be used to examine whether the trends in other social policies, income measures, and household compositions during this period are indeed indistinguishable between the two sectors. The following equation is estimated to examine these trends,

$$Y_{ict} = \alpha_1 NonState_{ict} + \alpha_2 Year2005 + \alpha_3 NonState_{ict} \times Year2005 + Z'_{ict}\alpha_4 + D_{c \times t} + \varepsilon_{ict} \quad (10)$$

where i indexes the working age individual and Y_{ict} stands for the aforementioned outcomes: medical insurance, monthly wage, yearly bonus, housing ownership, housing value, hours of work, household income per capita, household size, and if living with parents. The vector Z'_{ict} contains covariates including the individual's age and years of schooling. A small and insignificant estimate of α_3 supports the view that other trends are not systematically different in state and non-state sectors.

18 There are eight categories for employer types in the 2005 population survey: land contractor, government agencies and social service units, state-owned or controlled enterprises, collective enterprises, the self-employed, private enterprises, other enterprises, and others. We exclude the land contractor category and combine “other enterprises” and “others” in the calculation.

19 Others have used prevailing averages as instrument variables in previous studies on health insurance in the US (e.g., Cutler and Gruber 1996; Gruber and McKnight 2003).

Estimations for working-age women and men are separately presented in table 2. Both women and men in the non-state sector are more likely to be enrolled in the pension program in 2005 relative to 2001, compared to their counterparts in the state sector. But the trends in medical insurance are indistinguishable between the two sectors. Non-state sector employees in general have lower values in wage, bonus, and household income per capita, but the changes over time in these outcomes are similar in the two sectors. Both housing ownership and housing values have increased substantially over time, but the

Table 2. Estimations of Pension Coverage and Potential Confounding Variables

	Pension	Medical insurance	Monthly wage (log)	Yearly bonus (log)	Housing ownership
Panel A. Women (age 24–55)					
Non-state Sector × Year 2005	0.191*** (0.055)	0.141 (0.096)	0.115 (0.078)	−0.046 (0.049)	−0.060 (0.101)
Non-state sector	−0.265*** (0.038)	−0.393*** (0.080)	−0.125*** (0.040)	−0.927*** (0.216)	0.030 (0.070)
Year 2005	0.035 (0.023)	−0.030 (0.037)	0.182*** (0.042)	0.119 (0.345)	0.283*** (0.066)
Number of observations	4,156	4,156	4,156	4,156	4,156
Panel B. Men (age 24–60)					
Non-state sector × year 2005	0.271*** (0.048)	0.023 (0.078)	0.051 (0.089)	0.033 (0.055)	−0.030 (0.102)
Non-state sector	−0.391*** (0.036)	−0.344*** (0.067)	−0.024 (0.029)	−1.086*** (0.254)	−0.027 (0.054)
Year 2005	0.009 (0.015)	0.015 (0.034)	0.259*** (0.023)	0.058 (0.450)	0.278*** (0.064)
Number of observations	4,547	4,547	4,547	4,547	4,547
	Housing value (log)	Working hours	Household income per capita (log)	Household size	Living with parent(s)
Panel A. Women (age 24–55)					
Non-state sector × year 2005	−0.489 (0.558)	0.035 (0.027)	0.063 (0.054)	0.047 (0.141)	0.047 (0.046)
Non-state sector	0.121 (0.398)	0.053*** (0.016)	−0.172*** (0.031)	0.002 (0.106)	0.013 (0.031)
Year 2005	8.145*** (0.298)	0.020** (0.008)	−0.029 (0.030)	0.148* (0.078)	0.132*** (0.020)
Number of observations	4,156	3,059	4,153	4, 156	4, 156
Panel B. Men (age 24–60)					
Non-state sector × year 2005	−0.336 (0.761)	0.042 (0.027)	0.076 (0.061)	−0.074 (0.136)	−0.052 (0.047)
Non-state sector	−0.017 (0.325)	0.055*** (0.014)	−0.074** (0.030)	0.017 (0.085)	0.050 (0.032)
Year 2005	8.269*** (0.297)	0.038*** (0.010)	0.015 (0.033)	0.136* (0.082)	0.087*** (0.024)
Number of observations	4,547	3,801	4,539	4,547	4,547

Notes: Self-employed individuals (including family workers) and individuals working in firms with fewer than eight employees are not included in the analysis. Other variables included but not reported are age, years of schooling, city fixed effects, and city-specific time dummies. ***significant at 1% level; **significant at 5% level; *significant at 10% level.

