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. We use the expansion of pension coverage from the state sector to the non-state sector in urban China as a quasi-experiment to analyze the intergenerational impact of social security on educational investments in children. With a difference-in-differences framework, we find a significant increase in the total education expenditure attributable to pension expansion. The results are unlikely to be driven by trends in medical insurance, wages, bonus income, and housing values. 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.

Keywords: pension, education expenditure, gender difference, urban, China

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1. Introduction

With declining fertility and increasing life expectancy in many developing countries, governments will soon have to introduce pensions to provide for the needs of a growing elderly population. Pension programs are likely to have profound implications for labor markets, economic growth, and the distribution of risks and income by generation. This paper focuses on the intergenerational effects of a pension program on education in urban China.

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, 1996; 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 policies, like those

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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 if 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).

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 need of parents to save less may simultaneously influence parents' decisions to invest in 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 the first study to assess the intergenerational impact of the expansion of social security on a family's education expenditures on children. For identification purposes, we utilize one pension reform in urban China 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 government agencies, publicly financed social services (e.g. schools, youth organizations, and health care providers etc.), and state-owned enterprises (SOEs), have long been covered by social security, but no mandate for non-state employers to enroll their employees in the public pension program until 1999 (State Council, 1999; 2000).

In the empirical analysis, we apply a difference-in-differences framework, 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

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[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.

would have been for children with both parents in the non-state sector. We first

demonstrate that other trends, such as those in medical insurance, wages, bonus income,

and housing values, are indistinguishable between the two sectors. Moreover, we

illustrate that individual determinants of working in the state or non-state sector don't

change over time. We then show a statistically significant increase in family education

expenditures attributable to the pension reform. 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. No consensus appears in the economics literature regarding what motivates

parents to make transfers to or investments 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. Equally mixed is empirical

evidence. Some studies support the altruistic motive hypothesis (e.g. McGarry and

Schoeni, 1995); some 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. If the

exchange motive, more specifically the old-age security motive, dominates parental

decisions on investing in children's human capital, then with social pensions becoming

available to parents, we expect such investment not to increase. An opposite finding

indicates that the exchange motive is unlikely to be the driving force in such a decision.

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[4] Altruistic transfers from parents to children may also be made to offset inequality in

children's earnings (Behrman et al., 1982).

This study also relates to the literature on the intergenerational effects of welfare reform on education. Studies of changes in the U.S. 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, 2011) and young children (Duncan and Chase-Lansdale, 2001; Morris et al., 2005, Zaslow et al., 2002). These findings in the US have advanced our understanding of the effects of social programs on education, but an open question remains whether such a finding generalizes 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, our study advances the debate and discussion on the impact of pension provisions in developing countries in general and pension reform in China in particular. Several studies have analyzed the gender specific impact of old-age pensions in South Africa, and find that pensions have 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., 2007; Zhao and Xu, 2004), however, evidence of policy impacts 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).

Another contribution of this study is that we use total monetary spending on tuitions, school fees, tutors, and extracurricular programs to measure educational investments. Studies of the accumulation of human capital often focus on school

enrollment or dropout rates. These extensive measures of schooling may miss the quality

of educations, a crucial dimension of human capital differentials, especially in settings

where little difference exists in age-specific enrollment among children. Intensive

measures of education inputs, that is, the actual amount of money spent on education and

related activities have more variations that can be explored to detect impact on

investment in education.

The remainder of the paper is organized as follows: Section 2 provides a review

of cultural and institutional background for elderly support in China. Section 3 presents a

simple conceptual framework linking pension coverage for parents and their decisions for

investing in their children's education. Section 4 discusses our empirical approach and

data. Section 5 reports the results, and Section 6 concludes.

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

According to Confucian teaching, filial piety is the root of all virtues. The

practice of honoring parents, including providing material means to support 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,

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[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.

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 multi-generation co-residence 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 the living arrangements for the elderly 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,

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[6] Under the mode of traditional filial piety in China, sons are responsible for care of elder 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.

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 55 or older (Jackson and Howe 2004). The percentage of households with wealth-to-income ratio of more than two at retirement will remain small in the future (Takayama 2002).

The third source of old-age income is social pension. Since the early 1950s, urban residents who worked in government, government sponsored non-profit 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 has been 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 then then current retirees.

With concerns about sustainability of a PAYG system for a rapidly aging population, further reform of the pension system for enterprise workers was initiated in

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

the mid-1990s.[8] As a result, a mandatory system consisting of social pooling and individual accounts was established. The social pooling pillar is based on PAYG, relying on a 20% payroll tax paid by the enterprises to pay for the current pensions. Individual accounts, purported to be fully funded were financed with contributions of 8% from enterprises and 3% from individuals. 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, the 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 the acceleration of the inclusion of non-state enterprises workers into the pension pool (State Council 1999). Since then the pension coverage in the non-state enterprise 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, which operates without contributions by workers and with 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.

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[8] The two crucial policy documents were 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.*

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.

3. 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 their consumption and the human capital of children because parents must reduce their own consumption (including leisure) to acquire the time and resources they spend on child care and children's education, training, and health.[9]

Consider in a simple version of two-period model, the parents have a time-separable concave utility function defined over their family consumption in period one (C_1), 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. We assume that the child's level of well-being is a function of his or her education (e).

In period one, the parents use their money income (y) for family consumption, child education and saving (s). In period two, their consumption is determined the saving, transfer from their child (T) and the pension income (P). Assume the return on

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[9] Only rich parents can avoid this trade-off because they can use bequests to help finance their investments in children (Becker and Murphy, 1988).

saving is R, and the transfer is a linear function of the child's education, that is, $T = \gamma e$.

Thus, the budget constraints for parents are

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

and

$$C_2 = Rs + \gamma e + P \tag{3}$$

Choosing C_1 and e to maximize (1) yields the following equation:

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

where the partial derivatives of the utility functions are denoted by superscripts. This

intertemporal first-order condition 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 gain from the

consumption increase due to more transfer $(\beta \gamma U_2^1)$; and the gain due to an increase in the

child's welfare $(\beta U_2^2 \alpha V')$.

