Education Expenditure and Parenting Styles: Evidence from Cognitive Development in China

Lin Zhang
Faculty of Economics, Kindai University
3-4-1 Kowakae, Higashi-Osaka
Osaka 577-8502, Japan
Email: zhang@eco.kindai.ac.jp
Tel.: +81-6-4307-3235

Abstract

Does education spending affect parental investment in human capital, such as parenting practices? If so, is the influence positive or negative? Using pooled cross-sectional data from the China Family Panel Studies, this study investigated whether and how parenting practices were affected by education expenditure across provinces using instrumental variable estimations. The results were as follows: (1) Parents in regions with higher education spending were more likely to obtain a higher score on control behavior, a dimension related to parental demandingness, involvement, and monitoring. (2) Parents in regions with lower education spending were more likely to show harshness, a behavior associated with hostility, punitiveness, and coercion, towards their children and adopt harsh parenting practices, such as physical punishment and scolding. These results jointly indicated that parents in environments with greater education spending tend to adopt an authoritative parenting practice, which is considered the most effective parenting style. The findings of this study highlight the importance of education spending in improving educational attainments and reveal a spillover effect from school to family in human capital formation.

Keywords: Parenting practices; Education expenditure; Child development; Parental investment

JEL classification: I28, J13

Acknowledgements

The author thanks Wu Qiong and participants of RoMacs seminar at Kobe University for their helpful comments. The author acknowledges the financial support from JSPS (Japan Society for the Promotion of Science) KAKENHI Grant Number 18K12807. All errors are mine.

Introduction

The way parents raise their children has been well acknowledged as a substantial factor during the development of children. A large body of literature has shown a strong correlation between parenting practices and children's educational, sociopsychological, and biological outcomes. Appropriate and effective parenting practices could positively influence children's academic achievement, self-esteem, and health development. On the other hand, unfavorable and adverse parenting practices could have negative effects on children (for detailed reviews, see Bornstein 2002, 2019; O'Conner and Scott 2007).

For the educational outcomes, there is extensive literature showing that parenting practices are one of the decisive factors affecting children's academic outcomes (Brown and Iyengar 2008; Masud et al. 2015; Pinquart 2016; Spera 2006). Moreover, parenting practices, in the form of parent–child interaction or parental time, were shown to be a key determinant in the process of children's human capital formation (Bono et al. 2016; Ermisch 2008; Fiorini and Keane 2014; Houtenville and Conway 2008; Kim et al. 2018). For the sociopsychological outcomes, a series of studies have shown that the negative parent − child relationship accounted for some behavioral issues in children, such as aggressive behavior, depression, and low self-esteem (Denham et al. 2000; Dishion 1990; Laible and Thompson 1998; McLeod et al. 2007; Wood et al. 2003). In terms of children's biological outcomes, adverse parenting practices have been shown to be associated with high-risk health behavior, such as smoking, alcohol use, and drug abuse (Bailey et al. 2009; Barnes et al. 2000; Chassin et al. 1998; Schmidt et al. 1996).

Given the importance of parenting practices in child development and family well-being, researchers in different disciplines have investigated why parents adopt different parenting styles and how to improve children's long-term welfare through parental behavior. Economic circumstance has been acknowledged as one of the factors influencing family-related decisions (Becker 1993; Lundberg and Pollak 2007). This study aims to further interpret how parenting practices are affected by economic conditions.

Past studies have discussed the economic basis for parenting practices, that is, how economic conditions have influenced parents to adopt different styles of parenting. Weinberg (2001) discussed the parent–child relationship under different income levels and showed that low-income parents were more likely to use harsh parenting methods, such as corporal punishment, because they were constrained from using monetary incentives. Zhang and Ikeda (2016) demonstrated that both rich and poor parents kept income transfers to children lower than they desired because parents were aware of

habit formation while children were not; however, only the welfare of children from rich families could be increased by this parenting strategy. Based on a household production model, Cobb-Clark et al. (2019) showed that socioeconomic disadvantages, such as being unemployed and becoming disabled, restricted parents from choosing effective parenting styles. Doepke and Zilibotti (2017, 2019) provided evidence over time and across countries showing the association between the long-run trends of parenting styles and macroeconomic conditions such as economic development level, income inequality, return on education, and redistributive policies. As shown above, prior studies have suggested that variations in parenting styles could be explained by parents' socioeconomic status at the micro level and by development level, social inequality, and social mobility at the macro level. However, research on the relationship between education expenditure and parenting practices is rare. The current study aims to fill this gap by proposing a link between parenting practices and public education expenditure.

The assessment of parenting practices has remained an essential part of this research. I incorporated the dimensional approach widely used in developmental psychology by evaluating parenting practices based on two dimensions: control/demandingness and warmth/responsiveness. On the control/demandingness dimension, a parent scores high if he or she exhibits demandingness, involvement, and monitoring; he or she scores low if these factors are not observed. On the warmth/responsiveness dimension, a high measurement score is given for warmth factors, such as responsiveness, support, acceptance, and democratic reasoning; while a low score is given for harsh discipline, coerciveness, or punitive punishment. Furthermore, I employed measures for these practices adjusted for the context of Chinese families.

By empirically examining how education spending affects parenting practices on the two dimensions, I showed that the results were consistent with the theoretical prediction. Harsh parenting practices were associated with lower education spending, and control parenting practices were associated with higher education spending.

Conceptual Framework and Hypothesis

I followed the framework of the classic human capital theory in economics to interpret the link between education expenditure and parenting practices. The human capital theory considers human capital formation as the production of cognitive and non-cognitive skills (Becker 1964). Like traditional goods production, human capital production involves multiple inputs (Becker 1965; Michael and Becker 1973). An essential input involved in human capital production is material resources, namely expenditure on education (Guryan et al. 2008). Human capital production also

involves parents' time and effort. That is, parenting practices are considered as another input in the human capital formation (Becker 1991; Cunha 2015). Whether public education expenditure could effectively improve educational attainments is a core topic for education policies. When evaluating the effect of education expenditure on educational outcomes, it is crucial to separate the direct effect of education expenditure from the effects through other inputs, since education expenditure may have impacts on other inputs (Todd and Wolpin 2003).

In the model of human capital investment, households determine the optimal level of education investment under the given conditions (Becker 1962; Ben-Porath 1967). Moreover, households' human capital investment decisions would be modified when there are changes in these conditions, e.g., public education spending. Families respond to changes in education spending by varying their own input (Todd and Wolpin 2003). There has been a growing literature investigation on how different levels of education spending influenced household schooling investment (Das et al. 2013; Shi 2012; Yuan and Zhang 2015). However, there is little discussion on how different levels of education spending influenced parenting practices. The current study aims to fill this gap.

Building on the points from the theoretical analysis, this study investigated the association between parenting practices and education expenditure. Education expenditure could influence parenting practices through the following channels. First, more education expenditure could improve school quality, which in turn could reduce the burden and stress on parents, and thus parents would tend to be more patient with their children (Yamaguchi et al. 2018). Second, the provision of more educational resources could reduce households' economic burden of investing in school materials (Das et al. 2013; Shi 2012; Yuan and Zhang 2015). Furthermore, it could relieve families' financial constraints which would otherwise limit parents' ability to apply effective parenting practices (Bradley and Corwyn 2002; Doyle 2020). Third, more education expenditure could improve parents' access to relevant information and knowledge about parenting skills and parent–child interactions, for example, through lectures or seminars held by the school or other institutions. Further development of parenting skills could help parents communicate with their children more effectively (Chislett and Kennett 2007; Kim et al. 2018). Moreover, more public education expenditure could improve the welfare treatment and labor conditions for teachers. This could give teachers incentives to communicate with parents actively, for example, through home visits. This could in turn reduce the instances of adverse parenting practices (Webster-Stratton et al. 2004).

Based on (but not limited to) these channels, public education expenditure could have effects on the parenting practices. And if that is the case, the effect should be positive. I further examine this hypothesis below.

Background and Literature

Parenting Styles

Developmental psychologists inaugurated the study of parenting behavior. After several decades of development, a well-acknowledged typology and classification has been established. Baumrind (1966, 1971) initially pioneered the three categories of parenting styles: authoritative, authoritarian, and permissive. Maccoby and Martin (1983) further added the neglectful style to Baumrind's categories. Parenting practices could be classified into these four styles based on two dimensions: (1) control/demandingness and (2) warmth/responsiveness. The authoritative parent scores high on both the warmth and control dimensions, whereas the neglectful parent scores low on both. The authoritarian parent scores low on the warmth but high on the control dimension, while the permissive parent scores high on the warmth but low on the control dimension. I adopted this dimensional approach, which is widely used in developmental psychology, to assess parenting practices.

