Family's Educational Spending in China

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令和 4 年 12 月

神戸大学経済学研究科

経済学専攻

指導教員　梶谷　懐

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（中国の家庭の教育支出に関する研究）

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1. Chapter 1
Should we take for granted that families are still willing to invest in education

1.1. Change of human capital

When we talk about the importance of human capital to the economy growth and political development of a country, we usually neglect a prerequisite, which is family and individual are willing to invest in education.

Many economists have estimated the return to education, and their results usually suggest considerable rates of return that much higher than the saving rate, which then become the reasons for family's enthusiasm on education. Besides, because of the positive externality of education on the whole society and economy, government should also provide helps to those families who cannot afford the basic education. All in all, family, as well as the individual's choice about education should not be the obstacle to the accumulation of human capital.

However, situations in real world may have disappointed the economists of 60 years ago, for there appeared series of complicated issues about education since then. Having experienced the education expansion and economic crisis, more doubts on the return to education has appeared. Those doubts focused on the realization of human capital, or simply the employment problems. To explain the role of education in employment, Spence considered the diploma of a certain education as a signal to transmit some information of individual, but not necessarily represent the level of human capital (Spence, 1978). Thurow suggested a concept of job queue, where individuals line up in an order of their education level, to acquire a job (Thurow, 1975). These mean that education is treated as a tool or standard for the employer to select the candidates, instead of a measurement of their ability.

Meanwhile, Hirsch defined education as a positional good, and the competition around this kind of good will cause significant waste to social resources and human capital (Hirsch, 1976). The result of the education competition is that more workers in their position are using less knowledge and ability

that education has equipped them with. This situation led to a discussion about overeducation (Duncan & Hoffman, 1981; Rumberger, 1981). All these studies were probably showing a weak connection between education and human capital.

The above findings have been a shock to the education enthusiasm of government and individual. From the view of governments, it is totally a waste of social resource to let potential scientists compete for a cleaner's job. For individuals, similarly, if higher education can only provide a diploma that probably fail in competition with others, there may exist other options for individuals to earn their lives, since progression of technology has made lots of knowledge accessible to ordinary people.

We are not denying the positiveness of formal education and schooling, and in the same time, are not forgetting people that don't have even a chance to accept proper basic education. But when we praise the mighty human capital and its indispensable meaning to the development of a country, we should not forget that in some places, the its base at microeconomy level has started cracking.

Talking about the base of education at microeconomy level, family is naturally the most important object. When the discussion comes to how family invest in education, many researches about families in East Asia can be found. China, one of these Asia countries, with its recent astonishing economic grow and development dilemma, has been providing various and interesting materials to relevant researches, and this is one of the most important reasons for this research focusing on the education investment behavior of Chinese family.

1.2. Special features of human capital and education in China

Before the research contents, it would easier to understand why examples in China are "various and interesting" if we give some introduction as parts of background here. As a supplement, we mainly talk about the China after its Reform and Openness in 1980s (Naughton, 1993).

(1) The contribution of human capital to China's economy

China experienced its first rapid growth in 1950s because of the construction of its basic industry sectors. However, in 60s and 70s, China's economy dropped to the bottom for some political reasons, and the education was also in stagnation. Because of the Cultural Revolution, almost every student in China was sent into the revolution movement or agricultural works. It was not until 1977, when the university entrance test was restarted, that the formal education in China can set sail again.

Actually, the importance of the accumulation of human capital in China was usually concealed by the astonishing economic growth after the economic reform. Research found that the human capital, as TFP, contributes 17% of growth of China's GDP between 1978 and 2008 (Whalley & Zhao, 2013), without accounting its positive externality to the country. Besides, thanks to the education expansion, the average education of labor force was 6.2 year in 1988 and 10.9 in 2021. Though there were still obvious differences comparing to developed countries, we can still see the development of education

and how education stimulated the economy growth. When comparing to the period of Cultural Revolution, the importance of human capital does not need further proves.

However, the education expansion in late 90s eventually brought many questions. The first one is that the human capital, measured by educated year, start to contribute less to the GDP growth (Whalley & Zhao, 2013). Even we don't consider the slowdown of China's economy growth, education expansion that overlooks the rule of accumulation of education resources always cause the declination of quality.

On the other hand, because of the educational industrialization policies and the fiscal decentralization in China (Lin & Liu, 2000), the inequality of education was increasing (Hannum & Meiyan, 2006). Regions with better economic performance and better fiscal condition owns much more higher education institutions. Also, although the compulsory education has been statically popularized in China, the quality differs across the country because of the regional inequality. In addition, since the education system in China allows universities to enroll more local students, the so-called "National" universities are bringing more inequality to the education. Education inequality and the slow economic growth in recent China are explained as the reason of solidification in social stratum, and they are becoming potential risks to the education and even the society.

At the micro level, after the rapid growth of return to education, from 4% in 1988 to 10% in 2001 in China's urban areas (Zhang, et, al., 2005), the effect of education expansion started to cease and even decrease the rate of return. At meantime, because of the imbalance of distribution of educational resources, and the restriction on the migration, there are obvious disparity in both rate of return to education and the cost of education between citizens with different characteristics. For example, floating population generally have lower rate of return compared to the local citizens, but they have little fiscal support from local government. Similarly, rural areas have education of lower quality, and sanitation of worse condition when compared to urban areas, which significantly generate negative influence to the accumulation of human capital of the rural population, and thus the nation as a whole.

Besides, the social stratification also affected the accumulation of human capital and decreased its contribution, for the lead the disparity in attitude and behavior between families and between governments as well. For those rural families who cannot receive enough fiscal support, education can provide very limited help to their future return, which sometime force them give up further education after the compulsory education of low quality. Because areas of poverty are facing problems such as limited financial income, lack of supervision and brain drain, government educational expenditure are always insufficient or being misused. In contradiction, wealth families are capable and willing to pay extra fee for their children's education, including housing in school district and private tutoring courses, to help winning the education competition. Meanwhile, developed regions have stronger motivation in building educational institutions, increasing educational expenditure to accumulate more educational resources.

With the deteriorating equality condition in China's education, the contribution of human capital to economic growth may only reflect the contribution of the fortunate sons. For a nation that monopolized by one party, the education is also inevitably in its control. In other words, government in China should has the ability to change the situation of imbalanced distribution of its scarce education resources, but the reality is education under government control only strengthen the connection between local economy condition and quality of local education. From above, we can see, human capital has contributed to China's economic growth, however, because of the irrational education expansion and the disparity in education quality, its contribution is getting weaker. With this background, knowing how family change their education decision will be helpful in future policy making, in order to fully take the advantage of human capital.

(2) Special education system

The reason why this system is interesting, is that the core of the system is the university entrance test (Gaokao) based on the migrating restriction supported by the Hukou (Resident identification) system. This system has three distinguishing features: 1, university entrance test is held by the provincial or national government once every year, instead of university or college administration department. 2, Students can only participate examination in the registered province according to their Hukou. 3, Universities and colleges are allowed to enroll more local students.

This examination used to be praised as one of the fairest system designs in China. However, its drawbacks gradually became notorious as the inequality speeded up. More detailed analyses will be talked about in later chapters, but we hope these drawbacks would be understandable when we give two examples here.

In the first example, let us suggest the province called Henan, and the capital city called Beijing. In 2019, Beijing had 215 million citizens, while Henan had 964 million. The graduate students from senior middle school in Beijing was 50390, while Henan was over ten times, 679853. However, the enrollment of university in Beijing was 130,851, while in Henan was 287338[1]. Although Beijing receives students from everywhere of China, it gives considerable enrollment priority to local students, as mention above. Besides, the wide enrollment just reflects the high quality of higher education in Beijing, while Henan don't have at least one university from 985 projects, a project used to be set by national government for building top universities. These number shows, student in Beijing have better chance in being enrolled by top universities, and the difference will be clearer if we take the disparity in quality of lower education stages into account.

The second example is the Gaokao migration, a costly activity of changing Hukou status to have a chance to receive university entrance test in provinces where the quality of education is low, and

[1] National Bureau of Statistics of China.
http://www.stats.gov.cn/tjsj/ndsj/2020/indexch.htm

have favor from national government, such as Gansu and Tibet. Besides, receiving better education in other province and then receive the test in local province is also a kind of Gaokao migrating behavior in board sense. Both of them raise a same question: when huge gaps in school quality between provinces and even regions within province, can the unified examination organized by province still keep its fairness.

Ironically, the restriction on migration and the examination system based on it make education in China attractive for researchers. Generally, families only consider the quality of local education until senior middle schools, and after that, families will turn to the national level to search better universities, if they want to go further. To this extent, it is the same in China, but the restriction and unified examination make the imbalanced distribution of educational resources crucial in family's choice, for they don't have even a similar condition when they are aiming at the same university.