With this general framework, we can focus on three cases, each of which uniquely

defines parental motives in investing in the education of their child:

Case 1. Parents only have the exchange motive. That is, the child's well-being

carries zero weight in their parents' utility function, but the parents rely on the child's

transfer for consumption in the later period. This case can be denoted by $\alpha = 0$ and $\gamma >$

0. The first-order condition in Eq. (4) reduces to:

$$\beta \gamma U_2^1 = U_1' \tag{5}$$

To study the effects of changes in pension income P on e, we apply the implicit function

theorem and obtain the following comparative statics:

$$\frac{de}{dP} = -\frac{\gamma \beta U_2^{11}}{\gamma^2 \beta U_2^{11} + U_1''} \tag{6}$$

Given the concavity of the utility functions, we know $U_2^{11} < 0$; $U_1'' < 0$ (also $U_2^{22} < 0$ and $V'' < 0$). Therefore, it follows that

$$\frac{de}{dP} < 0 \tag{7}$$

Case 2. Parents are altruistic. They value their child's well-being, but don't depend on the child's transfer for consumption in period two. That is, $\alpha > 0$ and $\gamma = 0$. The comparative statics now takes the following form:

$$\frac{de}{dP} = -\frac{\beta U_2^{21}}{\beta \alpha U_2^{22} V' V' + \beta \alpha U_2^2 V'' + U_1''} \tag{8}$$

It is reasonable to assume that the utility gain that the altruistic parents derive from more consumption is enhanced by improved well-being of their child. In notional term, this can be expressed as $U_2^{21} > 0$. With this assumption, it follows that

$$\frac{de}{dP} > 0 \tag{9}$$

Case 3. Parents care about their child's welfare, but they also depend on the child for consumption in period two. Therefore, we have both $\alpha > 0$ and $\gamma > 0$. The change in e with respect to the change in P is:

$$\frac{de}{dP} = -\frac{\beta \alpha U_2^{21} V' + \gamma \beta U_2^{11}}{2\beta \alpha \gamma U_2^{21} V' + \beta \alpha^2 U_2^{22} V' V' + \beta \alpha U_2^2 V'' + \gamma^2 \beta U_2^{11} + U_1''} \tag{10}$$

In this case, the sign of $\frac{de}{dP}$ is undetermined.

In summary, non-altruistic parents with the exchange motive would decrease the education expenditure for their child in response to new pension availability. In contrast,

altruistic parents will respond by increasing the education expenditure. Parents who have

a mixture of altruistic and exchange motives may either increase or reduce the education

expenditure, depending on factors that are traced in this framework.

4. Empirical Framework

As outlined above, pension availability may have opposing effects of investments

in children's education; therefore, its net effect is inherently an empirical question. In

this section we explain the empirical strategies for identification, followed by a

discussion of the data.

4.1 Identification Strategies

We estimate the net effect of pension expansion on parents' investments in their

children's education investments in a difference-in-differences framework:

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\begin{aligned}
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}
\end{aligned}
\tag{11}
$$

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.[10] The post pension reform trend ($Year2005$) is

estimated using children whose parent(s) is employed in or retired from the state sector.

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[10] The non-state sector includes collectively owned or controlled enterprises; privately

owned or controlled enterprises (with 8 or more employees); foreign-owned or controlled

enterprises; privately owned enterprises (with 7 or fewer employees), the self-employed,

and other types. The state sector includes government agencies, social service units (e.g.,

schools, youth organizations, and health care providers, etc.) and state-owned or

controlled enterprises.

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.[11]

A vector of parents characteristics is denoted by H'_{ict}, in which we control not only for the conventional variables, such as age and years of schooling; but also for parents' family background information, uniquely available in the data. 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' time preference can be another omitted variable — myopic parents may choose current consumption over future consumption; and consequently invest less in both children's education and their own retirement. The quality of schooling that parents experienced when they attended school may not only affect the type of employers that they may have later on; but also the way they view the value of education and consequently their decision on their investment in children's. These characteristics are not observed but they are shaped by their family background. Therefore, we include parents' Hukou status

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[11] There is no need to control for the number of siblings, since vast majority of the children are the only child of their family. In our sample, the average number of siblings a child has is 0.084.

at the age of 16 [12]; the number of siblings they have; and their parents' education as additional control variables. In addition, the city-specific year dummies ($D_{c \times t}$) are included to control for city-specific policy changes during this period. The idiosyncratic error term is denoted by ε_{ict}.

The assumption underlying this identification is that the two groups (parent in the state sector and parents in the non-state sector) experience otherwise similar changes in investments in education during the period. Therefore, the observed trend in education expenditure for children among parent in the state sector provides an appropriate counterfactual estimate for what would have happened to children with parents in the non-state sector in the absence of pension reform. Conditional on covariates, we assume that pension coverage is the only systematic factor that has a differential impact on children who have parents in the non-state sector. Although this assumption is not directly testable, we can use the same double-difference framework to examine whether the trends in other social policies and income measures during this period are indeed indistinguishable between the two sectors. The medical reform in 1997 is a major concern because it involves establishing a unified "urban employee basic health insurance scheme" and widening coverage of health insurance for the urban employed (Liu 2002). In addition, we are concerned that wage, bonus, and housing value might reveal different trends in the two sectors. To examine these trends, we estimate the following equation,

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[12] Hukou status (rural vs. urban) at age of 16 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).

$$Y_{ict} = \alpha_1 NonState_{ict} + \alpha_2 Year2005 + \alpha_3 NonState_{ict} \times Year2005 + Z'_{ict}\alpha_4 \\ + D_{c \times t} + \varepsilon_{ict} \tag{12}$$

where i indexes the working age individual and Y_{ict} stands for the aforementioned

outcomes. Z'_{ict} is a vector of 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.