Parenting in China

The classical approach of parenting style was originally established in Western culture (Bornstein 2015) while a sample of Chinese parents, which exhibit a typical pattern of East Asian parenting, was used for this study. Thus, it was necessary and important to reconsider parenting styles in the Chinese social and cultural context. Furthermore, a vast body of literature has demonstrated that the basic structure of parenting styles, namely categories varying on different dimensions, could be applied to the Chinese sample (e.g., Chen et al. 1997; Huang and Prochner 2003; Li et al. 2010; Ng and Wang 2019; Zhou et al. 2004; Zhou et al. 2008). However, due to the difference in family structure and core values of the Chinese people compared to their Western peers, some key factors of parenting dimensions needed adjustment when assessing Chinese parent–child relationship (Chao 1994; Chao and Tseng 2002; Li et al. 2010; Ng and Wang 2019).

Traditional Chinese culture is characterized by suppression of emotions. In addition, traditional Chinese customs place great emphasis on family hierarchy and discipline. This social-cultural context generated different expressions of parental warmth from the Western way (Chao and Tseng 2002). That is, Chinese parents tend to convey parental warmth, support, and closeness for their children through control actions, such as restraint, monitoring, and discipline (Barber et al. 2005; Chao 1994, 2000; Ren et al. 2017; Supple et al. 2004; Tobin et al. 1987; Wang et al. 2007). Therefore, for Chinese parents, the warmth dimension shares similar factors with the control dimension.

In addition to the warmth dimension overlapping with the control dimension in the context of Chinese parenting, there is another key factor of the warmth dimension that needs to be identified,

namely disciplinary strategy or the nature of control (Barber 2002; Becker 1964; Ng and Wang 2019). A series of studies have regarded this factor as an *emotional tone* or a *disposition* towards the children (Darling and Steinberg 1993; Deater-Deckard 2000). The negative side of this factor involves harsh, punitive, and coercive parenting behavior and takes various forms, such as yelling, threats, ridicule, scolding, hitting, and physical punishment (Chang et al. 2003; Tolan et al. 2013; Weis and Toolis 2010). These harsh verbal and physical discipline practices could in turn lead to negative effects on the development of children (Chang et al. 2003; Chang et al. 2004; Supple et al. 2004; Xu et al. 2009).

China's Education System

China has a common cultural and institutional background across regions and an unbalanced educational resource allocation, which provides an applicable environment for investigating the research topic of this study. After the decentralization reform of the education system in the 1980s, the provision, administration, and financing of education were mainly implemented by the local government. Government appropriation is the main source of funding for the whole education system (Tsang 2002; Heckman 2005). The central government attached great importance to education investment and stipulated that government education appropriation should grow in accordance with the country's economic development. The National Medium and Long-Term Educational Reform and Development Programme (1993) set the government goal that education appropriation should be over 4% of GDP in 2012, and it led to an overall increase in the portion of education appropriation as a percentage of GDP. However, actual steps taken by each province varied across regions. Moreover, the household registration (*hukou*) system restricted people from moving freely between provinces (Heckman 2005; Wang 2011), which exacerbated the regional disparity in education.

The education system in China is divided into four levels: primary, lower secondary, upper secondary, and tertiary. The primary and lower secondary levels of education are free and compulsory. The benefit of receiving higher education has been considerably high in China (Fleisher et al. 2011; Li 2003; Zhang et al. 2005). Due to the special importance attached to higher education and the examination-oriented educational system, students in China start to prepare for the National College Entrance Examination (*gaokao*) as early as lower secondary school and even primary school.

Overall, students from different provinces are faced with different regional education finance policies. Theoretically, this should influence private human capital investment, such as parenting practices. This study offers empirical evidence in support of this theory.

Related Literature

This study is related to the literature documenting the link between the supply of educational resources and human capital decisions. Pridmore and Jere (2011) examined a large-scale school-based

program in Malawi, which used a randomized controlled design. The results showed that providing educational resources, such as a more flexible curriculum and additional learning support, significantly reduced dropout rates. Using Longitudinal data in the U.S., Herbst and Tekin (2011) found that child care subsidies significantly gave single mothers support to engage in human capital investment, such as attending school and engaging in job training programs. Handa (2002) showed that building new schools largely increased primary school enrolment rates in the rural areas of Mozambique. And simulation results indicated that raising primary school coverage rate to 79% would increase enrolment rates by 13%. Burde and Linden (2013) evaluated a program conducted in rural Afghanistan and found that access to primary school significantly increased the enrolment rates of girls and reduced the gender gap in education. Chin (2005) assessed a reform named Operation Blackboard in India and found that this reform increased the primary school completion rates particularly for girls by providing additional teachers and education equipment. As shown above, these previous studies have suggested that an increase in supply-side factors of educational resources could advance human capital investment. The current study extends the existing literature by providing evidence showing that parenting practices, another form of human capital investment, could be affected by the educational resources.

Methodology

Empirical Method

To investigate how education expenditure affects parenting behavior, I proposed the following initial model:

$$P_{ijt}^{k} = \beta_0 + \beta_1 S_{jt} + \beta_2 X_{ijt} + \theta_j + \varphi_t + \varepsilon_{ijt}^{k}, \quad (1)$$

where the outcome variable P_{ijt}^{k} is the parenting measure on dimension k of parent i in province j in wave t ($k = c$ for the control dimension and $k = w$ for the warmth dimension). Owing to the different nature of the questions related to each dimension, I constructed different types of outcome variables: P_{ijt}^{c} is the first principal component for the control related questions, while P_{ijt}^{w} is a binary indicator for harshness related questions. I employed them as the outcome variable of parenting styles accordingly.

The main explanatory variable S_{jt} is the provincial spending on education of province j in wave t, which is either in the form of a percentage of provincial GDP or education expenditure per student.

X_{ijt} represents a set of control variables that are relevant to parenting behavior, such as child, parent, household, and provincial characteristics. θ_j is the province fixed effect and φ_t represents the wave

fixed effect. All specifications used robust standard errors clustered at the county level to avoid the possibility of heteroskedasticity problems.

Controlling a series of variables might help to mitigate omitted variable bias. However, there was still concern that the OLS estimation results of equation (1) might suffer from severe endogeneity problems. For example, there could be unobserved factors that are correlated with both provincial education spending and parenting outcomes. For instance, parents who highly value their child's education might tend to live in regions with more education spending and adopt more effective parenting practices. This self-selection problem could positively bias the OLS estimation results. Furthermore, in the regions associated with less effective parenting practices, the educational outcomes of children were more likely to be poor. Therefore, to help mitigate poor educational outcomes, the government could spend more on education in regions with less effective parenting practices. This reverse causality could negatively bias the OLS estimation results. Hence, the overall OLS estimation of coefficient β_1 could be biased upward, downward, or even towards zero.

To address these issues, I employed a two-stage least squares (2SLS) estimation to overcome the potential sources of endogeneity. With this method, I used instrumental variables giving exogenous variation in provincial education expenditures to identify the effect on parenting practices. To construct the instrumental variables, I first explored the number of schools at each education level in each province, that is, the school numbers at primary, lower secondary, upper secondary, and tertiary levels of education.

A valid instrumental variable is required to be relevant to the explanatory variable and exogenous to the outcome variable. In the context of this study, the instrumental variable must have an impact on parenting practices only through its effect on education spending. Rather than using the current school numbers per capita as an instrument, I constructed a series of lagged ratios between school numbers of different levels (*lagged school ratio* hereafter): $\frac{N_{j,t-1}^{lower\ secondary}}{N_{j,t-1}^{primary}}$, $\frac{N_{j,t-1}^{upper\ secondary}}{N_{j,t-1}^{primary}}$, and $\frac{N_{j,t-1}^{tertiary}}{N_{j,t-1}^{primary}}$. $N_{j,t-1}^{m}$ represents the number of schools in province j in the prior year $(t-1)$, where m denotes the education level (primary, lower secondary, upper secondary, or tertiary).