We have known that education in China, from its contents to its finance, is controlled by government, and we have seen the potential influences of imbalanced distribution of its educational resources. Thus, we are interested in testing how government educational expenditure affect family educational spending and if the imbalance of it has a significant effect, which will be discussed in Chapter 4.

(3) Development of shadow education in China

We borrowed the concept of shadow education for researches on education, which suggests informal education activities that have the characteristics of privateness, supplementation and teaching academic subjects. We usually use private education to describe these activities, but to address its relation to formal education and its imitation move, we use concept of shadow education in this study.

We have simply introduced the education system in China. In this system, if informal private education is the shadow of formal schooling, then the university entrance test would be the only illuminant. Because even the formal education remains unchanged, the alter of illuminant will change the shade as well as the size of shadow education.

The biggest problem brought by shadow education is that family will strengthen its social status by using its fortune, which consolidate the social stratification. But it has other several effects on families in China. Firstly, as profitability is the destination of these private sectors, without proper supervision and rules, illusive advertisement, enormous charge and default by institutions usually happens in the market. Secondly, apart from pecuniary spending, increasing time spending in shadow education is also casting negative influences on family's health and finance. Time spending is much more important here than in formal education, is because the participation is on the spontaneous choice by family, thus the time spending differs a lot among families. However, the time spending behavior is seldom mentioned in economic studies, so in Chapter 3, we will see how family's factors affect its pecuniary and time spending, for they both are important in explaining the family's educational investment attitude and behavior.

(4) The change of labor market in China

Former studies have claimed that the value of education is usually realized by productive activities, such as working. From another point of view, the benefit from working will significantly affect family's educational investment decision. However, because of the instability of labor market and lack of laws, it is hard to clearly identify the value of education and the mechanism of realization of human capital. Even though, knowing the change of labor market in China will help us understanding the role of education in China.

Before the economic reform started from 1978, China did not really have labor "market", because occupation is bonded to governmental sectors. It is easier to understand the phenomenon in the period of Cultural Revolution, since almost every citizen was only allowed to work for state owned industries or to join the revolution activities. The economic reform, or Reform and Openness gave permission for private capital and foreign capital to enter, which then help building original labor market in China. In the early period of reform, export-oriented, labor-intensive industries have created thousands of jobs, and created chances to people with little education to change their economic status.

In the meantime, rapid growth led to stronger demand for labor forces and stimulate the reform of Hukou system, allowing floating population to participate workers in other provinces. Since then, though many rights are still not protected well, there were almost no obstacle on the movement of labors. It was thought in 2004 that China met its Louis turning point, and the supply of unlimited surplus labor forces from rural areas came to an end. During this period, in order to accelerate the accumulation of physical capital, wages of labor were generally lower than the value they created. Therefore, results were considered seriously underestimating the rate of return to education.

Shortage of labor forces in manufactory raised the labor cost and make China lose its advantage in labor-intensive industries. China's government announce series of policies to stimulate economic transition, in order to get rid of the reliance on industries of low value added, but the transition is not as smooth as it was supposed to be. Higher labor cost drive factories to relocate in Southeast Asia, but high technology industries are currently not able to absorb enough additional workers. The deteriorated situation in labor market was soon transmitted to education, and raise the intensity of education competition. Since it will probably also lower the expected benefit from education, it become unclear if family still has enough motivation to keep increasing educational investment.

We must notice that wage is only a part of benefit that education offers. A working chance in SOEs and governmental sectors in China, and the employment possibility itself are also significant to individuals. SOEs and governmental sectors played crucial role in China's labor market. Before the reforms on SOEs, these enterprises were employing plenty of labors, and provide them with children's education, medical services, pension and even housing. Thus, the job in SOEs and government is usually called as "iron bowl", which means the job is absolutely stable. However, economic reform revealed the extremely low efficiency of most SOEs, because they don't manage the companies, for

they have to wait instructions from government, and they also don't take responsibility to profits or losses, for their finance is controlled by government. As government could no longer bear the deterioration of government finance, SOEs reform was started in 1990s, and result about 80 million workers losing their jobs.

Despite the reform, Chinese government still fully control industries that are crucial to national security and taxation, such as cigarette, energy, aerospace industry. Essentially, the consequence of a series of SOEs reforms is the strengthened monopoly power of SOEs in particular profitable industries. Although reforms have cut down several kinds of welfare for the employees, the monopoly status and stability make SOEs still attractive enough to most labors, especially in the current decades when China's economy keeps slowing down.

If entering SOEs is another important reason for individual to accept education, then judging the return by only use individual's wage will definitely underestimate the motivation of a person. Since the job competition make the ranking in job queues more significant, the education may cast its influence not merely by absolute educated year, but also by relative education level. Influence of relative education on particular employment possibility will provide us new perspective in understanding the value of education in China, and help us to realize and guide the educational investment behavior of individuals, which will be examined in Chapter 2.

Up to now, we have given a rough introduction on China's background related to its education, and shown the struggle of family and individual in their education. It should be announced again, that no matter how important the human capital is in the economy development, or how useless the human capital is in the economy where robots are replacing human beings, we must have a clear look at the foundation of human capital, which is education investment decision made by every single family. Knowing how much family spend on education and attitude behind their behaviors, will help us discover and fix the fatal drawbacks of education system, which will contribute to a more efficient way for human capital to serve our economy.

1.3. The order of dissertation

In Chapter 2, we will test effect of relative education and detect the motivation of family's educational spending. Having confirmed the motivation, we then in Chapter 3, discuss the family internal factors that affect its spending on shadow education, and in Chapter 4, we turn to the external factors that affect family's behavior, particularly the government educational expenditure and its distribution across the country.

Precisely, in Chapter 2, we introduce the fierce education competition in China, whose danger to Chinese families, students, and the whole economy is widely debated. Despites the harm, families are sparing no effort to participate the competition in education. The situation implies that there may exist

additional benefits other than merely pecuniary wages, and the relative education, rather than absolute educated year is also bringing profit to individuals. In this chapter, we consider wages, employment chances and type of employment as the main motivations that drive Chinese families into the education competition. By using CGSS 2003, 2010 and 2017 data of Chinese citizens, we show the importance of relative education, and examine how it affects individual's income and employment opportunity. Meanwhile, by comparing individuals from different cohorts and different years, we also test how the power of relative education changes over time. By empirical test using manipulated Mincer model and Heckman selection model, we found:

1. Relative education, measured by ECAS (Educational Competitive Advantage Score), has positive effect on personal wage, employment possibility and chance of having a job in governmental sectors.
2. As time passes and age increases, explaining power of ECAS on personal wage became weaker.

In Chapter 3, we pick up a particular educational activity called shadow education, to analyze family's behavior in educational spending. The definition of shadow education was firstly appeared around 1990, based on the private tutoring market that has been mostly observed in East Asia. It has been growing fast and it now generates impacts to the rest of the world. Since shadow education is now widely supported by families and the value of the related industries is considerable, its development has attracted many attentions from educational and economic fields.

Shadow education has been existing for years in China, but has not been taken seriously until about 20 years ago. With its astonishing speed of development, it has brought many family and social problems. To understand these problems, it is important to start analysis from the perspective of economics, and focus on both pecuniary and time expenditure of the families. Here in this thesis, I use CFPS data of 2016 to see how family characters influence family's pecuniary and time expenditure in shadow education. By using Tobit and Heckman two stage model, we found:

1. Family income has positive effect on both pecuniary and time spending
2. The expectation of parents, on children's educational degree, does not have significant influence on family's spending
3. Family is willing to spend time, instead of money, in shadow education

Based on these discoveries, we gave some advices, especially on the current strict policies about shadow education industry, and try to emphasized the importance of researches about time spending.

In Chapter 4, we discussed how government educational funds on different education stages influences the educational spending of families in China. Because government dominate education by control its finance and contents, it is reasonable to assume the strong connection between school quality and government educational expenditure of particular area. Besides, the specialties of university entrance examination system in China makes the distribution of educational resources

another key factor that affect family's spending decision. How family react to imbalanced distribution will be inspiring in future policies. By analyzing the panel data on China's provinces, we found:

1. The directions of influence are opposite in primary and senior middle school
2. It is the relative education expenditure on higher education, which means the comparison of government funds, that significantly influence the spending of family, not only the absolute amount
3. Rural family are influenced by the educational funds on vocational middle school, while urban family are influenced by the funds on normal senior middle school, suggesting government differ its attitude towards different families.

Based on these discoveries, we suggest China's central government turns the more attention onto the compulsory education, to raise the education quality in especially rural areas, while let market help higher education, mostly the national university, to achieve a balanced development across the country, and provide more resources for students of underdeveloped areas.