To provide additional robustness checks to the estimation results of Eq. (11), we

make use of the 2005 Chinese national intercensal population survey[13] in addition to

CULS; and apply the instrumental variable method to estimate the following equation

$$E_{ic} = \gamma_1 Pension_i + X'_{ic}\gamma_2 + H'_{ic}\gamma_3 + D_c + \varepsilon_{ic} \tag{13}$$

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. We construct two instrumental variables for $Pension_i$,

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 type[14]/city cell calculated from the 2005 population

[13] We have access to 20% of the observations in the total sample, and they account for

0.95% of Chinese population.

[14] There are eight categories for employer types in 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.

survey. This instrument varies by age, education, gender, employer ownership type, and city, and each of these factors is controlled for linearly in Eq. (13). The identification comes only from their interactions, which we assume to be exogenous to parental decisions on investment in education. Others have used the prevailing average as instrument variables in previous studies on health insurance in the US (e.g. Cutler and Gruber, 1996; Gruber and McKnight, 2003). One obvious disadvantage of using this method in our study is that we can use only 2005 data with a much smaller sample; therefore, we only use this approach as a robustness check. We proceed with the double-difference framework outlined in Eq. (11) to examine potential differential impact on girls vs. boys and children with college educated parent vs. those whose parents are less educated.

4.2 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 Xian. The proportional population sampling approach is used for both waves. Within each city, an average of 10 registered urban households in each of 70 and 50 neighborhood clusters (*shequ*) were surveyed in 2001 and 2005, respectively.[15] Each household head was asked questions about family members. Family members above age 16 who were no longer in

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

school were interviewed individually. The sample includes 3,499 households from the

2001 survey and 2,505 households from the 2005 survey.

In our final analysis sample, which contains children aged 1–18, we have 988

observations in 2001 and 897 in 2005. About 63% of young children aged 1–5 are

enrolled in daycares. The school enrollment rate is 98% for children age 6–15, and 95%

for the 16 –18 group. With such high enrollment rates for school age children, it would

be difficult to detect impact on education, if any, based on the extensive measures of

school outcomes, such 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, more variations can be explored in order to examine the impact on investment

in education. For this purpose, an education expenditure module is included in the

household survey, where information on tuitions and school fees, as well as expenditures

on interest classes and extracurricular activities is collected for each household member

who is either in daycare or school.

Yearly education expenditures did not change much between 2001 and 2005, and

the average was about 2,600 yuan (Table 1).[16] Tuition and school fees averaged about

2,110 yuan and accounted for 81% of the total education expenditure in 2001; the amount

was 1,927 in 2005, and its share in the total expenditure dropped to 76%. The decrease in

tuition and schools fees is likely to be driven by policy, namely the "one fee system"

adopted in fall 2004 by three cities (Shanghai, Wuhan, and Shenyang) and designed to

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[16] The exchange rate between the yuan and the US dollar is 8.27. The expenditure of

2,600 yuan is equal to 314 US dollars.

curb excessive fee collection made by public schools.[17] Under this system, public primary schools and junior high schools can charge students one time for two items: school fees and textbooks and notebooks fees. The amount of fees is 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 on tutors or special interest classes and extracurricular activities increased from 486 yuan to 603 yuan. In addition, proportionally more children had tutors or engaged in extracurriculars in 2001 (41%) than in 2005 (49%). In the light of the income increase occurring during this period,[18] more spending on these education activities outside of schools 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 their competitiveness in the labor market and marriage market (Wei and Zhang, 2011). In addition, a belief is embraced at elite urban

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[17] This practice is 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 is 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.

[18] The average household income is 29,029 yuan (3,510 US dollars) in 2001 and 32,829 yuan (3,970 US dollars) in 2005.

private schools and more by the public that extracurricular activities can help to foster

self-confidence in children and stimulate their interest in learning (Lin 2007)

With regard to pension coverage for parents, the numbers show that 77% of the

children had at least one parent with a pension in 2001, and in 2005 the number increased

to 80%.. The share of children with two parents having pensions also went up from 42%

in 2001 to 51% in 2005. More parents worked in the non-state sector in 2005 than in

2001. About 22% of the children had two parents in the non-state sector in 2001, and this

number increased to 42% in 2005.

The samples in these two survey rounds are very similar with respect to child age

and gender. They are 12 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 of 16;

they also have fewer siblings and slightly better educated parents than the parents in the

2001 sample. But none of the differences in parent characteristics are statistically

significant between the two samples.

5. Results

Before we present the main estimation results of Eq. (11), we want to indirectly

validate the assumption of the difference-in-differences framework; that is, the trends in

pension coverage differ between the state and the non-state sector; but other trends are

the same. More specifically, we examine medical insurance coverage, measures of

income, and assets.

Figure 1 presents the locally weighted regression lines for rates of pension

coverage, showing that the coverage rates for the state sector exhibit little systematic

change from 2001 to 2005. They average around 80% with older employees having higher coverage rates. For the non-state sector, the average rates jump from about 40% in 2001 to a little over 60% in 2005. The increase applies to employees in all ages.

As we discussed in Section 4, one confounding policy change could be the implementation of the 1997 health care reform, the goal of which is to increase coverage for the urban employed. Indeed, we see in our sample that the health insurance coverage rates increases from an average of 34% in 2001 to 41% in 2005 for the employed in the non-state sector. During the same period, employees in the state sector also experience a similar rise in health insurance coverage (Figure 2) from 77% to 84%. The same trends in medical insurance validate our identification assumption that policy changes other than pension reform do not affect the two sectors differently.

These visual evidences are further confirmed in the difference-in-differences results reported in Table 2. Estimations for working age women are presented in the top panel, and men in the bottom panel. 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. In addition, we also check the monthly wage, yearly bonus income, and the values of their houses. Non-state sector employees have lower values for these outcomes, but they have similar changes over time as the state sector employees, evidenced by the small and insignificant coefficients on all the interaction terms.