Source: Authors' analysis based on data described in the text.

same trends apply to both sectors.²⁰ Employees in the nonstate sector work longer hours than those in the state sector, but the difference in the working hours stays similar in these two years. Lastly, there is no differential trend in either household size or the probability of living with a parent.

The evidence presented in [table 2](#) doesn't suggest that factors other than pension coverage have no impact on education investment. Instead it shows that trends in those factors do not differ between the two sectors. Hence, it is unlikely that any differential changes in education investment over time between parents working in the two sectors would be caused by the outcomes examined in [table 2](#).

Main Results from the DD Estimations

The estimates of the overall effects of pension reform on education expenditure are reported in [table 3](#). The top panel contains results for the logarithm of the total education expenditure, and the lower panel shows whether or not the child had tutors or participated in extracurricular classes.

Table 3. Double-Difference Estimations of Educational Investment for Children Age 1–18

	(1)	(2)	(3)	(4)	(5)
Panel A: Total education expenditures (log)					
Parents in non-state sector × year 2005	0.177 (0.112)	0.106*** (0.040)	0.085* (0.046)	0.109** (0.050)	0.115** (0.057)
Parents in non-state sector	−0.328*** (0.095)	−0.299*** (0.036)	−0.190*** (0.043)	−0.165*** (0.044)	−0.155*** (0.053)
Year 2005	0.296*** (0.046)	0.314*** (0.046)	0.339*** (0.053)	0.303*** (0.064)	0.274*** (0.074)
Panel B: Has tutors or enrolled in interest classes					
Parents in non-state sector × year 2005	0.058 (0.041)	0.063 (0.041)	0.081** (0.037)	0.065** (0.033)	0.065** (0.031)
Parents in non-state sector	−0.122*** (0.032)	−0.121*** (0.033)	−0.134*** (0.028)	−0.063*** (0.019)	−0.056*** (0.016)
Year 2005	0.215*** (0.030)	0.203*** (0.031)	0.210*** (0.034)	0.225*** (0.041)	0.203*** (0.047)
City-specific year dummies	Yes	Yes	Yes	Yes	Yes
Child age, gender, and school level	No	Yes	Yes	Yes	Yes
Age and education of parents	No	No	Yes	Yes	Yes
Parent current Hukou status & Hukou and residential location at age 16	No	No	No	Yes	Yes
Grandparents' education	No	No	No	No	Yes
Number of observations	1,838	1,838	1,838	1,838	1,838

Notes: ***significant at 1% level; **significant at 5% level; *significant at 10% level. Standard errors are clustered by city, year, and employers' ownership type.

Source: Authors' analysis based on data described in the text.

- 20 Changes in expected future housing wealth may also influence the household's education expenditure through inter-temporal budget constraint. We don't have enough information to examine expected future wealth and its changes across state and non-state workers. But our data suggest that workers in the state sector were more likely to have older and smaller housing unit, built and previously owned by their work unit, than workers in the non-state sector. Compared to housing units later built by real estate developers, the housing units built by state-owned factories or organizations before the housing reform (in 1994) were more likely to be demolished. Therefore, workers in the state sector seemed to be better positioned to benefit from significant payout when their homes were scheduled for demolition. So it is likely that the expected housing wealth is higher for workers in the state sector. This would bias against finding the result that parents in the non-state sector spend more over time on education. The descriptive statistics of housing characteristics by sector are reported in [table S1](#) of the supplementary.

Table 4. Double-Difference Estimations of Two Types of Education Expenditures for Children Age 1–18