1.4. References

Duncan, G. J., & Hoffman, S. D. (1981). The incidence and wage effects of overeducation. *Economics of education review*, *1*(1), 75-86.

Hannum, E., & Meiyan, W. (2006). Geography and educational inequality in China. *China economic review*, *17*(3), 253-265.

Hirsch, F. 1976. *Social Limits to Growth.* Cambridge, Mass.: Harvard University Press.

Kanbur, R., & Zhang, X. (2005). Fifty years of regional inequality in China: a journey through central planning, reform, and openness. *Review of development Economics*, *9*(1), 87-106.

Lin, J. Y., & Liu, Z. (2000). Fiscal decentralization and economic growth in China. *Economic development and cultural change*, *49*(1), 1-21.

Naughton, B. (1995). *Growing out of the plan: Chinese economic reform, 1978-1993*. Cambridge university press.

Rumberger, R. W. (1981). The rising incidence of overeducation in the US labor market. *Economics of Education Review*, *1*(3), 293-314.

Spence, M. (1978). Job market signaling. In *Uncertainty in economics* (pp. 281-306). Academic Press.

Thurow, L. C. (1975). *Generating inequality*. Basic books.

Whalley, J., & Zhao, X. (2013). The contribution of human capital to China's economic growth. *China Economic Policy Review*, *2*(01), 1350001.

Yan, W., & Yudong, Y. (2003). Sources of China's economic growth 1952–1999: incorporating human capital accumulation. *China Economic Review*, *14*(1), 32-52.

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.

2. Chapter 2
Influence of relative education on individual's wage and employment opportunity in China

2.1. Introduction

The educational expenditure of family has always been researched and debated. As an investment, the types of its return can hardly be accounted; as a commodity, it is almost impossible to calculate or compares its return to different individuals. In this perspective, measuring the return to education is probably a meaningless job for today's economists.

However, education has caused many economic problems to families, local governments and even the nation, thus this theme can have contribution even in the economic way. In China, especially, education system and education market had several dramatically changes in only less than 100 years since the PCR is established. The most current education expansion has its problems magnified partially because of the declination of economic growth speed in China. These problems are now being highly concerned since they are increasing financial burden to families and local governments, and they are creating an imbalanced labor market as well. Since the problems may eventually negatively affect the development of education and economy as a whole, it become necessary to reconfirm two things when we focus on education spending, the motivation of education spending and the mechanism of education generating return.

Starting with the motivation. When the concept of human capital has been first announced, researches tended to use educated year of individuals to measure the level of their human capital, and use wages and GDP as the return to education. However, in 1970s America, concern about overeducation appeared, and researches emphasized the signaling and filtering function of education have drawn attentions. These theories indicated that the motivations of accepting education started being complicated. Moreover, because the educated population grew fast but the economy grew slowly, and the mismatch between school knowledge and real work became more apparent, the demand side of the labor has some new point of views on the current education, one of which is the main object of this research, the relative education level.

We use the concept of relative education, to suggest the situation that from the perspective of labor demand side, the value of certain education level depends on how many other people have it as well. By determining the range of "other people", we can distinguish the relative education from the absolute education that usually measured merely by educated year. With this idea, hopefully we can denote the scarcity of a certain level of education, in certain time and certain places. In other words, we focus on the how the scarcity of education experience helps people in their occupation and wages, instead of

ability cultivated by education, and from this perspective, we will reconsider the motivation and rationality of the behavior of education spending.

Then we discuss the mechanism that reveals how education generates return and profit, whose importance is generally underestimated. Studies aiming at the wage of workers with certain education experience overlook the procedure between graduation and occupation. Besides, the existence of many types of profit that related to education are barely mentioned, thus making the relation between education and its profit obscure to families and societies.

When returns other than pecuniary wages are taken into account, we find more interesting and distinct stories in China. There is profit from changing hukou status because the Hukou system restrict the citizen's migration. There is profit from working in coastal cities because the imbalanced development across the country. There is also profit from entering the sectors related to governments or the CPC (Communist Party of China), because the one-party dominance in politics of China.

Therefore, in this research, by calculating a variable representing relative education level, using micro data and regression models, we are going to analyze the influences of relative education on different types of return that education can provide. From the analysis, we try to explain the reason why families and individuals are still willing and even more enthusiastic to spend in education. Based on the results, hopefully we can also give some illuminating suggestions on the future education in China.

Section 2 is the background, introducing education market and labor market in China, types of returns to education and the phenomenon of educational competition. In Section 3, we mention the former studies that are related to this research and we suggest the importance of relative education in the measurement of individual's educational return. Section 4 is about the main hypotheses of this research. Section 5 is about the empirical test. The model that we used, is constructed based on Mincer model and concept of ECAS (Educational Competitive Advantage Score). In Section 6, we found our hypotheses are generally confirmed, and we explain the results from those tests. Section 7 discusses the implication on the current education system in China and the future researches about the return to education. Section 8 is the conclusion.

2.2. Background

2.2.1. Change of China's education market and labor market

(1) Education market

Although the aim of "Reform and Openness" policy was to build market economy for China, whether the education should also follow these rules was widely debated. The protester claimed that government should take the major part of responsibility to provide education services, which is considered as semi-public good that has positive externality to national economic and social

development. Besides, without proper supervision and regulation, corruption would happen private capital is involved in so-called public schools.

Despite the critics, China's government decided the expansion of education, and the situation was clearly observed in higher education. Up to 2019, number of enrollment students of higher education was 9.15 million, comparing to 1.08 million in 1998[2], while the enrollment rate went to 86% from 43%[3].

The expansion of education, without any surprise, commercialized the test scores and the certificates. Lots of phenomena are relevant to this expansion: from school-selection fee to school-district housing, from Olympic math to private tutoring, and from Gaokao (university entrance examination) migrants to Gaokao factories (Zhang, 2013; Ming, 2014).

Meanwhile, these phenomena did not only occur around senior middle school, which is the closest stage from university entrance examination, but started to transmit to lower educational stages, even to preschool education. "To win at the start line", drive families, mainly the middle class, to have their children to participate various private tutoring causes, using great part of their income[4]. Results of many investigations worry us, and bring about the main question that we try to answer in this chapter: if all these spendings in education are worthy?

(2) Labor market

The change of labor market should not be neglected when we discuss the education market in China. That is because the fast growth of education market mainly relies on the logic that better education will bring higher return, mostly in form of better jobs and salary. In other words, if this logic was threatened, the development of current education market will definitely go to a different direction. Therefore, a perspective from labor market will be equally helpful to our research on family education spending.

Just a half century ago, having higher education in China leads to a steady job promised by the country. Although those university graduates were required to obey the instruction or allocation by government, their occupations are assured. Considering the history that there were barely no private sectors in China, a job in state-owned enterprise or government sectors was attractive enough.

The job market dramatically changed after Reform and Openness from late 1980s, and the most profound change happened around 1993 when China's government announced to reform the SOEs (Li & Putterman, 2008). From 1998 to 2000, about 21.37 million SOEs workers lost their job, which was

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[2] National Bureau of Statistics of China

[3] Higher education enrollment rate = number of senior middle school graduates/number of higher education enrollment

[4] 中国商业教育辅导市场消费力报告 2019 (Consumption power report of commercial education market)

called XiaGang (Xie, 2004). In the meantime, the reform in taxation also forced local governments to suppress their size and functions. Services and welfares that used to be provided by governments and SOEs, like housing, education and pension were cut down and even canceled, because of the increasing financial burden on governments (Lin et, al., 2020).

Even though, the SOEs and government sectors in China still remain attractive for their considerable welfare and steadiness, compared to private sectors and enterprises owned by foreign capital. After series of reforms, the biggest influence is that the intensity of competition around occupation in SOEs and government sectors was enhanced, which then affected the education market as well.

Of course, outside the SOEs and government sectors, China's labor market was also greatly changed by Reform and Openness. Economic reform brought foreign capital and world market to China, and both of them provide plenty of jobs and investment chances. Those opportunities allowed labors from some poorest areas in China, and those with relatively fewer education experience, to earn a satisfying salary (Zhao, 1999).

However, the labor migration won't continue forever, and was thought to have reached its turning point in about 2004 (Chan, 2010). Many reasons, like the raising living cost in urban areas, limitations in Hukou system, poor execution of labor law, and development in rural areas, are considered as reasons of the phenomenon called "Shortage of migrant workers" in China (Cai, 2010).