I employed the combinations of these lagged school ratios as the instruments for the endogenous explanatory variable to identify the effect. The first stage of the 2SLS approach is given as

$$S_{jt} = \alpha_0 + \alpha_1 R_{j,t-1}^{m} + \alpha_2 X_{ijt} + \theta_j + \varphi_t + \xi_{ijt}, \quad (2)$$

where $R_{j,t-1}^{m}$ is the lagged school ratio.

Data and Sample

This study employed pooled cross-sectional data from the China Family Panel Studies (CFPS). The CFPS is a nationally representative survey launched in 2010, and the follow-up surveys were conducted every other year. The CFPS baseline sample in 2010 covered 25 (out of 34) provincial administrative regions, interviewing a total of 14,960 households and 42,590 individuals. CFPS implemented Probability-Proportional-to-Size Sampling with implicit stratification. It took administrative units and socioeconomic status as the main stratification variables. A three-stage sampling design was employed. The primary sampling units were counties, the second-stage sampling units were neighborhood communities, and the third-stage sampling units were households.[1] The random sampling design and large sample size of CFPS assured the quality of data and enabled this study to make reliable estimations.

The survey consisted of community, family, and individual questionnaires, which provided plentiful information on the respondents' demographic, economic, and psychological characteristics. More importantly, for the purpose of this study, the CFPS contained a child questionnaire regarding the respondents' parenting behavior, which was our main outcome of interest.

The child questionnaire asked questions of parents whose children were aged from 6 to 15 years about their daily parenting behavior. The questions on daily parenting behavior were filled by the adult family member who was the child's primary caregiver. The unit of analysis of this study was the parent–child dyad. However, the data for children, adults, and households was provided separately. Using personal identifiers and household identifiers, I could link the parent, the child, and their family background together in several steps outlined below. First, I restricted the sample to the children whose primary caregiver filled the daily parenting behavior questions. In the second step, by using the caregivers' personal identifiers, I linked the data from the first stage to the data of the adults. In this step, I further restricted the sample to the children whose caregiver's individual information was available. Moreover, I linked the combined data from the steps described above to their respective household information. In addition, because the questions on daily parenting practices were in the context of school-related scenarios, I deleted children who dropped out of school from the sample. Since the personal identifiers were missing for the 2012 wave, the final sample employed data from the waves for 2010, 2014, and 2016.

The CFPS is longitudinal data in nature, with the child questionnaire covering a 9-year period. In China, students begin primary school at the age of 6 years and lower secondary school at the age of 12 years. Hence, our sample included all child questionnaire respondents (the primary caregivers)

[1] For the details of the CFPS sampling design, see Xie et al. (2017).

whose children were primary or lower secondary school students. Our final sample consisted of 24,458 observations for 13,656 children, and each child was observed a maximum of three times. Additionally, in the final sample of this study, 66.71% of the primary caregivers were female and 33.29% were male.

Measures

It has been previously shown that parenting practices are associated with children's cognitive and non-cognitive development. This study assessed the parenting on children's cognitive development and focused on education-related parenting practices. Hence, I constructed outcome variables based on the questions from the CFPS related to schools, such as scholastic performance and homework.

Moreover, as discussed in the former section, parenting practices in the Chinese social and cultural context exhibit characteristic patterns. On one hand, there is overlapping part between the control dimension and the warmth dimension. On the other, there is a factor of the warmth dimension with regard to harsh, punitive, and coercive parenting behavior that needs to be identified. Given the consideration of these characteristics of parenting in China, I assessed parenting practices as follows.

First, for the overlap part (the control hereafter) of the control and warmth dimension, I used the following questions to address parents' involvement in their children's daily life and school work. (1) How often have you discussed what happens at school with your child since this semester started/last semester? (2) How often did you ask the child to finish homework? (3) How often did you check the child's homework? (4) How often did you restrict the child from watching TV? (5) How often did you restrict the types of TV programs the child could watch? The respondents were then asked to answer each question according to the actual situation last year. The available answers to the five questions listed above were as follows: very often (6–7 times a week), often (2–3 times a week), sometimes (1–2 times a week), rarely (once a month), or never. These questions were all related to parents' caring, control, monitoring, and demandingness about their children's study and life, and enabled us to assess parents' level of involvement and monitoring. I conducted a principal component analysis based on these five questions and employed the first component as the measure of the control outcome. The results of the principal component analysis are reported in the Appendix. The first component, with eigenvalues larger than one, loaded highly on all five questions and gauged parents' demandingness and control over their children's daily life.

Second, I measured the harsh, punitive, and coercive parenting behavior (the harshness hereafter) based on the following question: If your child brings back a transcript with a score below your expectation, what is your most common solution? The possible options were as follows: contact the teacher, physical punishment, scold the child, ask the child to study harder, restrict the child's activities, and help the child more. Physical punishment and scolding were most closely associated with the

harsh parenting style, which was the opposite of warmth. The option *ask the child to study harder* was ambiguous since I could not directly tell the parent's attitude and for that specific reason, I excluded parents who answered it from the sample. After recording all the answers, I constructed a binary harshness indicator by labeling the indicator 1 if the respondent reported physical punishment or scolding the child, and 0 if the answer was any of the other options.

I employed two measures as the explanatory variable, i.e., the provincial education expenditure as a percentage of GDP and the provincial education expenditure per student. This education expenditure data was obtained from the *China Statistical Yearbook*.

As discussed in the former section, to address the endogeneity issue, the lagged school ratios were employed as instrumental variables. The data on school numbers at each education level in different regions was further obtained from the National Bureau of Statistics of China.

Control Variables

I controlled for the background characteristics at the individual, family, and provincial levels. For the individual characteristics, I controlled for the child's age and gender and added an urban dummy, which indicated the child's household registration (*hukou*). I controlled for the parent's age, gender, and years of schooling. For the family background characteristics, I controlled for the log of family net income per capita. I also included the log of provincial GDP per capita to control for the development level. The individual and household data was collected from the CFPS and the provincial GDP per capita data was obtained from the National Bureau of Statistics of China.

Empirical Results

Instrumental Variable Estimation

I constructed three lagged school ratios and incorporated four different combinations of them as instruments for the endogenous explanatory variable education spending. The four specifications with these four combinations are presented in columns 1–4. Column 1 includes all lagged school ratios, while columns 2 and 3 include two of them as the instrumental variables. Column 4 only includes the tertiary/primary ratio. All estimations include control variables such as child's characteristics (age, gender, and the urban dummy), parent characteristics (age, gender, and schooling years), household characteristic (log of family net income per capita), log of provincial GDP per capita, as well as province and wave fixed effects.

The results of the 2SLS estimations with the different combinations of lagged school ratios used as instruments are shown in Tables 1 and 2. Both tables showed that parenting practices were significantly associated with the instrumented endogenous explanatory variable education spending (except for

column 4 of panel B). In Table 1, the control parenting practice was positively associated with education spending. In other words, in regions with a higher fraction of education investment in terms of GDP or higher education spending per student, parents were more likely to adopt control parenting practices with their children. In Table 2, harsh parenting practices were negatively associated with education expenditure. In other words, in regions with a lower fraction of education investment in terms of GDP or lower education spending per student, parents were more likely to adopt harsh parenting practices, such as physical punishment and scolding.

<Table 1>

<Table 2>

The bottom of panels A and B in Tables 1 and 2 present the results of various tests for the quality of the instruments. The p-value of Kleibergen-Paap underidentification test suggests that the null hypothesis, which states that instruments are uncorrelated with the endogenous explanatory variable (except for column 4 of panel B), can be rejected. The Cragg-Donald Wald F statistic was used for the weak identification test, and the results suggested that the instruments were jointly strong. The evidence presented above provided support that the relevance requirement is being satisfied by the instruments used in columns 1– 3.

The other key assumption is the exogeneity of instruments. In the overidentification test in Tables 1 and 2, the p-value of the Hansen J statistic indicated that I could not reject that there was no correlation between the instruments and the error term, and therefore the exogeneity requirement was satisfied. In this study, an exogenous instrument implies that the instrument has no impact on parenting practices other than via its impact on the endogenous explanatory variable education expenditure. To provide further suggestive evidence for the exogeneity of instruments, I followed the methodology of Acemoglu et al. (2001) and tested whether the lagged school ratio had any effect on parenting practices by adding each one of them as an exogenous regressor into the 2SLS estimation. The results are shown in Tables 3 and 4. The insignificant coefficients of the lagged school ratio imply that I could not reject that this variable had no direct impact on the outcome variables. In other words, the lagged school ratio influenced parenting practices only via education spending.