	(1)	(2)	(3)	(4)	(5)
Panel A: Tuition and school fees (log)					
Parents in non-state sector × year 2005	0.149 (0.126)	0.040 (0.050)	0.040 (0.053)	0.033 (0.057)	0.029 (0.062)
Parents in non-state sector	-0.201* (0.103)	-0.158*** (0.047)	-0.120** (0.050)	-0.102* (0.056)	-0.091 (0.063)
Year 2005	0.099 (0.077)	0.131** (0.055)	0.147*** (0.056)	0.146** (0.059)	0.127* (0.067)
Panel B: Expenditures on tutoring and interest classes (log)					
Parents in non-state sector × year 2005	0.431 (0.292)	0.589** (0.249)	0.453** (0.226)	0.449** (0.216)	0.474** (0.216)
Parents in non-state sector	-0.964*** (0.191)	-1.036*** (0.171)	-0.499*** (0.110)	-0.452*** (0.086)	-0.414*** (0.084)
Year 2005	1.612*** (0.194)	1.586*** (0.233)	1.695*** (0.287)	1.556*** (0.319)	1.485*** (0.328)
City-specific year dummies	Yes	Yes	Yes	Yes	Yes
Child age, gender, and school level	No	Yes	Yes	Yes	Yes
Age and education of parents	No	No	Yes	Yes	Yes
Parent current Hukou status & Hukou and residential location at age 16	No	No	No	Yes	Yes
Grandparents' education	No	No	No	No	Yes
Number of observations	1,838	1,838	1,838	1,838	1,838

Notes: ***significant at 1% level; **significant at 5% level; *significant at 10% level. Standard errors are clustered by city, year and employers' ownership type.
Source: Authors' analysis based on data described in the text.

Results from the basic difference-in-differences model, including the full set of city and year fixed effects are shown (table 3). Pension reform is associated with an increase in education expenditure, but the estimate is not statistically significant. In the next column, the estimate is 0.106, significant at the 1% level, with additional controls for child age, gender, and school level. The result shows that, compared to education expenditure for children with one parent in the state sector, education expenditure for children with two parents in the non-state sector has an increase of 10.6% during this period. Specification is further augmented with parents' individual characteristics and their family backgrounds as covariates, including parents' age and education (column 3), parents' Hukou status (column 4), and, finally, grandparents' education (column 5). With this extensive list of covariates, the impact estimate ranges from 8.5% to 11.5%, all significant at the 5% level.²¹

The results of tutoring and extracurricular classes are sensitive to the inclusion of different controls. However, the estimate remains significant at the 5% level with the full set of controls, showing that over time the likelihood of having tutors and attending special interest classes is 6.5 percentage points higher for children with parents in the non-state sector than for children with a parent in the state-sector.

When examining the effects on two components of the total education expenditures: tuition and school fees, and tutors and extracurricular classes (table 4), it is found that, with the full set of controls, the impact coefficient for tuition and fees is not significantly different from zero. Note that the specific public schools attended by the K–9 children are based mainly on the school district of their residence. With the implementation of the “one fee” system, the amount of tuition and school fees is

21 The regression results are robust to the inclusion of three additional variables as controls: the number of siblings of the child, the number of mother's siblings, and the number of father's siblings.

capped in the public schools; thus, it is not surprising that no impact is found on tuition and school fees. The estimated impact on expenditures on tutors and extracurricular classes is large in magnitude (about 47%)²² and significant at the 5% level. These results imply that the rise in total education expenditure occurs primarily because of increased participation in and expenses on educational activities outside regular schools.

Trends in other benefits—health insurance policy, wage, bonus income, working hours, housing values, etc.—have been shown to be essentially the same for both state and non-state sectors. Therefore, the observed impact on education expenditure for children whose parents are employed in the non-state sector cannot be driven by any of these factors. With the large set of control variables included in the regressions, it can be concluded that the effects found on education investments can be ascribed to the expansion of pension coverage to the non-state sector.²³

Could the Results be Driven by State-Owned Enterprise (SOE) Restructuring?

In the mid-1990s, the SOEs underwent various reforms. Given that the more educated and younger victims of the SOE restructuring were more likely to be reemployed (Giles et al. 2006b)—and considering the extent to which the restructuring process might be still ongoing during 2001–2005—one may be concerned that the differences in the worker composition between the two sectors would change during this time, and then the composition consistency underlying the double difference approach would be violated. Actually, the state-sector restructuring was carried out at a fast pace, and by the end of 2001, some 86% of industrial SOEs had been through restructuring (Garnaut et al. 2006), and, therefore, SOE reforms would not be expected to cause different worker composition in the two sectors during 2001 and 2005. To examine this issue empirically, a linear probability model is run of parents' likelihood of working in the non-state sector on their individual characteristics and family background. It shows that the individual determinants are the same in 2001 and 2005 (table 5). Specifically, compared to workers in the state sector, workers in the non-state sector tend to be younger, less educated, and less likely to have local Hukou. It is worth noting that in 2005, the employees in the private sector don't have disproportionately more public sector experience than in 2001. As the insignificant interaction terms between the year 2005 dummy and the individual and family characteristics show, there is no observable difference between the two years in terms of selection into the non-state sector.