On the other hand, China's government has emphasized the transformation of its economic development pattern, basically from labor intensive to capital intensive, and announced many supporting industrial policies (Xinle, 2022), especially on high-tech industry. Meanwhile, as the labor cost in low end manufactory has been continually growing, many labor-intensive industries have been relocated to countries with lower labor cost, such as countries in south-east Asia (Yang, 2016).

To ensure the economic transformation, China has announced a plan called "Made in China 2025", which is a plan for further industrialization (Wübbeke et, al., 2016). Because of the underestimate of the difficulty in scientific research and the change of international situation, it is now barely mentioned. However, the gap between expectation and reality put the current labor market in a dilemma. On the one hand, less simple manual jobs are available in the economy, for those factories are moved to other countries. On the other hand, industries that are supposed to use high-tech to provide more jobs, are still not capable to absorb enough workers (Zhu et, al., 2021). Although this situation is called a short-term frictional unemployment, it has indeed generated profound influences to education in China.

The current imbalanced labor market in China is actually a buyer's market, which naturally bring companies and firms more power in negotiation. Lower wages, longer working time and unstable occupation send many labors to receive extra examinations for occupations provided by the government, including government officials, SOEs' workers and teachers in public schools. One common characteristic of these kinds of jobs is that they are usually not well paid, but highly stable,

excluding the gray income and corruption. Data shows that in 2019, there were about 1.42 million candidates apply for 14.8 thousand government officials' job[5], showing the strong demand for stability and the intensity of the competition. Considering the reform of SOEs and the expansion of higher education, it is clearly that the difficulty of having a desiring job in government system is becoming higher.

Therefore, the change in China's labor market gives us with at least two messages that warrant our attention. The first one is that, the ascending willingness of education spending by families and individuals, is highly related to the situation that labor market cannot absorb enough workers. This raises the necessity of economic background when we analyze individual's educational spending. The second one is that, people may also prefer stability or pollical power, instead of wages only when the labor market becomes a buyer's market. For this reason, when there is doubt on the educational choice by families in China, we should give considerable attention on the type of jobs, not merely on individual's pecuniary return.

2.2.2. Education system and return of education in China

(1) Education system in China

We are not here trying to judge the fairness or efficiency of education system in China, but we have to give introductions about China's education system and related policies that have enhanced the intensity of education competition, in order to see the influence of this system on individual's behavior.

The first of all is the industrialization of education since 1999, which directly lead to great expansion of the higher education, providing numbers of universities graduates that exceed the demand from the economy. The second one, is the higher education programs, such as 985 Project and 211 Project[6], in which 116 leading universities and 39 top universities are selected (Yang, Fukuyama & Song, 2018), in order to improve universities' research capacities and the comprehensive strength of China's higher education. Since universities of these programs were selected by government, thus receiving massive government's financial help, the gap between universities was becoming wider. Consequently, the condition of graduates from different universities are getting more unequal. The third is the Gaokao system. There is an enrollment rule of this system, which is that universities will give a bigger share of enrollment quota to the local students, even the universities are the national ones. Since provinces in east and south-east China are having the majority of the universities that belongs to national programs, this enrollment rule puts students from middle and west provinces in a more disadvantaged position, and make the "national" university a hollow name.

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[5] National Civil Service Administration: http://www.scs.gov.cn/

[6] Based on the governmental documents:《"211 工程"总体建设规划》《关于继续实施"985 工程"建设项目的意见》

(2) Return of education

Many researches have calculated the rate of return to education, mainly by considering how educated years affect individual's wage, which we will introduce in following part of former researches. However, return to education happens in other aspects, and some aspects are unique in China.

The first is the change in identity, mainly suggesting the change of Hukou status (Liu, 2005) in China. Rights and welfares are different for individuals of different Hukou status, which can hardly be reflected by wages. For example, when individuals in non-local hukou cannot use public education services and medical services, or use these services in the same low price that a local Hukou citizen need to pay. For these individuals, going to a university in other provinces is a rare way for them to change their Hukou status.

The second aspect of return of education is the type of work, and working environment. A traditional thinking of Chinese families about destination of receiving education is to work as government officials. To get rid of agricultural works and other physical jobs, going to university is a more promising method for most families. Ironically, blue-collar workers have considerable wages in developed countries for their scarcity, and this phenomenon started to happen in China, where many graduates of university or college are becoming deliveries, for a relatively higher wages than other available jobs.

The third one is partially relevant to the second, which is the type of ownership of company. As we have mentioned, government and SOEs provide jobs with stability, and its importance keeps growing in recent years (Li, et, al., 2020). Since having a degree of national universities or becoming a member of communist party will increase the possibility of being employed by institutions owned or supported by China's governments, additional incentive happens within the families and students. Considering the increasing ratio of students with higher education experience, it is basically determined that only graduates from higher education institutions have the chance to work for governments.

(3) Education competition

We have explained the necessity for China's families to increase their spending in children's education. As a supplement, we here introduce the environment of education competition in China, because it apparently affects the way and the amount of family's education spending.

Talking about education competition, we mainly separate it into two parts. One of the two is the competition in academic performances, which basically attributes to the effort of students. Another one is the competition around the rare education resources, and we will focus on it. To be noticed, the inequality of distribution of education resources across China happens as well as the income inequality does, for example, the distribution of national universities that we have mentioned above.

The interesting thing is that the second type of education competition usually involves the whole

family, which suggests that winning the competition is usually a team work. This close relationship to family's economic behavior is the reason why we are only interested in the later one here, while the former one is more like a topic in education fields.

The existence of this kind of team work in education competition make us believe that it increases the level of education spending of the whole society. We can see its effect from both pecuniary and time spending of the families.

Since the permission for private capital participating education, or, actually, for government using market mechanism to run schools, power of money increases in China's education. The housing in education district, selection fee, and Gaokao migrants that mentioned before are all require considerable pecuniary spending, which allows rich families to take advantages even in the stage of compulsory education.

The time, though it is generally overlooked, is also an indispensable part of the family team work. As learning activities occupy the time and place outside schools, the participation of education becomes more frequent. Apart from the mission given by teachers to parents to supervise their children's homework, private tutoring causes are also occupying much time of family members (Liu, et, al., 2019). In other words, there are cost of education that cannot be detected when we only focus on family's pecuniary expenditure, and because of the time spending behavior, the spending on education by families, though we have already thought the amount is enormous, is still probably being underestimated, which again explains the importance to realize the motivation of family educational spending behavior.

Actually, the education competition magnifies the necessary education spending by family, which involves a problem of how efficient that the spending is converted into academic performance or ranking. With this efficiency issue, it would be more unreasonable for family to increase education spending, if the efficiency is descending. However, the efficiency problem will be not discussed here. We only mention it to prove that it is rational to doubt that China's family are spending "too much" on education.

With the introduction about background of China's education, we explained the importance to consider the motivation of having more education, not only from individual's wage, but also other return, such as the type of ownership of the working place. Because of various kinds of return and education competition, maybe we should consider a fixed education level to measure the value of education, and former researches provide inspiring hints.

2.3. Former researches

Three aspects of former researches have enlightened our research, and they are: 1, researches about the rate of return to human capital in China; 2, researches about different type of enterprises'

ownership and Hukou status and their influences on China's economy; 3, researches about positional competition and jobs queues.

2.3.1. Rate of return to human capital

We have simply introduced some characteristics of the return of education in China, suggesting that there are returns other than pecuniary income that warrant attentions. However, since we are going to involve wages as dependent variable, it is necessary to know the monetary return in advance, and form the return of these researches, we will find out the limitation of using educated years as the only variable to represent the level of human capital, and the necessity of taking relative education into account.

First of all, in early time, many researches were aiming at the general average return to education of the whole China. For example, Zhang used the data from 1988 to 2001 in China, suggesting that the average return to schooling was keep growing from about 6% to 10% (Zhang, et, al., 2005). However, Heckman suggested that the true return to education in around 2000 can go up to over 30% (Heckman, 2005), but because of the impropriate market mechanism, inequality across the country and lack of government support, using individual's wage to calculate the return to education can only derive underestimated results. Meanwhile, Heckman also suggested that the low income of Chinese workers is because many economic sectors at that time were under the government's control, which suppress the increase of labor wages (Heckman & Yi, 2012). Basically, in the first 20 year of Reform and Openness, skilled workers and educated students were providing the economy with marginal product that extremely higher than their wages, due to the monopsony power of state employers (Fleisher & Wang, 2004).

After the policies about education expansion were implemented in China, Wang & Yue found that the return to education became steady and even started to drop (Wang & Yue, 2009).

As mentioned before, the increasing labor cost accelerates labor-intensive industries moving to Southeastern Asia, while economic transition generates lots of frictional unemployment. It is natural to expect a declining return to schooling, considering the fast expansion of education, which is a reason why we doubt the motivation of individual's behavior of continuing education investment.