<Table 3>

<Table 4>

When comparing the estimation and test results of columns 1– 4 in Tables 1 and 2, I noticed that the results in columns 1– 3 were similar and stable, while column 4 of panel B showed a different pattern where the standard error was larger and some of the R-square was negative. Based on the estimation results and tests for quality of instruments, I infer that the results in column 4 were

potentially caused by the weak instrumental variable. Therefore, in Tables 1 and 2, I prefer the estimations in columns 1– 3 where valid and strong instrumental variables are employed.

Thus far, I have shown how education spending affects parenting practices on two dimensions. More investment in education had a significant effect on both control and harsh parenting. In general, authoritative parenting tended to emerge in environments with higher education spending. This result was consistent with the hypothesis of this study.

Robustness Checks

To further confirm the robustness of the estimation results for the two measures of the explanatory variable, namely the provincial education expenditure as a percentage of GDP and the provincial education expenditure per student, I included the two variables into the same model specification. Table 5 presents the results. As shown in Table 5, the signs of the coefficients of both variables were similar to those in Tables 1 and 2. However, only the coefficients of the provincial education expenditure per student in columns 1 and 2 remained statistically significant, indicating that the result of provincial education expenditure per student was more robust in comparison with that of provincial education expenditure as a percentage of GDP. In this sense, provincial education expenditure per student could explain parenting practices better than provincial education expenditure as a percentage of GDP.

What is more, the results of provincial education expenditure per student in columns 1 and 2 of Table 5 were robust and significant. Together with the baseline estimation results in Tables 1 and 2, it suggested that the instrumental variables used in columns 1 and 2 were preferred.

<Table 5>

A concern with the estimation results was the gender combinations of the parent–child dyad. The parent–child dyads where the parent and the child were of the same gender (i.e., father-son or mother-daughter) and of different genders (i.e., father-daughter or mother-son) might exhibit different parenting styles. To check the robustness, I added a same-gender dummy variable (=1 for father-son or mother-daughter dyad) to the baseline estimations. In the sample of this study, 50.67% of the parent−child dyads were of the same gender. I reported the results with the same-gender dummy of the parent−child dyad in Tables 6 and 7. As shown by the tables, the results remained stable and robust.

<Table 6>

<Table 7>

Discussions and Conclusions

In this study, I investigated how education finance policies affected parenting practices using pooled

cross-sectional data from most Chinese provinces. I examined the effect on two dimensions based on the approach of developmental psychology. The results indicated that (1) control/demanding parenting practices were positively associated with education spending, and (2) harsh parenting practices were negatively associated with education spending. Overall, based on the classical categories of parenting styles, parents in environments with greater education spending were more likely to be authoritative. These results are consistent with the theoretical hypothesis based on the human capital model. The positive association between the inputs of human capital production (i.e., education expenditure and parenting practices) was tested. These results are also consistent with the literature that considered parenting practices as an investment in human capital and showed that such practices are affected by socioeconomic conditions (Attanasio et al. 2020; Cunha and Heckman 2008; Leibowitz 1974).

The significant importance of education expenditure in improving educational attainments has been extensively examined in the past. Most of the academic literature on the subject has suggested that the effect of education expenditure on educational attainments was driven by schools. The results of this study suggest that, besides schools, the family is another essential channel through which education expenditure could contribute to children's cognitive development. As shown in this study, higher education expenditure facilitated the adoption of more effective parenting practices. Meanwhile, parenting practices were shown to play an important role in children's development and later achievements. In this context, the positive effect of increasing education expenditure spills over from schools to families.

The findings of this study have important policy implications. First, this study underlines the notable efficiency of increasing education expenditure since higher investment in education has been shown to have both a direct effect on educational outcomes via schools, and also contributes to a spillover effect on parenting practices. Developing countries are confronted with insufficient educational investment and relatively low levels of educational attainments. Raising education expenditure could be an effective way to amend this situation. Second, it is noteworthy that the determinants of parenting behavior are not only found inside the family but also external factors, even at the macro level, can contribute to parental practices. In this sense, policymakers who aim at preventing negative parenting behavior, such as physical punishment, should not ignore the influence of different socioeconomic conditions. Moreover, as discussed in the previous section, only the coefficients of provincial education expenditure per student remained statistically significant when including both measures of the explanatory variable. It implies that, relative to the share of GDP, the effect of provincial education expenditure per student plays a more significant role in improving parenting practices. In this context, to further enhance child development and family well-being, sufficient attention should be paid to how

much each student can benefit rather than the total amount of education expenditure. Third, this study also provides evidence for regional disparity of education expenditure and parenting practices on the provincial level, which are important sources of social mobility and equality. The results of this study suggest that policies aiming at improving social mobility and equality could look for ways to close the regional gap of education expenditure.

This study makes the following contributions to existing literature. First, this study contributes to the limited economic literature that directly analyses parenting and its predictors. Doepke and Zilibotti (2017) found that inequality could be an influential factor for the declining authoritarian parenting in Western countries in recent years. Cobb-Clark et al. (2019) showed that socioeconomic disadvantage was a key factor in making parents choose less effective parenting styles. The present study extends these findings by providing supporting evidence that education expenditure could affect parenting choices. Moreover, this study is among the few studies to demonstrate the effect of the educational system on parenting investment. Doepke and Zilibotti (2017) further discussed the returns to tertiary education and parenting styles in developed countries. However, the education system in developing countries presents a different story. Second, this study contributes to the literature that explains the effect of educational resources on educational attainments. Previous studies focused on the direct impact of increasing educational investment. The findings of this study suggest that there is an indirect effect through which educational resources could affect educational outcomes. And this indirect effect via parenting practices may alter the estimations based on direct impact. Further, the present study contributes to the literature on the unbalanced distribution of educational resources and its effect by providing empirical results from the perspective of human capital investment.

There are several limitations to this study. First, although several individual and household characteristics from the current database were controlled for this study, more detailed control variables could be included. Furthermore, this study did not consider the household residency place type (a major city, a small city, or a village), and its potential influence on the parenting practices. Second, this study pooled the rural and urban areas to provide a general picture of the link between education expenditure and parenting practices. However, the gap of educational resources between the rural and urban areas is large in China. Further analysis on the rural and urban separately and the rural-urban gap is necessary and important for the topic of this study. Third, although this study controlled the child's gender, parent's gender, and included a same-gender dummy in its estimations, further studies require more detailed investigation on the impact of the gender, since the gender combinations of a parent–child dyad play an important role in the expression of parenting styles. Fourth, the current study used a survey where parents filled the questionnaire by themselves and thus provided only their

own viewpoint. However, a different survey outcome might emerge if the perception of children about their parents' attitude is taken into account. For this reason, a measure of parenting styles that incorporates a questionnaire adjusted for child perception would further enrich the study. I intend to tackle precisely these issues in future studies.

More work remains for the future research. The current study focuses on the effect of unbalanced education spending on parenting practices. There could be several more channels through which material resources could have effects on parenting styles. As the literature on human capital development shows, parenting practices represent a key factor in determining children's development and later life outcomes. How unbalanced educational resources affect human capital formation and children's achievement through parenting practices and its role in intergenerational mobility are also interesting potential topics for future research.

Appendix

See Table 8

<Table 8>

References

Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review*, 91(5), 1369 − 1401. https://doi.org/10.1257/aer.91.5.1369.

Attanasio, O., Cattan, S., Fitzsimons, E., Meghir, C., & Rubio-Codina, M. (2020). Estimating the production function for human capital: Results from a randomized control trial in Colombia. *American Economic Review*, 110 (1): 48−85. https://doi.org/10.1257/aer.20150183.

Bailey, J. A., Hill, K. G., Oesterle, S., & Hawkins, J. D. (2009). Parenting practices and problem behavior across three generations: Monitoring, harsh discipline, and drug use in the intergenerational transmission of externalizing behavior. *Developmental Psychology*, 45(5), 1214–1226. https://doi.org/10.1037/a0016129.

Barber, B.K. (2002). *Intrusive Parenting: How Psychological Control Affects Children and Adolescents*. Washington, DC: American Psychological Association.