These results suggest that the relative "returns" to being employees in the non-state sector haven't changed in the four years. Not surprisingly, when we run a linear

probability model on parents' likelihood of working in the non-state sector, we find the individual determinants are the same in 2001and 2005 (Table 3). Results in Table 3 further confirm that individual selections into the non-state sector can be accounted for in a difference-in-differences framework.

5.1 Main Results

We report estimates of the overall effects of pension reform on education expenditure in Table 4. 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.

The first column of Table 4 shows results from the basic difference-in-differences mode including the full set of city and year fixed effects. Pension reform is associated with a significant increase in education expenditure: Compared to education expenditure for children with one parent in state sector, education expenditure for children with two parents in the non-state sector shows an increase of 19.6% during this period. In the next column, the estimate is 13%, significant at 1% level, after additional controls for child age, gender, and school level. We further augment the specification with parents' individual characteristics and their family background as covariates, including parents' age and education (column 3), parents' Hukou status (column 4), parents' number of siblings (column 5) and finally grandparents' education (column 6). With this extensive list of covariates, the impact estimate ranges from 11% to 12.9%, all significant at the 5% level.

The results of tutoring and extracurricular classes seem to be sensitive to the inclusion of different controls. Only with the addition of child school level as covariate,

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does the impact estimate become significant. It remains significant at the 10% level with the full set of controls, showing that relatively children with parent in the non-state sector are 4.8% more likely to have tutors and attend special interest classes.

In Table 5, we examine the effects on two components of the total education expenditure: tuitions and school fees; and expenditure on tutors and extracurricular classes. The estimations for tuitions and fees are somewhat sensitive to the inclusion of additional variables. With the full set of controls, the impact coefficient is not significantly different from zero. Note that which public schools the K–9 children attend is 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 capped in the public schools, thus, it is not surprising that we find no impact on tuition and school fees. The estimated impact on the expenditures on tutors and extracurricular classes is large in magnitude (about 40%) and significant at the 5% with full controls. These results imply that the increase in the total education expenditure occurs primarily because of increased participation in and expenses of educational activities outside regular schools.

We have shown that the trends in health insurance policy, wage, bonus income, and housing values are essentially the same for the state and the non-state sectors. So 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, we conclude that the effects we find on education investments can be ascribed to the expansion of pension coverage to the non-state sector.

5.2 Robustness Checks

In this section, we present two robustness checks of the main results. First, we are concerned that even though the pension coverage rate in the state sector as a whole is not affected by the reform, pension wealth is. In particular, under the new pension system, employees under the state owned enterprises are offered lower replacement rates than in the old system (Salditt et al., 2008; Sin, 2005). The decline in the replacement rate for employees of state- owned enterprises is associated with higher savings (Chamon, et al., 2010; Feng, et al., 2011), which in turn may affect education expenditures. To allow for the potential impact on children with parent in employed in state owned enterprises, we use them as an additional "treatment" group. Children with parents in government agencies and social service units, whose pension benefits are not affected by the reform, are the control group.

The results based on this new specification are presented in Table 6. We present the results with the full set of controls for total education expenditure, tuition and fees, expenditures on tutors and extracurricular classes, and having had tutors or participated in extracurricular classes. The results show that education expenditures on children with parents in the state-owned enterprises are no different for children in the control group, whose parents are employed in government or related organizations. This result implies that the change in pension wealth doesn't seem to affect education expenditures. The impact is the result of the change in pension coverage. Children whose parents are in the non-state sector enjoy more educational input in terms of total education expenditure, expenditures on tutors and extracurricular classes, and greater likelihood of having a tutor or participating in extracurricular classes. These results are quantitatively similar to the ones presented in Tables 4 and 5.

The second robustness check we perform involves an alternative identification based on the instrumental variable (IV) method as outlined in Eq. (13). In this estimation, we directly control for whether or not at least one parent has enrolled in the public pension program. We then use the predicted enrollment probabilities for mothers and fathers as IVs. The predicted probabilities are the average enrollment rates for each age/education/gender/employer type/city cell calculated from the 2005 population survey. We present the IV results in Table 7, together with the F statistic for excluded instruments and the Hansen J statistic for the overidentification test.

These first-stage tests are passed easily for all four measures of education investments measures. 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 parent has 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, but they further support our conclusion that parental enrollment in the public pension system is conducive to more investment in children's education.

5.3 Heterogeneities in the Impacts

Next we stratify the total sample by children's age, gender and parental education so as to examine the heterogeneities in the impact. We carry out the analysis in the DD

framework as outlined in Eq. (11). For the sake of brevity, we present only results on the total education expenditures.

The results on impact by age are reported in Table 8. Again we start with a basic specification (column 1) and then add more controls (columns 2–7). The children are grouped into three age categories: pre-school age (1–5 years old); K–9 (6–15 years old); and 16–18 years old. The impact seems to be negatively correlated with children's age. For pre-school children, pension coverage is associated with an increase of 70% in the total education expenditure. This estimate is statistically significant at the 5% level. For children aged 6–15, the point estimates range from 11% to 18% and they are all significant at the 1%. The impact estimates are negative for children aged 16–18, but they are not statistically different from zero in most specifications with more controls.

Note that in the Chinese education system, which public school a child attends at the K–9 level is mostly based on residential location. Merit-based selection starts at the high school level. Which high school a student attends depends largely on his or her performance on a citywide high school entrance exam. But parents can also buy their children enrollment at schools one or two notches higher than their exam scores warrant (Fong 2004). The finding that young children (pre–K and K–9), not high school age children, benefit from parents' pension enrollment indicates that the impact may be limited in scope. It doesn't change which type of high school a child attends, and increases only a young child's extracurricular activities.

Next we investigate whether girls and boys benefit similarly from pension reform, stratifying the total sample by child gender. The results are presented in Table 9. We have about an equal number of observations in the two samples. Impact is precisely

estimated for girls in all specifications. The result based on the full set of controls

implies that education expenditures increased 21% for children whose parents are in non-

state sectors in 2005, however, estimates for boys are small in magnitude and turn

insignificant when more controls are included in the regressions (columns 3–7).