Following the general assessments, there appears many researches about the inequality in return to education between individuals with different characteristics in China, in other words, the heterogeneity in return. Among these researches, it is clear that imbalanced economic development across the countries make the urban employees have higher return to education (Huang, Gao & Cha, 2014; Ding, Yu & Yu, 2012). Also, Liu found the return to education of migrant workers was only 1.39% (Liu, 2011). Though return to higher education for rural students is even higher than urban students (Zhao, 2017), the quality difference in compulsory education may reduce the probability of entering higher education for those rural families. Besides, there are many kinds of poverty issues

within rural families, which also negatively affect the return to schooling (Zhang, Li & Zhang, 2018). These researches remind us that many factors, decided by family other than education only, are affecting the return to education of individuals, such as income, ability, parents' education level and social connections. Hence, it should also be possible that social environment that different individuals are facing, is also generating significant influence to their return to education.

2.3.2. Benefit from SOEs and Hukou

Secondly, though wage is an important award to those who have chosen education, and fortunately, also an available data in most statistics, it is far from enough for us to explain the educational decisions of individuals.

We have seen some studies having proved that state-owned enterprises (SOEs) are providing their workers with income above the social average level (Sun, 2022), and the existence of Hukou system allow workers with urban Hukou, an identification of urban citizen, to have higher wages than others with rural Hukou, most of whom are the so-called migrant workers (Song, 2016).

However, there are many invisible benefits that can be attained from SOEs and urban Hukou. In SOEs, many gray incomes are realized in many forms, such as shopping cards, low lending rate and surplus budget (Wang & Woo, 2011). Besides, Liu & Sun showed that although the reforms took out some social functions and personal welfare from the SOEs, such as free housing and free education to offspring, the medical support and pension are still considerable for those workers (Liu & Sun, 2016), and we cannot observe the future income, especially the difference in pension from current data.

Another benefit is usually overlooked, which is the leisure in the work. Many researches draw similar conclusions, that because SOEs are always monopolize some key industries, and under the protection of central government, they have barely no concern about their financial conditions (Szamosszegi & Kyle, 2011), which in essence indicates that SOEs are not independent in making decisions, and indifferent to their revenue. This special status naturally reduces the incentive of workers in SOEs to put effort into their jobs, making the working hours in SOEs easy and pleasant, which is also considered as a benefit by those candidates (Wang, 2008), but hardly measured by available data.

As for the benefit of particular Hukou status, we have seen its direct effect on individual's wage. However, apart from the influences caused by difference in sectors' ownership, the identification of urban citizen also give benefit for individuals. Researches on China's Hukou system have found that, people without local urban Hukou, usually called as "floating population", have fewer rights than the local citizens (Liang, Li & Ma, 2014; Shen & Huang, 2003). For example, there are more restrictions on individuals with non-local Hukou about their house purchasing. Moreover, floating population are not covered by social medical insurance or compulsory education services provided by local government (Liang & Chen, 2007; Ma, et, al., 2020), which means the cost on their children's

education and their medical services will be far more expensive than those citizens with local Hukou (Montgomery, 2012).

To deal with the inefficiency and inequality brought by this distorted Hukou system, China has announced many plans to improve it. In 2014, China's government issued <Opinions on Hukou Reform> and started to gradually formalize agricultural Hukou and non-agricultural Hukou into identical Citizen Hukou. However, it doesn't immediately equalize the right of every person. On the contrary, the difference between local Hukou and non-local Hukou is still sustained (Chan, 2019). From the observations on policies about qualifying local hukou, we can see that the more developed the city is, the harder for floating population to gain local Hukou from there and cities have stronger power in explaining and altering their policies.

Because of the reasons above, the importance of Hukou status will be continued, but the disappearance of distinction between Hukou of traditional classification, urban and rural, make it harder to detect the differences resulted by types of Hukou from data, because it is easy to attain a local Hukou of a small city in western China, but it probably won't provide any benefit. Therefore, we still consider the difference of local and non-local Hukou, but we don't consider it as the dependent variable, but a dummy to partially control differences. Instead, we focus the effect of ECAS on employment possibility, since having a job is the prerequisite of the qualification of local Hukou.

2.3.3. Theories of positional goods and job competition

Theories of positional goods and job competition are inspiring when we try to analyze the deterioration of labor market and escalating education competition in China. Hirsch draw the conclusion that education as a positional good, will gradually become more expensive, and emphasized the costly consequences when the society put more resources in this kind of positional good (Hirsch, 2005).

From his perspective, the value of education, or accepting education, is realized by its relative level, for it is impossible for employers to fully observe the ability cultivated by education. Therefore, we can assume that the individual also knows, that his expected gain from education can be roughly divided into two parts, the raise in human capital which helps his working ability, and the raise in relative level which suggest the scarcity of his education.

How the scarcity of education works in labor market, Thurow gave an explanation by its theory of job competition (Thurow, 1975). He suggests that better education will promise a better position in the job queue, where the companies select candidates in the front.

In the empirical aspect, Triventi calculated an index, ECAS (Education competitive advantage score), to measure the relative value of particular educational level, based on the theory by Sorensen (Sorensen, 1979; Triventi, et, al., 2016). The calculation will be introduced when we construct the model. To explain in a simple way, it calculates the scarcity of an individual with particular level of

education in his environment.

With this method, we are able to see the influence of education expansion, for it reduce the scarcity of higher education with no doubt. Besides, since the scarcity itself doesn't indicate individual's ability, when individual has passed the employment stage, the influence of relative education on its wage should become weaker, as his working experience accumulates.

2.4. Hypotheses

As we have demonstrated the different types of benefit that education can possibly provide in China, and the mechanism that how education being recognized and rewarded, we are going to test how the scarcity of particular level of education affects individual's wages and possibility of having a job in SOEs or government sectors. Testing following hypotheses may help us to learn the importance of Chinese families persistently investing for higher level of education, and the change of recognition on education by China's society and economy.

1. Relative education has positive influence on both pecuniary income and the possibility to work for SOEs or government units.
2. Because the education expansion, the influence of relative education becomes weakened as time passes.
3. As individual becomes aged, the influence of relative education becomes weakened.

2.5. Empirical Test

To test our hypotheses, we follow the Mincer model (Mincer, 1974), which is widely used to test the return to education. However, since we are going to add a variable to represent the concept of relative education that we mentioned above, which is ECAS (Educational Competitive Advantage Score), it requires us to make some definitions and clarifications on our data and key variable before we enter the construction of empirical model.

2.5.1. Setting

We first calculate the main variable that will be used in our empirical test, which is the ECAS we mentioned above. Follow Triventi's study (Triventi, et al. 2016) about the effect of relative education, and the theory used in their paper (Sorensen, 1979), we have:

$$ECAS\ (Educational\ Competitive\ Advantage\ Score)$$
$$= -\log\left(\frac{number\ of\ individuals\ who\ attained\ at\ least\ a\ certain\ level\ of\ education}{sample\ size\ of\ the\ paticual\ group}\right)$$

By saying “particular group”, we basically separate the full samples into different groups, according to geographic areas, age cohorts, and year of investigation, and the separation will be discussed in details later. Basically, with this method, we have individual’s ECAC with following characteristics that are desirable: 1, Individuals with higher education level have higher ECAS. 2, Individual’s ECAS is influenced by other people’s education level within the group. 3, Individuals from different groups differ in their ECAS even the received same level of education. Even though, some further clarifications are needed.

We start with the assumptions on which ECAS calculation relies. The first one is that more is better, which is similar to the traditional method in which we used educated year to represent the human capital level. Thus, we will see that at the same year, no matter how many universities graduates we have, they are more valuable than the senior-middle school graduates, according to the assumption.

It is possible that individuals who have received vocational education, can be more productive than a normal college graduates, but in China, at this point, we believe that: 1, individuals who made themselves into higher education are generally more capable in their works for their higher comprehensive abilities, and 2, neither the quality nor the system of vocational education in China is satisfying, which can be learned from the encouraging policies and opposite reaction of families (Hansen & Woronov, 2013). Therefore, in most cases, ECAS is a trustable standard for relative value of particular education level.

The second one is that, individual in the same group are competing in the same job market. When we follow the Thurow’s theory, which suggests that universities graduates are crowding out the college students and senior-middle school students from their original ranking in the job queue or even their works, we think the assumption coincides with our real world, even in China. However, it would be hard to explain the existence of competition between a university student and junior-middle school student. Therefore, we assume that companies who want to employ junior-middle school students to do simple manual works, won’t consider the supply condition of students of higher education. Some people may point out that ECAS assumes the competition between students with different expertise, which is lack of rationality. However, since the knowledge taught by higher education and skill required by society are less relevant, we assume that in many cases, students with different expertise still compete in same court, especially for some particular enterprises with magnificent attraction, such as SOEs with monopoly revenues.