22 Even with this sizable increase, the spending on tutors and extracurricular activities accounts for approximately 1.6% of annual household disposable income in 2005. In terms of the share of household income, the magnitude of the estimate seems to be reasonable.

23 The main results focused on here are based on the reduced form effects of parents being in the non-state sector in 2005. When we use this interaction as an instrument variable for the direct measure of any parent having pension coverage, we find that the estimated effects are consistent with the reduced-form estimation and larger in magnitude. The results are reported in table S2 of the supplementary appendix. As a robustness check, we also include interactions between the 2005 dummy variable and parental characteristics (age, education, current and previous Hukou status) as extra controls to allow the impact of characteristics on educational spending to change over time. The results, reported in table S3 of the supplementary appendix, are similar to the results in tables 3 and 4.

Table 5. Probabilities of Working in the Non-State Sector

	Father		Mother	
Age	-0.00	(0.00)	-0.011**	(0.01)
Years of schooling	-0.04***	(0.00)	-0.046***	(0.01)
Number of siblings	0.00	(0.01)	0.002	(0.01)
Rural Hukou before age 16	-0.00	(0.05)	0.060	(0.05)
Didn't live in this city before age 16	-0.09**	(0.05)	-0.087*	(0.04)
Having local Hukou	-0.30***	(0.05)	-0.230***	(0.04)
Previously employed in the state sector	0.07**	(0.03)	0.039	(0.03)
Father's years of schooling	0.00	(0.00)	-0.005	(0.00)
Mother's years of schooling	-0.01	(0.00)	-0.009***	(0.00)
Shanghai	-0.10*	(0.05)	-0.075	(0.05)
Wuhan	0.03	(0.04)	0.013	(0.05)
Shenyang	0.07	(0.05)	0.115**	(0.05)
Fuzhou	0.04	(0.04)	0.035	(0.04)
Year 2005	0.10	(0.20)	-0.454*	(0.25)
Age × year 2005	0.00	(0.00)	0.010	(0.01)
Years of schooling × year 2005	-0.01	(0.01)	0.001	(0.01)
Number of siblings × year 2005	0.03	(0.02)	0.016	(0.01)
Rural Hukou before age 16 × year 2005	0.04	(0.08)	0.032	(0.08)
Didn't live in this city before age 16 × year 2005	-0.09	(0.08)	0.064	(0.07)
Having local Hukou × year 2005	-0.05	(0.07)	-0.034	(0.06)
Previously employed in the state sector × year 2005	-0.07	(0.05)	-0.055	(0.05)
Mother's years of schooling × year 2005	-0.00	(0.01)	0.005	(0.01)
Father's years of schooling × year 2005	0.00	(0.01)	0.000	(0.00)
Shanghai × year 2005	0.10	(0.08)	0.031	(0.08)
Wuhan × year 2005	0.06	(0.07)	0.008	(0.07)
Shenyang × year 2005	-0.05	(0.07)	-0.119*	(0.07)
Fuzhou × year 2005	0.01	(0.06)	-0.170***	(0.06)
Constant	1.09**	(0.14)	1.66***	(0.17)
Number of Observations		1,838		1,838

Notes: ***significant at 1% level; **significant at 5% level; *significant at 10% level. Standard errors are robust to heteroskedasticity.

Source: Authors' analysis based on data described in the text.

Beginning in the late-1990s, one means of shedding workers from the state sector during the enterprise reform was to allow them to retire early.²⁴ As it is not uncommon for early-retirees to return to work, in the 2005 sample, there may be cases where a worker was a former retiree, collecting pension from the state sector while working in the non-state sector. To address this concern, the observations with mothers being older than forty are dropped, and the model is re-estimated using a much smaller sample, and the results remain similar.²⁵

Finally, a related concern regards pension wealth. A 1997 pension reform (State Council 1997) reduced pension wealth of employees of SOEs, who were offered lower replacement rates than before (Salditt et al. 2008; Sin 2005). The decline in pension wealth is found to be associated with higher

24 Giles et al. (2006) documents that nearly 40% of women between the ages of forty and forty-nine who lost employment during the SOE restructuring were able to retire and receive pensions.