Finally, we use parent's education as a proxy for family income, and estimate the

impact separately for children whose parents do not have a college degree and those who

have at least one college-educated parent. The results are reported in Table 10. The

point estimates for the year 2005 and non-state sector interaction term decrease in

magnitude and become statistically insignificant for children with more educated parents.

As we would expect, the pension reform has no effect on families less likely to be budget

constrained with regard to education expenditure. The impact estimates remain

significant for children whose parents are relatively less educated, and they are

substantial in magnitude (0.17 with the full set of controls).

These results on the heterogeneities of the impact based on parent education are

not surprising. As expected, families with less educated parents face more budget

constraints, and their investments in education would be more likely to respond to the

income effect of pension reform than families with more educated parents.

6. Conclusions

This paper presents the analysis of the impact of an expansion of the public

pension program in urban China on children's education expenditures. We collect

detailed information on expenditures of tuitions and school fees; as well as tutors and

extracurricular classes. We estimate the net effect of the pension expansion in a reduced

form difference-in-differences framework, using trends in education expenditures of

children with parent employed in the state sector to gauge counterfactual trends for what would have happened to those whose parents are employed in the non-state sector absent of the pension expansion. The validity of the method is indirectly supported by the fact that employees in the two sectors experience statistically indistinguishable time trends in medical insurance coverage, wage, bonus income, and housing values. The result is robust to the inclusion of a large set of covariates controlling for parents' family background. In addition, the result is also robust to an alternative identification based on the instrumental variable method.

The results in this study yield three implications. One is that social security reform affects intergenerational transfers in a household. Assessment of the impact of reform would be amiss if it does not include such intergenerational effects. Second, the finding that pension coverage for parents increases family expenditure on children's education suggests that investment in children's human capital seems to be dominated by the altruistic concerns of parents. Third, in the one-child family setting, gender difference still exists with regard to educational investment. This finding suggests that parent preference is likely to be predetermined by culture and norms.

Figure 1. Pension Coverage by Sectors and Years
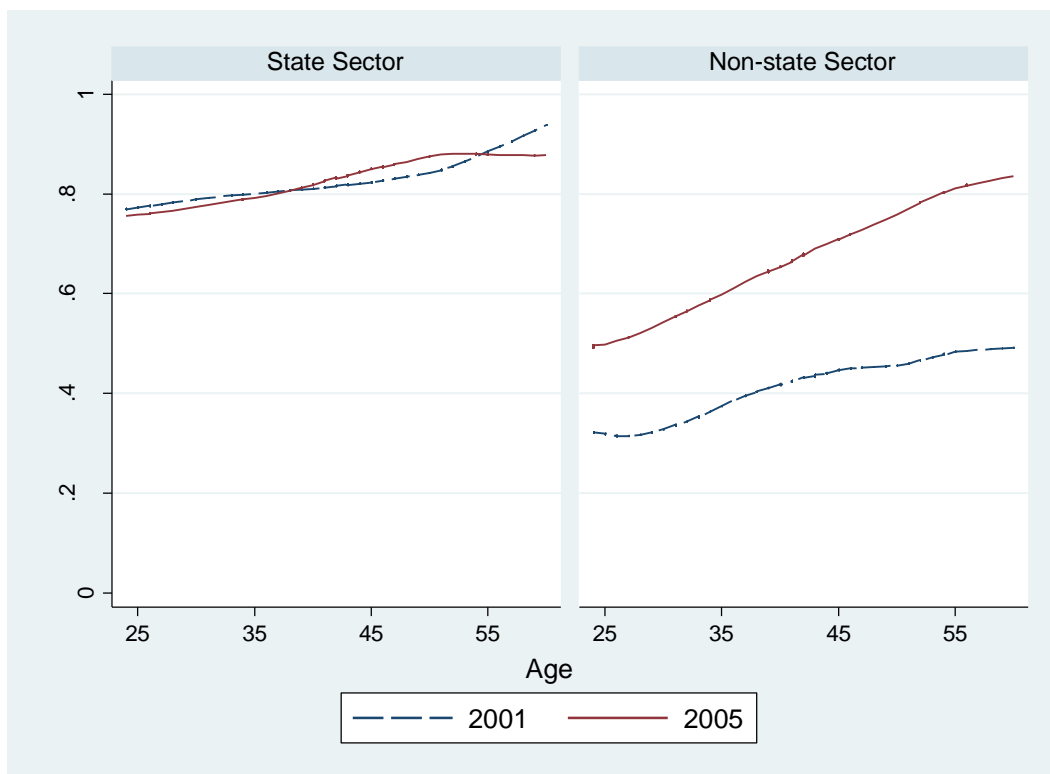
Data source: CULS1 and CULS2