The above discussion exposes some shortcomings of ECAS, mainly because it neglects the heterogeneity of the individuals with different education experience, which would be a main topic in future researches about education. Even though, ECAS is still the most reasonable variable that we can currently find in the measurement of relative value of certain level of education.

As for the advantages of ECAS in our empirical tests, the first one is that it reflects the

characteristics of relative education in a comparatively accurate way, which follows the logic that a merchant's scarcity affects its market value. The second advantage is that ECAS provides a way to compare the same level of education between different areas and years, because it considered the distribution of educated individuals in those areas and years. In other words, in days before, we only consider the educated year, in order to explain its value, but in the point of view of relative education, same level of education can have its value changed across places and times, and using ECAS enable us to focus these changes.

2.5.2. Data

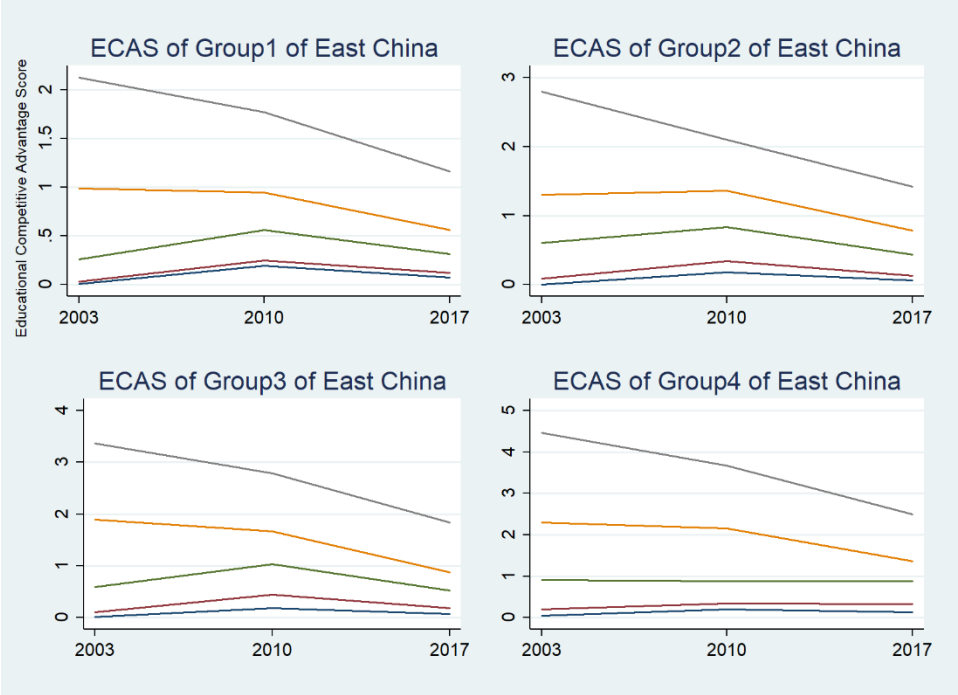
CGSS (Chinese General Social Survey) of 2003, 2010 and 2017 are used in our empirical tests. To take the education expansion into the models, and ensure the time span of data can cover the age changes of different groups, we define the concept of cohorts before we go to tests. Specifically, for data of each year, we keep individuals from age of 24 to 51, and divide them into 4 groups that each one covers 7 years, which means we construct the 4 cohorts of our models for each investigation and we have 12 groups in total, as Table 2.1 shows.

Table 2.1. Cohort groups by Age

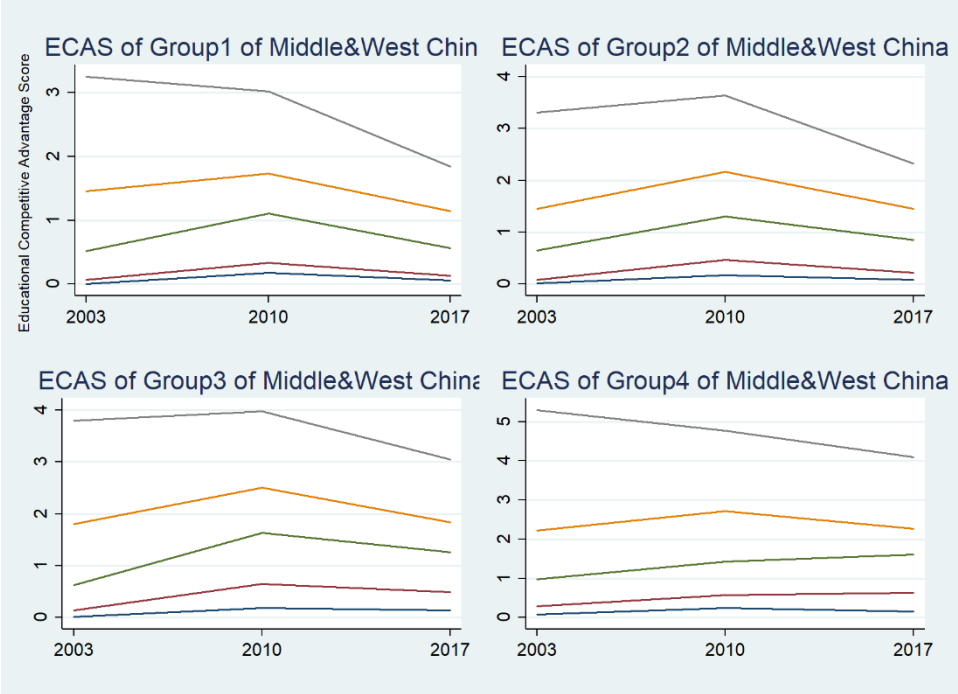
	CGSS2003	**CGSS2010**	**CGSS2017**
Group 1	24-30	24-30	24-30
Group 2	31-37	31-37	31-37
Group 3	38-44	38-44	38-44
Group 4	45-51	45-51	45-51

The separation allows us to test the different influence of relative education across cohorts in same year, and test the influence to a certain group of cohorts in different years. Besides, these treatments make the tracing on a certain group possible. For example, the first group in 2003 basically includes basically same people in the third group in 2017, and the second group 2003 and fourth group in 2017 have the same contents. By this classification, we now can calculate the change of ECAS with Graph 2.1 and Graph 2.2.

Graph 2.1. Education Competitive Advantage Score of groups in East China



Graph 2.2. Education Competitive Advantage Score of groups in Middle & West China



2.5.3. Model

We follow the basic Mincer model with working experience and its square, and add variables we interested, particularly the ECAS, and control variables that are proved to be necessary in researches about China, such as areas, and the political identity.

Apart from the basic models, we need alternative model to avoid some of the sample selection bias. Particularly, in this situation, since individuals with more education experience are more likely to have a job, if we exclude individuals without jobs, the influence of education would be possibly underestimated. Therefore, we also use a selection model to take the influence of education experience on possibility of being occupied into account (Heckman, 1979). Thus, we build models like:

(1) Manipulated Mincer model

$$\ln(Income) = a + \beta_1 ECAS + \beta_2 edu + \beta_3 experience + \beta_4 experience^2 + \theta X + \varepsilon$$

where X contains control variables.

(2) Heckman two-stage selection model

Selection Mechanism:

$$Z_i^* = \gamma' W + u_i,\ Z_i = 1\ if\ Z^* > 0\ and\ 0\ otherwise$$

Regression model:

$$Y_i^* = \beta' X + \varepsilon_i\ observed\ only\ if\ Z_i = 1,$$
$$E(Y_i | Z_i = 1, X) = \beta' X + \rho\sigma_u\sigma_\varepsilon\lambda(\gamma' W)$$

where $\lambda(\gamma' W_i)$ is the inverse Mill's ratio, Y_i^* is income and Z_i is the dummy variable suggesting being employed.

With these models and manipulated data, we have our empirical results.