Barber, B.K., Stoltz, H.E., & Olsen, J.A. (2005). Parental support, psychological control, and behavioural control. *Monographs of the Society for Research in Child Development*, 70(4), 1−147. https://www.jstor.org/stable/3701442.

Barnes, G. M., Reifman, A. S., Farrell, M. P., & Dintcheff, B. A. (2000). The effects of parenting on the development of adolescent alcohol misuse: a Six-Wave latent growth model. *Journal of Marriage and Family*, 62(1), 175−186. https://doi.org/10.1111/j.1741-3737.2000.00175.x.

Baumrind, D. (1966). Effects of authoritative parental control on child behavior. *Child Development*, 37(4), 887−907. https://doi.org/10.2307/1126611.

Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology*, 4(1), 1−103. https://doi.org/10.1037/h0030372.

Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5), 9–49. https://doi.org/10.1086/258724.

Becker, G.S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. National Bureau of Economic Research, New York. Distributed by Columbia University Press.

Becker, G. S. (1965). A Theory of the Allocation of Time. *The Economic Journal*, 75(99), 493−517. https://www.jstor.org/stable/2228949.

Becker, G. S. (1991). *A Treatise on the Family*. Harvard university press.

Becker, G. S. (1993). Nobel lecture: The economic way of looking at behavior. *Journal of Political*

Economy, 101(3), 385–409. https://doi.org/10.1086/261880.

Becker, W. C. (1964). Consequences of different kinds of parental discipline. In M. L. Hoffman & L. W. Hoffman (Eds.), *Review of Child Development Research* (Vol. 1; pp. 169–208). New York: Russell Sage Foundation.

Ben-Porath, Y. (1967). The production of human capital and the life cycle of earnings. *Journal of Political Economy*, 75(4), 352-365. https://doi.org/10.1086/259291.

Bono, E. D., Francesconi, M., Kelly, Y., & Sacker, A. (2016). Early maternal time investment and early child outcomes. *The Economic Journal*, 126(596), 96–135. https://doi.org/10.1111/ecoj.12342.

Bornstein, M. H. (2002). *Handbook of Parenting: Vol. 4 Social Conditions and Applied Parenting (3rd ed.)*. Mahwah, NJ: Lawrence Erlbaum Associates.

Bornstein, M.H. (2015). Children's parents. In M.H. Bornstein, T. Leventhal, and R.M. Lerner (Eds.), *Handbook of Child Psychology and Developmental Science: Ecological Settings and Processes* (pp. 554–132). Hoboken, NJ: John Wiley & Sons.

Bornstein, M. H. (2019). *Handbook of Parenting: Vol. 4 Social Conditions and Applied Parenting (3rd ed.)*. New York: Routledge.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, 53(1), 371-399. https://doi.org/10.1146/annurev.psych.53.100901.135233.

Brown, L., & Iyengar, S. (2008). Parenting styles: The impact on student achievement. *Marriage & Family Review*, 43(1-2), 14–38. https://doi.org/10.1080/01494920802010140.

Burde, D., & Linden, L. L. (2013). Bringing education to Afghan girls: A randomized controlled trial of village-based schools. *American Economic Journal: Applied Economics*, 5(3), 27-40. https://doi.org/10.1257/app.5.3.2.

Chang, L., Lansford, J.E., Schwartz, D., & Farver, J.M. (2004). Marital quality, maternal depressed affect, harsh parenting, and child externalising in Hong Kong Chinese families. *International Journal of Behavioral Development*, 28(4), 311–318. https://doi.org/10.1080/01650250344000523.

Chang, L., Schwartz, D., Dodge, K.A., & McBride-Chang, C. (2003). Harsh parenting in relation to child emotion regulation and aggression. *Journal of Family Psychology*, 17(4), 598 – 606. https://doi.org/10.1037/0893-3200.17.4.598.

Chao, R.K. (1994). Beyond parental control and authoritarian parenting style: Understanding Chinese parenting through the cultural notion of training. *Child Development*, 65(4), 1111 – 1119. https://doi.org/10.1111/j.1467-8624.1994.tb00806.x.

Chao, R.K. (2000). Cultural explanations for the role of parenting in the school success of Asian-American children. In R.D. Taylor and M.C. Wang (Eds.), *Resilience across Contexts: Family, Work,*

Culture, and Community (pp. 333–363). Mahwah, NJ: Lawrence Erlbaum Associates.

Chao, R.K., & Tseng, V. (2002). Parenting of Asians. In M.H. Bornstein (Ed.), *Handbook of Parenting: Vol. 4. Social Conditions and Applied Parenting* (2nd ed., pp. 59−93). Mahwah, NJ: Lawrence Erlbaum Associates.

Chassin, L., Presson, C. C., Todd, M., Rose, J. S., & Sherman, S. J. (1998). Maternal socialization of adolescent smoking: The intergenerational transmission of parenting and smoking. *Developmental Psychology*, 34(6), 1189–1201. https://doi.org/10.1037/0012-1649.34.6.1189.

Chen, X., Dong, Q., & Zhou, H. (1997). Authoritative and authoritarian parenting practices and social and school performance in Chinese children. *International Journal of Behavioral Development*, 21(4), 855−873. https://doi.org/10.1080/016502597384703.

Chin, A. (2005). Can redistributing teachers across schools raise educational attainment? Evidence from Operation Blackboard in India. *Journal of Development Economics*, 78(2), 384-405. https://doi.org/10.1016/j.jdeveco.2004.09.004.

Chislett, G., & Kennett, D. J. (2007). The effects of the Nobody's Perfect program on parenting resourcefulness and competency. *Journal of Child and Family Studies*, 16(4), 473 − 482. https://doi.org/10.1007/s10826-006-9098-x.

Cobb-Clark, D. A., Salamanca, N., & Zhu, A. (2019). Parenting style as an investment in human development. *Journal of Population Economics*, 32(4), 1315−1352. https://doi.org/10.1007/s00148-018-0703-2.

Cunha, F. (2015). Subjective rationality, parenting styles, and investments in children. I*n Families in an Era of Increasing Inequality* (pp. 83−94). Springer, Cham.

Cunha, F., & Heckman, J. J. (2008). Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation. *Journal of Human Resources*, 43(4), 738 − 782. https://doi.org/10.3368/jhr.43.4.738.

Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin*, 113 (3), 487−496. https://doi.org/10.1037/0033-2909.113.3.487.

Das, J., Dercon, S., Habyarimana, J., Krishnan, P., Muralidharan, K., & Sundararaman, V. (2013). School inputs, household substitution, and test scores. *American Economic Journal: Applied Economics*, 5(2), https://doi.org/29-57. 10.1257/app.5.2.29.

Deater-Deckard, K. (2000). Parenting and child behavioral adjustment in early childhood: A quantitative genetic approach to studying family processes. *Child Development*, 71(2), 468−484. https://doi.org/10.1111/1467-8624.00158.

Denham, S.A., Workman, E., Cole, P.M., Weissbrod, C., Kendziora, K.T., & ZahnWaxler, C. (2000)

Prediction of externalizing behaviour problems from early to middle childhood: the role of parental socialisation and emotion expression. *Development and Psychopathology*, 12(1), 23 − 45. https://doi.org/10.1017/S0954579400001024.

Dishion, T. J. (1990). The family ecology of boys' peer relations in middle childhood. *Child Development*, 61(3), 874-892. https://doi.org/10.1111/j.1467-8624.1990.tb02829.x.

Doepke, M., & Zilibotti, F. (2017). Parenting with style: Altruism and paternalism in intergenerational preference transmission. *Econometrica*, 85(5), 1331−1371. https://doi.org/10.3982/ECTA14634.

Doepke, M., & Zilibotti, F. (2019). *Love, Money, and Parenting: How Economics Explains the Way We Raise Our Kids*. Princeton, New Jersey: Princeton University Press.

Doyle, O. (2020). The first 2,000 days and child skills. *Journal of Political Economy*, 128(6), 2067-2122. https://doi.org/10.1086/705707.

Ermisch, J. (2008). Origins of social immobility and inequality: parenting and early child development. *National Institute Economic Review*, 205(1), 62−71. https://doi.org/10.1177/0027950108096589.

Fiorini, M., & Keane, M.P., (2014). How the allocation of children's time affects cognitive and non-cognitive development. *Journal of Labor Economics*, 32 (4), 787−836. https://doi.org/10.1086/677232.