Figure 2. Medical Insurance Coverage by Sectors and Years
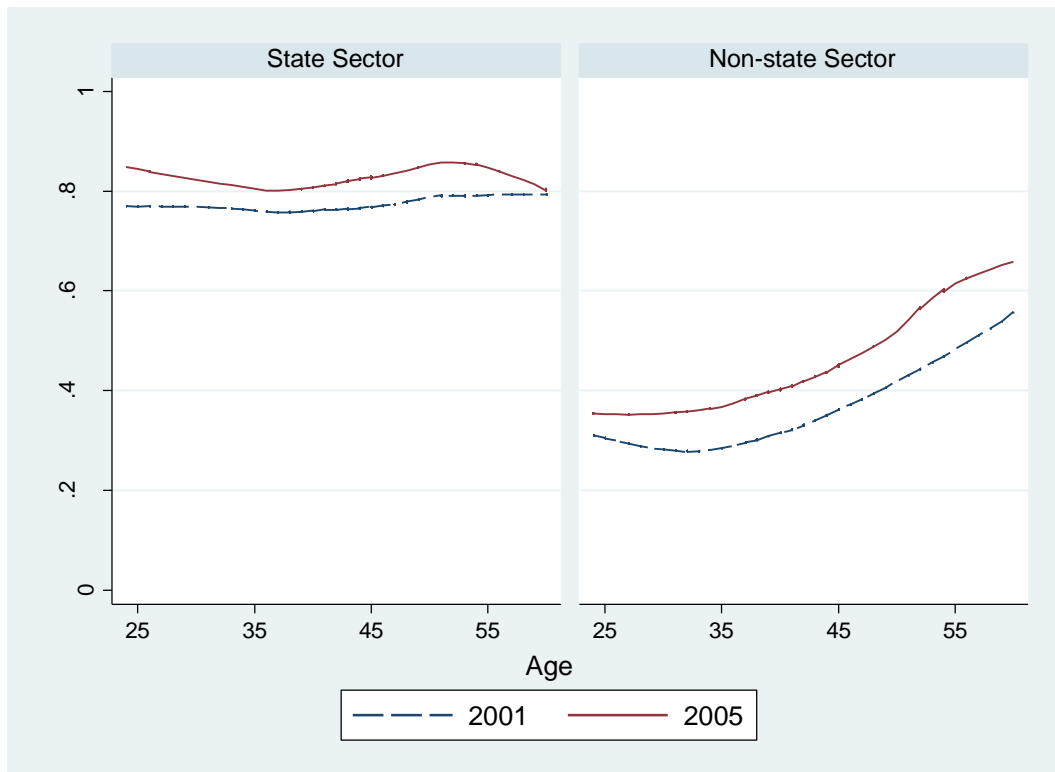
Data source: CULS1 and CULS2

Table 1 Summary Statistics

	2001		2005	
Educational Expenditures				
Total Education Expenditure	2596.21	(3364.62)	2535.36	(2596.85)
__Tuitions and Fees	2109.75	(3041.66)	1926.19	(2240.81)
__Tutors and Interest Classes	486.46	(1455.73)	602.73	(1161.33)
Has a Tutor or Enrolled in an Interest Class	0.41	(0.49)	0.49	(0.50)
Parent Pension Coverage				
Mother with Pension Coverage	0.54	(0.50)	0.61	(0.49)
Father with Pensi	0.65	(0.48)	0.70	(0.46)
At Least One Parent with Pension Coverage	0.77	(0.42)	0.80	(0.40)
Both Parents with Pension Coverage	0.42	(0.49)	0.50	(0.50)
Parent Employment Type				
Mother in Non-state Sector	0.45	(0.50)	0.63	(0.48)
Father in Non-state Sector	0.37	(0.48)	0.53	(0.50)
At Least One parent in Non-state Sector	0.59	(0.49)	0.74	(0.44)
Both Parents in Non-state Sector	0.22	(0.42)	0.42	(0.49)
Child Characteristics				
Age	12.62	(4.09)	11.54	(5.12)
Gender	0.51	(0.50)	0.51	(0.50)
Parent Characteristics				
Mother's Age	39.46	(5.31)	39.03	(6.20)
Father's Age	41.89	(5.25)	41.55	(6.11)
Mother's Years of schooling	11.18	(2.70)	11.52	(2.49)
Father's Years of schooling	11.60	(2.97)	11.75	(2.57)
Mother Had a Rural Hukou at Age 16	0.19	(0.39)	0.15	(0.35)
Father Had a Rural Hukou at Age 16	0.15	(0.35)	0.11	(0.32)
Mother's Number of Siblings	2.53	(1.45)	3.04	(1.51)
Father's Number of Siblings	2.58	(1.44)	3.06	(1.42)
Maternal Grandmother's Years of Schooling	4.59	(4.44)	5.17	(4.01)
Maternal Grandfather's Years of Schooling	3.99	(4.23)	4.80	(4.22)
Paternal Grandmother's Years of Schooling	6.79	(4.53)	7.21	(4.70)
Paternal Grandfather's Years of Schooling	6.29	(4.61)	6.89	(4.60)
Number of Observations	988		898	

Note: Standard deviations are in the parenthesis.

Table 2 Double-difference Estimations of Social Security Coverage, Income, and Housing Value

	Pension	Medical Insurance	Monthly Wage (log)	Yearly Bonus (log)	Housing Value (log)
Panel A. Women (age 24-55)					
Non-state Sector × Year 2005	0.29***	-0.01	-0.05	-0.14	0.10
	(0.05)	(0.08)	(0.11)	(0.62)	(0.23)
Non-state Sector	-0.44***	-0.35***	-0.02	-1.36***	-0.10*
	(0.03)	(0.07)	(0.02)	(0.37)	(0.06)
Year 2005	-0.02	-0.08***	0.26***	0.63***	0.39***
	(0.02)	(0.02)	(0.04)	(0.19)	(0.06)
Number of Observations	5,042	5,042	4,278	4,223	5,042
Panel B. Men (age 24-60)					
Non-state Sector × Year 2005	0.23***	0.09	0.03	-0.08	0.06
	(0.06)	(0.09)	(0.09)	(0.46)	(0.07)
Non-state Sector	-0.34***	-0.40***	-0.13***	-1.03***	-0.14***
	(0.03)	(0.08)	(0.04)	(0.24)	(0.04)
Year 2005	-0.02	-0.09***	0.21***	0.75***	-0.03
	(0.02)	(0.03)	(0.04)	(0.19)	(0.02)
Number of Observations	4,661	4,661	3,522	3,483	4,661

Note: Other variables included but not reported are age, years of schooling, city fixed effects, city-specific time dummies. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 3 Probabilities of Working in the Non-State Sector