Table 2.2. Descriptive statistics of the sample

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
inv_year	12,513	2,011	5.338	2,003	2,017
edu_year	12,513	10.59	3.856	1	19
ecas	12,513	0.785	0.762	0	5.298
ln_income	12,513	9.681	1.215	2.079	14.85
marixfe	12,513	0.440	0.496	0	1
marixmale	12,513	0.420	0.494	0	1
east	12,513	0.454	0.498	0	1
age_group	12,513	2.696	1.081	1	4
work_year	12,513	12.02	10.10	0	48
work_year2	12,513	246.5	299.2	0	2304
edutype_pt	12,513	0.0954	0.294	0	1
edutype_voc	12,513	0.172	0.378	0	1
hk_urban	12,513	0.542	0.498	0	1
cparty	12,513	0.130	0.337	0	1
occupy	12,513	0.872	0.334	0	1
farming	12,513	0.166	0.372	0	1
male	12,513	0.519	0.500	0	1
ptner_edu_year	12,513	8.763	4.997	0	19
ptner_occupy	12,513	0.666	0.472	0	1
child	12,513	1.217	0.857	0	12
f_edu_year	12,513	6.489	4.659	0	19
m_edu_year	12,513	4.426	4.570	0	19
edu_expa	12,513	0.227	0.419	0	1
state_own	12,513	0.258	0.437	0	1
year2010	12,513	0.403	0.491	0	1
year2017	12,513	0.360	0.480	0	1
eduxinv_year10	12,513	4.005	5.473	0	19
eduxinv_year17	12,513	3.928	5.793	0	19
ecasxinv_year10	12,513	0.351	0.663	0	4.769
ecasxinv_year17	12,513	0.261	0.529	0	4.102

Table 2.3. Mincer Model estimation on 12 groups

Dependent variable: Log individual's wage

VARIABLES	(1)2003G1 ln_income	(2) 2003G2 ln_income	(3) 2003G3 ln_income	(4) 2003G4 ln_income	(5) 2010G1 ln_income	(6) 2010G2 ln_income	(7) 2010G3 ln_income	(8) 2010G4 ln_income	(9)2017G1 ln_income	(10) 2017G2 ln_income	(11) 2017G3 ln_income	(12) 2017G4 ln_income
ecas	0.353***	0.320***	0.288***	0.076	0.069	0.244***	0.120*	0.246***	0.033	0.057	0.237***	0.193***
	(3.62)	(4.06)	(4.28)	(1.23)	(0.73)	(3.10)	(1.96)	(4.22)	(0.30)	(0.59)	(2.74)	(2.76)
edu_year	0.069**	0.032	0.022	0.067***	0.082***	0.080***	0.055***	0.019	0.070***	0.119***	0.060***	0.041***
	(2.25)	(1.29)	(1.02)	(3.47)	(3.85)	(4.67)	(3.89)	(1.60)	(4.21)	(6.78)	(3.65)	(2.77)
male	0.192***	0.188***	0.221***	0.194***	0.387***	0.386***	0.484***	0.379***	0.230***	0.406***	0.497***	0.296***
	(2.77)	(3.43)	(3.98)	(2.88)	(6.64)	(7.24)	(10.89)	(7.75)	(4.65)	(7.98)	(9.46)	(5.84)
east	0.374***	0.386***	0.328***	0.422***	0.382***	0.387***	0.315***	0.288***	0.568***	0.453***	0.580***	0.466***
	(4.98)	(6.98)	(5.96)	(6.51)	(4.77)	(6.12)	(6.27)	(5.24)	(8.63)	(6.92)	(7.91)	(7.58)
hk_urban	-0.388***	-0.355***	-0.199*	0.102	0.031	-0.014	0.164***	0.062	0.170***	0.019	0.053	0.117*
	(-3.13)	(-3.40)	(-1.81)	(0.59)	(0.38)	(-0.18)	(2.70)	(0.88)	(3.03)	(0.31)	(0.82)	(1.73)
cparty	-0.086	0.005	0.011	0.145*	0.101	-0.011	0.056	0.103	0.206**	-0.084	0.044	0.044
	(-0.82)	(0.06)	(0.15)	(1.82)	(1.07)	(-0.12)	(0.78)	(1.35)	(2.46)	(-0.99)	(0.53)	(0.49)
state_own	-0.144*	0.089	0.179***	0.086	-0.084	-0.140*	0.181***	0.087	-0.093	-0.092	-0.104	0.054
	(-1.96)	(1.45)	(2.92)	(1.20)	(-1.07)	(-1.87)	(2.66)	(1.17)	(-1.41)	(-1.25)	(-1.35)	(0.66)
farming	-1.028***	-1.322***	-0.871***	-1.070***	-0.595***	-0.653***	-0.509***	-0.557***	-0.457***	-0.593***	-0.803***	-0.716***
	(-3.49)	(-4.05)	(-3.60)	(-4.15)	(-5.82)	(-7.37)	(-7.14)	(-6.60)	(-3.48)	(-5.41)	(-8.06)	(-7.12)
work_year	0.131***	-0.012	0.004	-0.015	0.028**	0.034**	0.015	0.025**	0.035**	0.008	0.003	0.010
	(3.42)	(-0.49)	(0.20)	(-0.75)	(2.11)	(2.05)	(1.48)	(2.48)	(2.23)	(1.12)	(0.25)	(0.92)
work_year2	-0.006**	0.001	-0.000	0.000	-0.000	-0.001	-0.000	-0.001**	-0.002	-0.000	0.000	-0.000
	(-2.53)	(0.97)	(-0.47)	(0.97)	(-0.62)	(-1.06)	(-0.59)	(-1.99)	(-1.56)	(-0.40)	(0.41)	(-0.47)
edutype_pt	-0.170	0.034	0.050	0.066	-0.089	-0.317***	-0.060	0.020	-0.032	-0.102	0.127	0.089
	(-1.41)	(0.35)	(0.49)	(0.50)	(-0.80)	(-3.16)	(-0.66)	(0.18)	(-0.34)	(-1.15)	(1.39)	(0.81)
edutype_voc	0.045	0.127	0.180**	0.147	-0.108	-0.205***	-0.132*	0.059	-0.137**	-0.219***	-0.149**	0.081
	(0.48)	(1.54)	(2.09)	(1.50)	(-1.37)	(-2.68)	(-1.70)	(0.60)	(-2.27)	(-3.40)	(-2.00)	(0.97)
Constant	7.693***	8.465***	8.398***	7.836***	8.387***	8.288***	8.403***	8.604***	9.245***	8.832***	9.154***	9.283***
	(24.96)	(33.42)	(36.48)	(31.61)	(47.47)	(62.36)	(78.43)	(77.80)	(59.10)	(58.59)	(75.33)	(74.27)
Observations	437	703	692	573	785	1,026	1,482	1,233	829	943	991	1,217
R-squared	0.294	0.283	0.273	0.291	0.400	0.485	0.475	0.447	0.353	0.445	0.503	0.453

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.4. Coefficient of ECAS on wage for different groups

coefficient of ECAS on wage	CGSS2003	CGSS2010	CGSS2017
G1 24-30	0.353***	0.069	0.033
G2 31-37	0.32***	0.244***	0.057
G3 38-44	0.288***	0.12*	0.237***
G4 45-51	0.076	0.246***	0.193***

Table 2.5. OLS model estimation on groups of different age

VARIABLES	(1)Group1 state_own	(2)Group2 state_own	(3)Group3 state_own	(4)Group4 state_own
ecas	0.552*	0.850***	0.276	0.114
	(1.91)	(2.89)	(1.23)	(0.54)
edu_year	0.055	0.014	0.098	0.125**
	(0.68)	(0.20)	(1.63)	(2.26)
male	-0.035	0.085	-0.104	0.289***
	(-0.31)	(0.81)	(-1.00)	(2.63)
east	0.044	-0.071	-0.071	0.254**
	(0.27)	(-0.54)	(-0.55)	(2.05)
hk_urban	0.597***	1.017***	1.292***	1.325***
	(3.84)	(6.36)	(8.85)	(8.59)
cparty	0.749***	0.429***	0.402***	0.224
	(4.69)	(2.96)	(3.04)	(1.61)
edutype_pt	0.570***	0.577***	0.707***	0.363**
	(3.04)	(3.71)	(4.32)	(1.99)
edutype_voc	0.499***	0.518***	0.404***	0.524***
	(3.46)	(4.05)	(2.99)	(3.52)
year2010	-2.376**	-2.872***	-2.883***	-2.416***
	(-2.45)	(-3.59)	(-3.89)	(-3.42)
ecasxinv_year10	-0.022	-0.522	-0.032	0.143
	(-0.07)	(-1.43)	(-0.11)	(0.52)
eduxinv_year10	0.054	0.125	0.093	0.040
	(0.60)	(1.42)	(1.10)	(0.49)
year2017	-2.310**	-2.997***	-2.918***	-2.335***
	(-2.22)	(-3.43)	(-3.81)	(-3.56)
ecasxinv_year17	0.444	-0.534	0.078	-0.200
	(1.16)	(-1.32)	(0.25)	(-0.67)
eduxinv_year17	0.025	0.117	0.087	0.045
	(0.28)	(1.33)	(1.11)	(0.58)
Constant	-1.831**	-1.627**	-2.161***	-2.492***
	(-2.25)	(-2.56)	(-3.77)	(-5.23)
Observations	2,051	2,672	3,165	3,023