25 The results are reported in appendix table S4. The results on total education expenditure show that, compared to education expenditure for children with one parent in the state sector, the expenditure for children with two parents in the nonstate sector increases by 19% during this period. The increase in total education expenditure seems to be driven by more spending on tutoring and interest classes, a finding consistent with the results from the total sample. The impact on having tutors, though, is no longer significant. These results are likely to reflect the impacts on younger children, as the average age of children in this sample is 8.9 years versus 12.1 years in the total sample.

Table 6. Parents in State-Owned Enterprises as a Control Group

	Total education expenditure (log)	Has tutors or enrolled in interest classes	Tuition and school fees (log)	Expenditures on tutoring and interest classes (log)
Parents in non-state sector × year 2005	0.081** (0.041)	0.019 (0.065)	0.470** (0.213)	0.068** (0.031)
Parents in non-state sector	-0.308*** (0.035)	-0.110* (0.061)	-0.369*** (0.100)	-0.044** (0.017)
Parent in state-owned enterprises × year 2005	-0.148 (0.110)	-0.079 (0.109)	0.025 (0.371)	0.015 (0.052)
Parent in state-owned or state-controlled enterprises	-0.040 (0.031)	-0.085 (0.066)	0.199 (0.258)	0.026 (0.040)
Year 2005	0.348*** (0.050)	0.138 (0.087)	1.501*** (0.315)	0.196*** (0.048)
City-specific year dummies	Yes	Yes	Yes	Yes
Child age, gender, and school level	Yes	Yes	Yes	Yes
Age and education of parents	Yes	Yes	Yes	Yes
Parent current Hukou status & Hukou and residential location at age 16	Yes	Yes	Yes	Yes
Grandparents' education	Yes	Yes	Yes	Yes
Number of observations	1,838	1,838	1,838	1,838

Notes: ***significant at 1% level; **significant at 5% level; *significant at 10% level. Standard errors are clustered by city, year, and employers' ownership type.
Source: Authors' analysis based on data described in the text.

savings and reduced expenditures on children's education and health in the late 1990s (Chamon et al. 2010; Feng et al. 2011). If such effect still exists during 2001–2005, it would be wrong to attribute the observed increase in education investment to change in pension coverage in the non-state sector. To allow for the potential impact on children with parents employed in SOEs, an additional “treatment” group of children with parents in SOEs is created. The results based on this new specification (table 6) show that education expenditures on children with parents in SOEs are no different than for children in the control group, whose parents are employed in government or related organizations. The results further confirm that the observed impact is likely to be driven by the change in pension coverage. One possible reason that the impact of changes in pension wealth are not found in the data might be that the reform affecting pension wealth started in 1997 and the “shock” induced by the reform is likely to be strongest shortly after the reform, for example in 1999 as studied in Feng et al. 2011, but its impact may abate during 2001–2005.

Could Change in School Quality and Expansion of College Enrollment Explain the Results?

Another concern is that, over time, children whose parents are in the non-state sector may no longer have equal access to quality schools; therefore, their parents would be more likely to invest in after-school tutors in the later years. If that were true, what has been identified would be driven by the differential change in school quality available to the two sectors. To examine this issue, the impact is estimated separately for children whose parents do not have a college degree and for those who have at least one college-educated parent. If the results were driven by deteriorating school quality for the non-state sector, then it might be that parents in the non-state sector—particularly those with higher levels of education—spend more for tutors and extracurricular classes over time. However, if the results were driven by income effects brought forth by increased coverage in the non-state sector, then the effect would be more pronounced for families with tighter budget constraints. If income effect dominates, a larger impact on children whose parents are relatively less educated is expected to be observed.

With the stratified sample, it is found that the pension reform has no effect on children with more-educated parents or from families less likely to be budget-constrained. The impact estimates remain significant for

children whose parents are relatively less-educated, and they are substantial in magnitude. These results imply that the possible differential access to quality schools by sectors cannot explain the results.²⁶

With the increase in the university enrollment, particularly since 1999, the chance for high school students of going to college is increased by about 13% according to Li and Xing (2010). So it is likely that parents with less expectation of enrolling children in college in 2001 started to believe that college enrollment was now possible. If the expansion of educational opportunities at the college level had a strong effect on parents working in the non-state sector, then this might be reflected in the main results. To investigate if the results are driven by the increase in university enrollment during the time, the sample is stratified by child age into groups (pre-school age 1–5; elementary and middle school age 6–15; high school age 16–18).²⁷ If the better prospect of going to college was the major motivation for the observed increase in education expenditure, it is expected that the effect on children of high-school age would be the same, if not bigger, than the effect on younger children. However, the results show that the effect is not significant for high-school age children but significant for younger children. The results suggest that the expansion of college enrollment is unlikely to be an alternative explanation of the main results.