	Mother		Father	
Age	-0.01**	(0.001)	-0.00	(0.01)
Years of Schooling	-0.05***	(0.01)	-0.03***	(0.01)
Number of Siblings	-0.01	(0.01)	0.00	(0.01)
Rural Hukou at Age 16	0.05	(0.04)	-0.13***	(0.04)
Father's Years of Schooling	-0.00	(0.01)	0.00	(0.01)
Mother's Years of Schooling	-0.01***	(0.00)	-0.01**	(0.00)
Shanghai	-0.05	(0.05)	-0.03	(0.05)
Wuhan	0.01	(0.05)	0.02	(0.05)
Shenyang	0.11**	(0.05)	0.07	(0.05)
Fuzhou	0.04	(0.04)	0.04	(0.04)
Year 2005	-0.44**	(0.22)	-0.08	(0.22)
Age × Year 2005	0.01	(0.01)	-0.00	(0.01)
Years of Schooling × Year 2005	-0.00	(0.01)	-0.01	(0.01)
Number of Siblings × Year 2005	0.02	(0.01)	0.01	(0.02)
Rural Hukou at Age 16 × Year 2005	0.08	(0.06)	0.09	(0.06)
Father's Years of Schooling × Year 2005	-0.00	(0.01)	-0.00	(0.01)
Mother's Years of Schooling × Year 2005	0.01	(0.01)	0.00	(0.01)
Shanghai × Year 2005	0.02	(0.07)	0.06	(0.08)
Wuhan × Year 2005	0.02	(0.06)	0.08	(0.07)
Shenyang × Year 2005	-0.11*	(0.07)	0.03	(0.07)
Fuzhou × Year 2005	-0.18	(0.62)	0.01	(0.064)
Constant	1.53***	(0.17)	0.86***	(0.157)
Number of Observations	1,886		1,886	

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Standard errors are robust to heteroskedasticity

Table 4 Double-difference Estimations of Educational Investment for Children Age 1-18

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Total Education Expenditures (log)						
Parents in Non-state Sector × Year 2005	0.196*	0.130***	0.112**	0.113**	0.125**	0.129**
	(0.111)	(0.044)	(0.049)	(0.051)	(0.053)	(0.058)
Parents in Non-state Sector	-0.328***	-0.300***	-0.193***	-0.182***	-0.182***	-0.172***
	(0.095)	(0.036)	(0.042)	(0.044)	(0.044)	(0.051)
Year 2005	0.281***	0.302***	0.327***	0.295***	0.318***	0.281***
	(0.043)	(0.051)	(0.059)	(0.064)	(0.066)	(0.075)
Panel B: Has Tutors or Enrolled in Interest Classes						
Parents in Non-state Sector × Year 2005	0.053	0.074**	0.053*	0.052*	0.050*	0.048*
	(0.040)	(0.035)	(0.030)	(0.028)	(0.029)	(0.028)
Parents in Non-state Sector	-0.122***	-0.134***	-0.065***	-0.060***	-0.060***	-0.053***
	(0.032)	(0.028)	(0.018)	(0.015)	(0.016)	(0.015)
Year 2005	0.214***	0.210***	0.224***	0.219***	0.222***	0.215***
	(0.031)	(0.034)	(0.041)	(0.042)	(0.042)	(0.041)
City Specific Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Child Age, Gender and School Level	No	Yes	Yes	Yes	Yes	Yes
Age and Education of Parents	No	No	Yes	Yes	Yes	Yes
Parents' Hukou Status at Age 16	No	No	No	Yes	Yes	Yes
Parents' Number of Siblings of Parents	No	No	No	No	Yes	Yes
Grandparents' Educations	No	No	No	No	No	Yes
Number of Observations	1,886	1,886	1,886	1,886	1,886	1,886

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

Table 5 Double-difference Estimations of Two Types of Education Expenditures for Children Age 1-18

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Tuitions and School Fees (log)						
Parents in Non-state Sector × Year 2005	0.171***	0.070	0.073	0.069	0.078	0.074
	(0.057)	(0.051)	(0.054)	(0.054)	(0.056)	(0.061)
Parents in Non-state Sector	-0.201***	-0.159***	-0.124**	-0.116**	-0.115**	-0.106*
	(0.048)	(0.047)	(0.050)	(0.051)	(0.051)	(0.057)
Year 2005	0.087	0.122**	0.137**	0.139**	0.164***	0.147**
	(0.073)	(0.061)	(0.061)	(0.062)	(0.062)	(0.068)
Panel B: Expenditures on Tutoring and Interest Classes (log)						
Parents in Non-state Sector × Year 2005	0.396	0.535**	0.402*	0.406*	0.428*	0.434**
	(0.266)	(0.241)	(0.212)	(0.213)	(0.219)	(0.215)
Parents in Non-state Sector	-0.964***	-1.035***	-0.495***	-0.457***	-0.464***	-0.423***
	(0.193)	(0.172)	(0.110)	(0.100)	(0.109)	(0.102)
Year 2005	1.598***	1.578***	1.688***	1.540***	1.574***	1.478***
	(0.219)	(0.240)	(0.292)	(0.322)	(0.321)	(0.330)
City Specific Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Child Age, Gender and School Level	No	Yes	Yes	Yes	Yes	Yes
Age and Education of Parents	No	No	Yes	Yes	Yes	Yes
Parents' Hukou Status at Age 16	No	No	No	Yes	Yes	Yes
Parents' Number of Siblings of Parents	No	No	No	No	Yes	Yes
Grandparents' Educations	No	No	No	No	No	Yes
Number of Observations	1,886	1,886	1,886	1,886	1,886	1,886

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

Table 6 Robustness Check: Double-Difference Estimations with Parents in State-owned Enterprises as a Control Group