Fleisher, B. M., Hu, Y., Li, H., & Kim, S. (2011). Economic transition, higher education and worker productivity in China. *Journal of Development Economics*, 94(1), 86–94. https://doi.org/10.1016/j.jdeveco.2010.01.001.

Guryan, J., Hurst, E., & Kearney, M. (2008). Parental education and parental time with children. *Journal of Economic Perspectives*, 22(3), 23−46. https://doi.org/10.1257/jep.22.3.23.

Handa, S. (2002). Raising primary school enrolment in developing countries: The relative importance of supply and demand. *Journal of Development Economics*, 69(1), 103-128. https://doi.org/10.1016/S0304-3878(02)00055-X.

Heckman, J. J. (2005). China's human capital investment. *China Economic Review*, 16(1), 50−70. https://doi.org/10.1016/j.chieco.2004.06.012.

Herbst, C. M., & Tekin, E. (2011). Do child care subsidies influence single mothers' decision to invest in human capital? *Economics of Education Review*, 30(5), 901-912. https://doi.org/10.1016/j.econedurev.2011.03.006.

Houtenville, A. J., & Conway, K. S. (2008). Parental effort, school resources, and student achievement. *Journal of Human Resources*, 43(2), 437-453. https://doi.org/0.3368/jhr.43.2.437.

Huang, J., & Prochner, L. (2003). Chinese parenting styles and children's self-regulated learning.

Journal of Research in Childhood Education, 18(3), 227–238. https://doi.org/10.1080/02568540409595037.

Kim, J. H., Schulz, W., Zimmermann, T., & Hahlweg, K. (2018). Parent–child interactions and child outcomes: Evidence from randomized intervention. *Labour Economics*, 54, 152 – 171. https://doi.org/10.1016/j.labeco.2018.08.003.

Laible, D. J., & Thompson, R. A. (1998). Attachment and emotional understanding in preschool children. *Developmental Psychology*, 34(5), 1038–1045. https://doi.org/10.1037/0012-1649.34.5.1038.

Leibowitz, A. (1974). Home investments in children. *Journal of Political Economy*, 82(2), S111–S131. https://doi.org/10.1086/260295.

Li, H. (2003). Economic transition and returns to education in China. *Economics of Education Review*, 22(3), 317–328. https://doi.org/10.1016/S0272-7757(02)00056-0.

Li, Y., Costanzo, P. R., & Putallaz, M. (2010). Maternal socialization goals, parenting styles, and social-emotional adjustment among Chinese and European American young adults: Testing a mediation model. *The Journal of Genetic Psychology*, 171(4), 330 – 362. https://doi.org/10.1080/00221325.2010.505969.

Lundberg, S., & Pollak, R. A. (2007). The American family and family economics. *Journal of Economic Perspectives*, 21(2), 3–26. https://doi.org/10.1257/jep.21.2.3.

Maccoby, E. E., & Martin, J. A. (1983). Parent-child interaction. P. H. In Mussen & E. M. Hetherington (Ed.), *Handbook of Child Psychology: Vol. 4. Socialization, Personality and Social Development* (4th ed., pp. 1-101). Chichester, New York: Wiley.

Masud, H., Thurasamy, R., & Ahmad, M. S. (2015). Parenting styles and academic achievement of young adolescents: A systematic literature review. *Quality & Quantity*, 49(6), 2411 – 2433. https://doi.org/10.1007/s11135-014-0120-x.

McLeod, B. D., Weisz, J. R., & Wood, J. J. (2007). Examining the association between parenting and childhood depression: A meta-analysis. *Clinical Psychology Review*, 27(8), 986-1003. https://doi.org/10.1016/j.cpr.2007.03.001.

Michael, R. T., & Becker, G. S. (1973). On the new theory of consumer behavior. *The Swedish Journal of Economics*, 75(4), 378–396. https://www.jstor.org/stable/3439147.

Ng, F. F. Y., & Wang, Q. (2019). Asian and Asian American parenting. In M. H. Bornstein (Ed.), *Handbook of Parenting: Vol. 4. Social Conditions and Applied Parenting* (3rd ed., pp. 108–169). New York: Routledge.

O'Connor, T. G., & Scott, S. (2007). *Parenting and Outcomes for Children*. Joseph Rowntree

Foundation.

Pinquart, M. (2016). Associations of parenting styles and dimensions with academic achievement in children and adolescents: A meta-analysis. *Educational Psychology Review*, 28(3), 475−493. https://doi.org/10.1007/s10648-015-9338-y.

Pridmore, P., & Jere, C. (2011). Disrupting patterns of educational inequality and disadvantage in Malawi. *Compare: A Journal of Comparative and International Education*, 41(4), 513-531. https://doi.org/10.1080/03057925.2011.581518.

Ren, F., Li., Y., & Zhang, J. (2017). Perceived parental control and Chinese middle school adolescents' creativity: The mediating role of autonomous motivation. *Psychology of Aesthetics, Creativity, and the Arts*, 11(1), 34–42. https://doi.org/10.1037/aca0000078.

Schmidt, S. E., Liddle, H. A., & Dakof, G. A. (1996). Changes in parenting practices and adolescent drug abuse during multidimensional family therapy. *Journal of Family Psychology*, 10(1), 12–27. https://doi.org/10.1037/0893-3200.10.1.12.

Shi, X. (2012). Does an intra-household flypaper effect exist? Evidence from the educational fee reduction reform in rural China. *Journal of Development Economics*, 99(2), 459-473. https://doi.org/10.1016/j.jdeveco.2012.05.006.

Spera, C. (2006). Adolescents' perceptions of parental goals, practices, and styles in relation to their motivation and achievement. *The Journal of Early Adolescence*, 26(4), 456 − 490. https://doi.org/10.1177/0272431606291940.

Supple, A.J., Peterson, G.W., & Bush, K.R. (2004). Assessing the validity of parenting measures in a sample of Chinese adolescents. *Journal of Family Psychology*, 18(3), 539 − 544. https://doi.org/10.1037/0893-3200.18.3.539.

Tobin, J., Wu, D. Y. H., & Davidson, D. (1987). *Preschool in three cultures*. New Haven, CT: Yale University Press.

Todd, P. E., & Wolpin, K. I. (2003). On the specification and estimation of the production function for cognitive achievement. *The Economic Journal*, 113(485), F3-F33. https://doi.org/10.1111/1468-0297.00097.

Tolan, P. H., Dodge, K., & Rutter, M. (2013). Tracking the multiple pathways of parent and family influence on disruptive behavior disorders. In *Disruptive Behavior Disorders* (pp. 161−191). Springer, New York, NY.

Tsang, M. C. (2002). Intergovernmental grants and the financing of compulsory education in China. *Harvard China Review*, 3(2), 15–20. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.562.4185&rep=rep1&type=pdf.

Accessed 30 June 2020.

Wang, L. (2011). Social Exclusion and Inequality in Higher Education in China: A Capability Perspective. *International Journal of Educational Development*, 31 (3): 277 – 286. https://doi.org/10.1016/j.ijedudev.2010.08.002.

Wang, Q., Pomerantz, E.M., & Chen, H. (2007). The role of parents' control in early adolescents' psychological functioning: A longitudinal investigation in the United States and China. *Child Development*, 78(5), 1592−1610. https://doi.org/10.1111/j.1467-8624.2007.01085.x.

Webster-Stratton, C., Reid, M. J., & Hammond, M. (2004). Treating children with early-onset conduct problems: Intervention outcomes for parent, child, and teacher training. *Journal of Clinical Child and Adolescent Psychology*, 33(1), 105−124. https://doi.org/10.1207/S15374424JCCP3301_11.

Weinberg, B. A. (2001). An incentive model of the effect of parental income on children. *Journal of Political Economy*, 109(2), 266−280. https://doi.org/10.1086/319556.

Weis, R., & Toolis, E. E. (2010). Parenting across cultural contexts in the USA: Assessing parenting behaviour in an ethnically and socioeconomically diverse sample. *Early Child Development and Care*, 180(7), 849−867. https://doi.org/10.1080/03004430802472083.

Wood, J. J., McLeod, B. D., Sigman, M., Hwang, W. C., & Chu, B. C. (2003). Parenting and childhood anxiety: Theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry*, 44(1), 134−151. https://doi.org/10.1111/1469-7610.00106.