Results from the IV Estimates

Finally, the estimates are presented based on the alternative identification with the instrumental variable (IV) method as outlined in equation (9). In this estimation, whether or not at least one parent has enrolled in the public pension program is directly controlled for, using the average enrollment rates for the parents' age/education/gender/employer type/city cell calculated from the 2005 population survey as instruments. The IV results are presented in table 7, together with the F statistic for excluded instruments and the Hansen J statistic for the overidentification test.²⁸

Table 7. Instrumental Variable Estimations Based on the 2005 CULS and the 2005 Mini Census

	Total education expenditure (log)	Has tutors or enrolled in interest classes	Tuition and school fees (log)	Expenditures on tutoring and interest classes (log)
Parent(s) Have Pension Coverage	0.228* (0.117)	0.132 (0.286)	0.257 (0.363)	0.360** (0.179)
F-test on excluded instruments	21.050	21.050	21.050	21.050
Prob > F	0.000	0.000	0.000	0.000
Over-identification: Hansen J statistic	2.283	0.163	0.156	1.770
Chi-sq p-val	0.131	0.687	0.693	0.183
City fixed effects	Yes	Yes	Yes	Yes
Child age, gender, and school level	Yes	Yes	Yes	Yes
Age and education of parents	Yes	Yes	Yes	Yes
Parent current Hukou status & Hukou and Residential location at age 16	Yes	Yes	Yes	Yes
Grandparents' education	Yes	Yes	Yes	Yes
Number of observations	850	850	850	850

Notes: ***significant at 1% level; **significant at 5% level; *significant at 10% level. Standard errors are robust to heteroskedasticity. The pension variable measures whether or not at least one parent is covered by a public pension program; it is instrumented by two variables: mother's probability of enrolling in public pension program and father's enrollment probability. The probabilities are predicted from a sample consisting of 20% of the observations of the 2005 Chinese national inter-censal population survey, based on the city of residence, age, education level, and employer's ownership type.

Source: Authors' analysis based on data described in the text.

26 The results are reported in appendix table S5.

27 The results are reported in appendix table S6.

28 As the generated average enrollment rates are used as instruments and not as regressors, no adjustments are needed in calculating the asymptotic standard errors and test statistics (Wooldridge 2010, chapter 6).

These first-stage tests are passed easily for all four measures of education investments. The IV estimate for expenditures on tutors and extracurricular classes is positive but no longer significant, yet the coefficients on pension are precisely estimated for the total expenditure and the likelihood of having tutors and participating in extracurricular activities. The results show that children whose parents have pension coverage enjoy 24% more education expenditures and are 38% more likely to have a tutor or participate in extracurricular activities than the children whose parents are not enrolled in the public pension program. Compared to the results based on the DD framework, these two estimated impacts are larger in magnitude, and they further support the conclusion that parental enrollment in the public pension system is conducive to more investment in children's education.

VI. Conclusions

No consensus appears in the economics literature regarding what motivates parents to make transfers to or investments in children. This study provides new evidence in this inquiry. It presents the analysis of the impact of an expansion of the public pension program in urban China on children's education expenditures. The conceptual framework predicts that nonaltruistic parents would decrease education expenditure for their children in response to the pension program expansion. The empirical analysis finds that this policy change significantly increases the total education expenditure and suggests that in urban China parents' spending on children's human capital cannot be entirely driven by an old-age security motive but is likely to be motivated by the altruistic concern for their children.

At the same time, the results also imply that without access to public pension, altruistic parents do have to face the trade-off between savings for old-age and education spending on children. With the expansion of pension coverage, more parents are able to spend more on education. The evidence presented in this paper shows that social security reform affects intergenerational transfers in the form of education investment. Assessment of the impact of social security reform would be amiss if it did not include such intergenerational effects. With the basic pension system gradually being established in rural China, it would be interesting to examine the effects in the rural areas where arguably the role of family in elder care is traditionally stronger.

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