	Total Education Expenditure (log)	Tuitions and School Fees (log)	Expenditures on Tutoring and Interest Classes (log)	Has Tutors or Enrolled in Interest Classes
Parents in Non-state Sector × Year 2005	0.105**	0.063	0.346*	0.050*
	(0.043)	(0.062)	(0.204)	(0.029)
Parents in Non-state Sector	-0.309***	-0.124**	-0.389***	-0.047***
	(0.035)	(0.055)	(0.113)	(0.018)
Parent in State-owned Enterprises× Year 2005	-0.150	-0.063	0.053	0.015
	(0.113)	(0.101)	(0.347)	(0.050)
Parent in State-owned or State-controlled Enterprises	-0.041	-0.089	0.208	0.028
	(0.031)	(0.063)	(0.231)	(0.038)
Year 2005	0.336***	0.143*	1.615***	0.214***
	(0.053)	(0.084)	(0.279)	(0.041)
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
Parents' Hukou Status at Age 16	Yes	Yes	Yes	Yes
Parents' Number of Siblings of Parents	Yes	Yes	Yes	Yes
Grandparents' Educations	Yes	Yes	Yes	Yes
Number of Observations	1,885	1,885	1,885	1,885

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

Table 7 Robustness Check: Instrumental Variable Estimations based on the 2005 CULS and the 2005 Mini Census

	Total Education Expenditure (log)	Tuitions and School Fees (log)	Expenditures on Tutoring and Interest Classes (log)	Has Tutors or Enrolled in Interest Classes
Parent(s) Have Pension Coverage	0.242**	0.089	0.190	0.378**
	(0.110)	(0.279)	(0.365)	(0.172)
F-test on Excluded Instruments	22.91	21.94	20.43	22.91
Prob > F	0.000	0.000	0.000	0.000
Overidentification: Hansen J statistic	2.050	0.283	0.131	1.690
Chi-sq p-val	0.1522	0.594	0.718	0.194
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
Parents' Hukou Status at Age 16	Yes	Yes	Yes	Yes
Parents' Number of Siblings of Parents	Yes	Yes	Yes	Yes
Grandparents' Educations	Yes	Yes	Yes	Yes
Number of Observations	898	898	898	898

Note: *** 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 intercensal population survey, based on the city of residence, age, education level, and employer's ownership type.

Table 8 Heterogeneities of the Impacts on the Total Education Expenditures by Child Age

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: age 1-5						
Parents in Non-state Sector × Year 2005	0.799**	0.618*	0.662**	0.596*	0.647*	0.707**
	(0.320)	(0.317)	(0.297)	(0.305)	(0.338)	(0.303)
Number of Observations	141	141	141	141	141	141
Panel B: age 6-15						
Parents in Non-state Sector × Year 2005	0.181***	0.141***	0.115***	0.113***	0.127***	0.134***
	(0.051)	(0.041)	(0.042)	(0.043)	(0.044)	(0.048)
Number of Observations	1,360	1,360	1,360	1,360	1,360	1,360
Panel C: age 16-19						
Parents in Non-state Sector × Year 2005	-0.124*	-0.103	-0.092	-0.090	-0.118	-0.147
	(0.072)	(0.087)	(0.088)	(0.113)	(0.122)	(0.153)
Number of Observations	208	208	208	208	208	208
Year Dummy for 2005	Yes	Yes	Yes	Yes	Yes	Yes
Parents in Non-state Sector	Yes	Yes	Yes	Yes	Yes	Yes
City Specific Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Child Age, Gender and School Level	No	Yes	Yes	Yes	Yes	Yes
Age and Education of Parents	No	No	Yes	Yes	Yes	Yes
Parents' Hukou Status at Age 16	No	No	No	Yes	Yes	Yes
Parents' Number of Siblings of Parents	No	No	No	No	Yes	Yes
Grandparents' Educations	No	No	No	No	No	Yes

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

Table 9 Heterogeneities of the Impacts on the Total Education Expenditures by Child Gender

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Girls						
Parents in Non-state Sector × Year 2005	0.227***	0.175***	0.164***	0.155***	0.171***	0.205***
	(0.059)	(0.059)	(0.061)	(0.059)	(0.060)	(0.064)
Number of Observations	929	929	929	929	929	929
Panel B: Boys						
Parents in Non-state Sector × Year 2005	0.182*	0.081	0.058	0.058	0.079	0.076
	(0.096)	(0.081)	(0.095)	(0.097)	(0.103)	(0.108)
Number of Observations	957	957	957	957	957	957
Year Dummy for 2005	Yes	Yes	Yes	Yes	Yes	Yes
Parents in Non-state Sector	Yes	Yes	Yes	Yes	Yes	Yes
City Specific Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Child Age, Gender and School Level	No	Yes	Yes	Yes	Yes	Yes
Age and Education of Parents	No	No	Yes	Yes	Yes	Yes
Parents' Hukou Status at Age 16	No	No	No	Yes	Yes	Yes
Parents' Number of Siblings of Parents	No	No	No	No	Yes	Yes
Grandparents' Educations	No	No	No	No	No	Yes

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors are

clustered by city, year and employers' ownership type.

Table 10 Heterogeneities of the Impacts on the Total Education Expenditures by Parent Education

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: At Least One Parent Has a College Degree						
Parents in Non-state Sector × Year 2005	0.110	0.082	0.076	0.051	0.061	-0.021
	(0.123)	(0.126)	(0.124)	(0.141)	(0.160)	(0.159)
Number of Observations	522	522	522	522	522	522
Panel B: No Parent Has a College Degree						
Parents in Non-state Sector × Year 2005	0.201***	0.128*	0.134*	0.140*	0.154*	0.166*
	(0.070)	(0.066)	(0.076)	(0.077)	(0.080)	(0.086)
Number of Observations	1,364	1,364	1,364	1,364	1,364	1,364
Year Dummy for 2005	Yes	Yes	Yes	Yes	Yes	Yes
Parents in Non-state Sector	Yes	Yes	Yes	Yes	Yes	Yes
City Specific Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Child Age, Gender and School Level	No	Yes	Yes	Yes	Yes	Yes
Age and Education of Parents	No	No	Yes	Yes	Yes	Yes
Parents' Hukou Status at Age 16	No	No	No	Yes	Yes	Yes
Parents' Number of Siblings of Parents	No	No	No	No	Yes	Yes
Grandparents' Educations	No	No	No	No	No	Yes

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors are

clustered by city, year and employers' ownership type.

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