Xie, Y., Zhang, X., Tu, P., Ren, Q., Sun, Y., Lv, P., Ding, H., Hu, J., & Wu, Q. (2017) China Family Panel Studies User's Manual (3rd edition). http://www.isss.pku.edu.cn/cfps/docs/20180928161838082277.pdf. Accessed 30 June 2020.

Xu, Y., Zhang, Z., & Farver, J.A.M. (2009). Temperament, harsh and indulgent parenting, and Chinese children's proactive and reactive aggression. *Child Development*, 80(1), 244 – 258. https://doi.org/10.1111/j.1467-8624.2008.01257.x.

Yamaguchi, S., Asai, Y., & Kambayashi, R. (2018). How does early childcare enrollment affect children, parents, and their interactions? *Labour Economics*, 55, 56 – 71. https://doi.org/10.1016/j.labeco.2018.08.006.

Yuan, C., & Zhang, L. (2015). Public education spending and private substitution in urban China. *Journal of Development Economics*, 115, 124-139. https://doi.org/10.1016/j.jdeveco.2015.02.006.

Zhang, J., Zhao, Y., Park, A., & Song, X. (2005). Economic returns to schooling in urban China, 1988 to 2001. *Journal of Comparative Economics*, 33(4), 730−752. https://doi.org/10.1016/j.jce.2005.05.008.

Zhang, L., & Ikeda, S. (2016). Welfare-enhancing parental altruism and children's habit formation.

International Review of Economics, 63(3), 281−303. https://doi.org/10.1007/s12232-016-0255-2.

Zhou, Q., Eisenberg, N., Wang, Y., & Reiser, M. (2004). Chinese children's effortful control and dispositional anger/frustration: Relations to parenting styles and children's social functioning. *Developmental Psychology*, 40(3), 352−366. https://doi.org/10.1037/0012-1649.40.3.352.

Zhou, Q., Wang, Y., Eisenberg, N., Wolchik, S., Tein, J-Y., & Deng, X. (2008). Relations of parenting and temperament to Chinese children's experience of negative life events, coping efficacy, and externalizing problems. *Child Development*, 79(3), 493 − 513. https://doi.org/10.1111/j.1467-8624.2008.01139.x.

Table 1 2SLS estimation: the effect of education spending on control parenting practices

Panel A Instrumented explanatory variable: provincial education spending % of GDP

	(1)	(2)	(3)	(4)
Provincial education spending % of GDP	3.979***	3.941***	3.700**	3.239*
	(0.958)	(0.953)	(1.195)	(1.474)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	12867	12867	12867	12867
R-squared	0.094	0.095	0.096	0.099
Kleibergen-Paap P-val	0.000	0.000	0.000	0.000
Cragg-Donald Wald F-stat	894.891	1302.642	1185.787	1921.436
Hansen J Overidentification P-val	0.770	0.537	0.466	

Panel B Instrumented explanatory variable: provincial education spending per student

	(1)	(2)	(3)	(4)
Provincial education spending per student	3.051*	3.020*	4.488*	15.876
	(1.487)	(1.500)	(1.958)	(19.166)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	12867	12867	12867	12867
R-squared	0.093	0.094	0.079	-0.205
Kleibergen-Paap P-val	0.000	0.000	0.014	0.350
Cragg-Donald Wald F-stat	761.739	1139.263	360.882	48.411
Hansen J Overidentification P-val	0.327	0.140	0.208	

Note: All columns include control variables such as child's characteristics (age, gender, and urban dummy), parent's characteristics (age, gender, and years of schooling), household characteristic (log of family net income per capita), log of provincial GDP per capita, as well as province and wave fixed effects. The dependent variable is the first component of control outcome. The instrumented explanatory variable is provincial education spending as percentage of provincial GDP in Panel A and provincial education spending per student in Panel B. The variables *Tertiary/Primary*, *Upper secondary/Primary*, and *Lower secondary/Primary* represent lagged school ratios used as instrumental variables (IV) in columns 1－4. Robust standard errors (in parentheses) are clustered at the county level.

† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 2 2SLS estimation: the effect of education spending on harsh parenting practices

Panel A Instrumented explanatory variable: provincial education spending % of GDP

	(1)	(2)	(3)	(4)
Provincial education spending % of GDP	-1.571*	-1.559*	-1.568*	-1.531*
	(0.622)	(0.626)	(0.673)	(0.739)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	4596	4596	4596	4596
R-squared	0.147	0.147	0.147	0.147
Kleibergen-Paap P-val	0.000	0.000	0.000	0.000
Cragg-Donald Wald F-stat	273.505	397.602	384.112	664.648
Hansen J Overidentification P-val	0.986	0.929	0.868	

Panel B Instrumented explanatory variable: provincial education spending per student

	(1)	(2)	(3)	(4)
Provincial education spending per student	-0.942 †	-0.926 †	-1.714 †	-4.275
	(0.553)	(0.555)	(0.974)	(3.864)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	4596	4596	4596	4596
R-squared	0.147	0.147	0.123	-0.052
Kleibergen-Paap P-val	0.000	0.000	0.011	0.131
Cragg-Donald Wald F-stat	230.564	344.047	125.357	52.517
Hansen J Overidentification P-val	0.306	0.127	0.239	

Note: All columns include control variables such as child's characteristics (age, gender, and urban dummy), parent's characteristics (age, gender, and years of schooling), household characteristic (log of family net income per capita), log of provincial GDP per capita, as well as province and wave fixed effects. The dependent variable is the binary harshness indicator. The instrumented explanatory variable is provincial education spending as percentage of provincial GDP in Panel A and provincial education spending per student in Panel B. The variables *Tertiary/Primary*, *Upper secondary/Primary*, and *Lower secondary/Primary* represent lagged school ratios used as instrumental variables (IV) in columns 1－4. Robust standard errors (in parentheses) are clustered at the county level.

† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3 Overidentification test: when the dependent variable is control parenting practices

Panel A Instrumented explanatory variable: provincial education spending % of GDP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Provincial education spending % of GDP	6.231 †	4.537***	4.558***	6.313	4.529***	6.031 †	4.256***
	(3.717)	(1.265)	(1.289)	(4.188)	(1.326)	(3.547)	(1.278)
Tertiary/Primary	29.092	IV	IV	29.887	IV	27.147	IV
	(46.199)			(51.072)		(41.489)	
Upper secondary/Primary	IV	2.369	IV			IV	2.129
		(3.315)					(2.968)
Lower secondary/Primary	IV	IV	0.792	IV	0.785		
			(1.204)		(1.219)		
Obs.	12867	12867	12867	12867	12867	12867	12867
R-squared	0.076	0.091	0.091	0.075	0.091	0.078	0.093

Panel B Instrumented explanatory variable: provincial education spending per student

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Provincial education spending per student	2.724	3.384*	4.143**	2.691	4.107**	3.623 †	5.783*
	(1.663)	(1.496)	(1.447)	(1.679)	(1.466)	(2.050)	(2.273)
Tertiary/Primary	-26.085	IV	IV	-26.150	IV	-24.302	IV
	(17.353)			(17.347)		(17.977)	
Upper secondary/Primary	IV	-3.149	IV			IV	-4.311
		(2.788)					(3.804)
Lower secondary/Primary	IV	IV	-1.471	IV	-24.302		
			(1.110)		(1.103)		
Obs.	12867	12867	12867	12867	12867	12867	12867
R-squared	0.097	0.091	0.084	0.097	0.084	0.089	0.062

Note: All columns include control variables such as child's characteristics (age, gender, and urban dummy), parent's characteristics (age, gender, and years of schooling), household characteristic (log of family net income per capita), log of provincial GDP per capita, as well as province and wave fixed effects. The dependent variable is the first component of control outcome. The instrumented explanatory variable is provincial education spending as percentage of provincial GDP in Panel A and provincial education spending per student in Panel B. The variables *Tertiary/Primary*, *Upper secondary/Primary*, and *Lower secondary/Primary* represent lagged school ratios used as instrumental variables (IV) in columns 1－4. Robust standard errors (in parentheses) are clustered at the county level.
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 4 Overidentification test: when the dependent variable is harsh parenting practices

Panel A Instrumented explanatory variable: provincial education spending % of GDP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Provincial education spending % of GDP	-1.772	-1.633*	-1.613*	-1.724	-1.598*	-1.849	-1.635*
	(1.610)	(0.693)	(0.690)	(1.881)	(0.710)	(1.757)	(0.735)
Tertiary/Primary	-2.304	IV	IV	-1.845	IV	-3.043	IV
	(18.282)			(20.924)		(18.731)	
Upper secondary/Primary	IV	-0.212	IV			IV	-0.213
		(1.318)					(1.284)
Lower secondary/Primary	IV	IV	-0.044	IV	-0.040		
			(0.437)		(0.443)		
Obs.	4596	4596	4596	4596	4596	4596	4596
R-squared	0.143	0.145	0.146	0.144	0.146	0.141	0.145

Panel B Instrumented explanatory variable: provincial education spending per student

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Provincial education spending per student	-0.627	-1.020 †	-1.325*	-0.608	-1.309*	-0.998	-1.934 †
	(0.619)	(0.588)	(0.635)	(0.625)	(0.639)	(0.956)	(1.026)
Tertiary/Primary	12.482*	IV	IV	12.548*	IV	11.212	IV
	(7.273)			(7.268)		(7.926)	
Upper secondary/Primary	IV	1.537	IV			IV	1.722
		(1.224)					(1.507)
Lower secondary/Primary	IV	IV	0.635	IV	0.631		
			(0.450)		(0.447)		
Obs.	4596	4596	4596	4596	4596	4596	4596
R-squared	0.154	0.146	0.139	0.154	0.139	0.147	0.115

Note: All columns include control variables such as child's characteristics (age, gender, and urban dummy), parent's characteristics (age, gender, and years of schooling), household characteristic (log of family net income per capita), log of provincial GDP per capita, as well as province and wave fixed effects. The dependent variable is the binary harshness indicator. The instrumented explanatory variable is provincial education spending as percentage of provincial GDP in Panel A and provincial education spending per student in Panel B. The variables *Tertiary/Primary*, *Upper secondary/Primary*, and *Lower secondary/Primary* represent lagged school ratios used as instrumental variables (IV) in columns 1－4. Robust standard errors (in parentheses) are clustered at the county level.
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 5 Robustness check: Provincial education spending % of GDP & per student

Panel A Dependent variable: control parenting practices

	(1)	(2)	(3)
Provincial education spending % of GDP	5.965	5.881	5.356
	(5.610)	(5.544)	(5.784)
Provincial education spending per student	3.212 †	3.19 †	3.716
	(1.858)	(1.860)	(2.586)
Tertiary/Primary	IV	IV	IV
Upper secondary/Primary	IV		IV
Lower secondary/Primary	IV	IV	
Obs.	12867	12867	12867
R-squared	0.020	0.022	0.024

Panel B Dependent variable: harsh parenting practices

	(1)	(2)	(3)
Provincial education spending % of GDP	-2.198	-2.199	-1.951
	(2.124)	(2.121)	(2.138)
Provincial education spending per student	-1.064 †	-1.049 †	-1.242
	(0.566)	(0.574)	(0.816)
Tertiary/Primary	IV	IV	IV
Upper secondary/Primary	IV		IV
Lower secondary/Primary	IV	IV	
Obs.	4596	4596	4596
R-squared	0.071	0.071	0.077

Note: All columns include control variables such as child's characteristics (age, gender, and urban dummy), parent's characteristics (age, gender, and years of schooling), household characteristic (log of family net income per capita), as well as province and wave fixed effects. The dependent variable is the first component of control outcome in Panel A. The dependent variable is the binary harshness indicator in Panel B. The instrumented explanatory variables are provincial education spending as percentage of provincial GDP and provincial education spending per student in both panels. The variables *Tertiary/Primary*, *Upper secondary/Primary*, and *Lower secondary/Primary* represent lagged school ratios used as instrumental variables (IV) in columns 1 − 3. Robust standard errors (in parentheses) are clustered at the county level.
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 6 Robustness check: the effect of education spending on control parenting practices

Panel A Instrumented explanatory variable: provincial education spending % of GDP

	(1)	(2)	(3)	(4)
Provincial education spending % of GDP	3.958***	3.920***	3.679**	3.215*
	(0.956)	(0.951)	(1.191)	(1.470)
Same-gender dummy	0.034	0.034	0.034	0.035
	(0.030)	(0.030)	(0.029)	(0.029)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	12867	12867	12867	12867
R-squared	0.095	0.095	0.097	0.099

Panel B Instrumented explanatory variable: provincial education spending per student

	(1)	(2)	(3)	(4)
Provincial education spending per student	3.042*	3.011*	4.473*	15.807
	(1.490)	(1.503)	(1.957)	(19.146)
Same-gender dummy	0.034	0.034	0.033	0.020
	(0.030)	(0.030)	(0.030)	(0.036)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	12867	12867	12867	12867
R-squared	0.094	0.094	0.079	-0.203

Note: All columns include control variables such as child's characteristics (age, gender, and urban dummy), parent's characteristics (age, gender, and years of schooling), household characteristic (log of family net income per capita), log of provincial GDP per capita, as well as province and wave fixed effects. The dependent variable is the first component of control outcome. The instrumented explanatory variable is provincial education spending as percentage of provincial GDP in Panel A and provincial education spending per student in Panel B. The variables *Tertiary/Primary*, *Upper secondary/Primary*, and *Lower secondary/Primary* represent lagged school ratios used as instrumental variables (IV) in columns 1－4. The same-sex dummy equals 1 if the parent-child dyad is father-son or mother-daughter and 0 otherwise. Robust standard errors (in parentheses) are clustered at the county level.
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 7 Robustness check: the effect of education spending harsh parenting practices

Panel A Instrumented explanatory variable: provincial education spending % of GDP

	(1)	(2)	(3)	(4)
Provincial education spending % of GDP	-1.570*	-1.558*	-1.568*	-1.533*
	(0.622)	(0.626)	(0.673)	(0.738)
Same-gender dummy	0.012	0.012	0.012	0.012
	(0.013)	(0.013)	(0.013)	(0.013)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	4596	4596	4596	4596
R-squared	0.147	0.147	0.147	0.147

Panel B Instrumented explanatory variable: provincial education spending per student

	(1)	(2)	(3)	(4)
Provincial education spending per student	-0.937 †	-0.921 †	-1.707 †	-4.283
	(0.551)	(0.553)	(0.972)	(3.866)
Same-gender dummy	0.011	0.011	0.012	0.014
	(0.013)	(0.013)	(0.013)	(0.015)
Tertiary/Primary	IV	IV	IV	IV
Upper secondary/Primary	IV		IV	
Lower secondary/Primary	IV	IV		
Obs.	4596	4596	4596	4596
R-squared	0.147	0.147	0.124	-0.053

Note: All columns include control variables such as child's characteristics (age, gender, and urban dummy), parent's characteristics (age, gender, and years of schooling), household characteristic (log of family net income per capita), log of provincial GDP per capita, as well as province and wave fixed effects. The dependent variable is the binary harshness indicator. The instrumented explanatory variable is provincial education spending as percentage of provincial GDP in Panel A and provincial education spending per student in Panel B. The variables *Tertiary/Primary*, *Upper secondary/Primary*, and *Lower secondary/Primary* represent lagged school ratios used as instrumental variables (IV) in columns 1－4. The same-sex dummy equals 1 if the parent-child dyad is father-son or mother-daughter and 0 otherwise. Robust standard errors (in parentheses) are clustered at the county level.
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 8 Principal component analysis of the control dimension questions

	Component 1	Component 2	Component 3	Component 4	Component 5
Eigenvalue	2.125	0.969	0.782	0.608	0.516
Discussing what happens at school	0.402	0.541	0.493	0.539	0.109
Asking the child to finish homework	0.464	0.077	-0.708	0.120	0.513
Checking the child's homework	0.473	0.422	-0.023	-0.682	-0.365
Restricting the child from watching TV	0.475	-0.479	-0.130	0.372	-0.625
Restricting the types of TV programmes the child could watch	0.417	-0.542	0.488	-0.304	0.450
Variation Explained (%)	42.5	19.4	15.6	12.2	10.3

Note: The table reports the eigenvalue, loading, and variation explained of the principal component analysis of five questions in regards to parents control and demandingness practices. The five questions are: (1) "How often have you discussed what happens at school with your child since this semester started/last semester?"; (2) "How often did you ask the child to finish homework?"; (3) "How often did you check the child's homework?"; (4) "How often did you restrict the child from watching TV?"; (5) "How often did you restrict the types of TV programmes the child could watch?".