Dependent variable: Possibility of having a job in governmental sector

z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.6. OLS model estimation on groups of different age

Dependent variable: Log individual's wage

VARIABLES	(1)Group1 ln_income	(2)Group2 ln_income	(3)Group3 ln_income	(4)Group4 ln_income
ecas	0.270***	0.214***	0.270***	0.066
	(3.14)	(2.72)	(3.82)	(1.02)
edu_year	0.065**	0.078***	0.031	0.073***
	(2.57)	(3.60)	(1.47)	(3.83)
male	0.270***	0.342***	0.424***	0.310***
	(8.10)	(11.13)	(14.59)	(9.98)
east	0.469***	0.402***	0.373***	0.384***
	(10.99)	(11.33)	(11.16)	(11.04)
hk_urban	0.075*	-0.048	0.059	0.067
	(1.72)	(-1.12)	(1.46)	(1.48)
cparty	0.098*	-0.017	0.047	0.095**
	(1.80)	(-0.35)	(1.05)	(1.99)
state_own	-0.104**	-0.045	0.103***	0.062
	(-2.44)	(-1.12)	(2.58)	(1.41)
farming	-0.557***	-0.687***	-0.651***	-0.651***
	(-7.54)	(-10.96)	(-11.99)	(-10.76)
work_year	0.029***	0.012**	0.014**	0.015**
	(3.49)	(2.16)	(2.03)	(2.23)
work_year2	-0.001	-0.000	-0.000	-0.000
	(-1.35)	(-0.37)	(-1.03)	(-1.46)
edutype_pt	-0.110*	-0.174***	0.014	0.044
	(-1.82)	(-3.25)	(0.26)	(0.68)
edutype_voc	-0.098**	-0.132***	-0.060	0.093*
	(-2.31)	(-3.19)	(-1.33)	(1.81)
year2010	0.858***	0.745***	0.811***	1.193***
	(3.10)	(3.38)	(3.84)	(6.70)
ecasxinv_year10	-0.145	0.028	-0.088	0.200**
	(-1.42)	(0.28)	(-1.02)	(2.51)
eduxinv_year10	0.003	0.001	0.011	-0.061***
	(0.09)	(0.03)	(0.48)	(-2.88)
year2017	1.475***	1.204***	1.233***	1.657***
	(5.26)	(5.23)	(5.72)	(9.17)
ecasxinv_year17	-0.263**	-0.162	-0.205**	0.085
	(-2.28)	(-1.46)	(-2.14)	(0.98)
eduxinv_year17	0.021	0.041*	0.056**	-0.019
	(0.81)	(1.66)	(2.40)	(-0.85)
Constant	7.647***	7.667***	7.778***	7.531***
	(29.19)	(36.67)	(37.93)	(43.58)
Observations	2,051	2,672	3,165	3,023
R-squared	0.556	0.588	0.553	0.505

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.7. Heckman selection model estimation on different year

Selection variable: employment status

Dependent variable: Log individual's wage

VARIABLES	(1)2003 occupy	(2)2003 ln_income	(3)2010 occupy	(4)2010 ln_income	(5)2017 occupy	(6)2017 ln_income
ecas	-0.109*	0.260***	0.389***	0.167***	0.179**	0.129***
	(-1.70)	(7.83)	(4.81)	(4.83)	(2.04)	(3.21)
edu_year	0.085***	0.014	-0.040**	0.056***	0.024*	0.070***
	(5.08)	(1.19)	(-2.49)	(7.51)	(1.66)	(9.07)
male		0.070**		0.402***		0.336***
		(2.00)		(14.65)		(11.06)
east	-0.133**	0.394***	0.197***	0.345***	0.155**	0.507***
	(-2.34)	(13.06)	(3.29)	(11.57)	(2.55)	(15.33)
hk_urban		-0.226***		0.087**		0.101***
		(-3.77)		(2.47)		(3.21)
cparty		0.030		0.062		0.064
		(0.75)		(1.54)		(1.49)
state_own		0.068**		0.031		-0.056
		(2.07)		(0.84)		(-1.50)
farming		-1.077***		-0.590***		-0.689***
		(-8.02)		(-14.12)		(-13.59)
work_year		-0.002		0.030***		0.013***
		(-0.35)		(5.79)		(2.95)
work_year2		0.000		-0.001***		-0.000*
		(0.42)		(-5.41)		(-1.73)
o.edu_expa	-	-				
edutype_pt		0.012		-0.068		0.037
		(0.22)		(-1.38)		(0.78)
edutype_voc		0.107**		-0.077*		-0.112***
		(2.51)		(-1.95)		(-3.27)
imr		-0.863***		-0.127		-0.204
		(-6.51)		(-0.94)		(-1.26)
marixfe	0.127		0.106		-0.041	
	(0.88)		(0.84)		(-0.31)	
marixmale	-0.488***		-0.475***		-0.698***	
	(-3.17)		(-3.38)		(-4.78)	
ptner_occupy	0.622***		0.766***		0.685***	
	(9.73)		(11.79)		(9.78)	
ptner_edu_year	0.003		-0.002		-0.002	
	(0.27)		(-0.16)		(-0.18)	
child	-0.028		0.098***		0.031	
	(-0.61)		(2.63)		(0.93)	
f_edu_year	0.013*		0.005		-0.002	
	(1.78)		(0.82)		(-0.32)	
m_edu_year	0.002		-0.001		0.012	
	(0.25)		(-0.09)		(1.53)	
edu_expa			0.308***	0.132***	0.021	0.137***
			(3.94)	(3.46)	(0.32)	(4.01)
Constant	-0.147	8.931***	0.769***	8.465***	0.592***	9.152***
	(-0.84)	(55.53)	(5.69)	(120.44)	(4.64)	(95.54)
Observations	2,958	2,405	5,045	4,526	4,510	3,980
R-squared		0.278		0.463		0.476

z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

2.6. Result

2.6.1. The effect of relative education

In our results of the models, it is easy to find out that in many cases, ECAS positively influences both individual's wage (in Table 2.3.) and the chance of having a job in SOEs or government sectors (in Table 2.5.), which coincides our prediction. However, it is necessary to give more explanations on its effects, because they are not consistently significant.

Firstly, as for the pecuniary income, when we control the educated year of the individuals, ECAS usually reflects the scarcity of individual's education level in particular time and area, and the scarcity decides their position in the job queue. After "Reform and Openness" policies were implemented in China, but before the educational expansion, the increasing speed of number of new jobs were overwhelming the supply of workers with higher education experience, which provides more choices and enhance the negotiating power of those workers. The consequence is that worker who has received higher education have priority in job queue of most industries and areas, with higher wages.

However, in our analysis that use basic model to test our 12 groups, we can see that in some groups, wages of those individuals were not significantly affected by their relative education (in Table 2.4.). One of them is individuals of Group4 in 2003, who received the influence of "Cultural Revolution" in their ages for higher education, and this becomes a part of reason for insignificant coefficient of ECAS in Group4 (Table 2.6.). Others are Group 1 of 2010 and Group 1&2 of 2017, which consists of individuals who have experienced education expansion when they were age for university entrance test.

These insignificant results indicate that at least two aspects of change. The first one is that the scarcity of higher education has less power in explaining the income, because people with higher education experience, though they are still rare in China, have their ECAS dramatically decreased along with the progress of education expansion. Their income, however, has not changed that much, compared to the change in number of higher education graduates.

The second aspect of change is that the demand side in labor market, including enterprises and government sectors, has found that judging the value of labor by their scarcity in education level became less efficient than it used to be. Therefore, employers will take methods like, 1, asking for more certificates from the employees; 2, setting a new standard that have less relation with formal education. However, both have potential danger to education and employment as well.

The potential danger in the former one is that it would lead a more serious social division within China. Gaokao system, though it has several problems, is generally considered as the fairest system in China (Wang & Ross, 2010). If normal families are required to provide certificates or experiences other than higher education, the inequality will almost definitely be magnified, and generate more social problems.

As for the later one, it may lead to a wider separation between schools and societies. We have mentioned before that part of the reason of competition around education is for a better living standard or working environment. If higher education and the knowledge that it teaches cannot fulfill this expectation, or, gradually widen the gap between the exact gain and expected return, it would be a disaster to China's future education industry.

Secondly, showed by Table 2.5., ECAS also have significant influence on the possibility of having a government relevant job, to individuals of Group1 and Group2, who were between age of 24 and 37. It suggests that the individual enhancing their relative education level is also motivated by the possibility of having a job in government, rather than for higher wages only. Reversely, government sectors, though the contents of their job generally do not require the ability or knowledge taught in universities, they are preferring to employ these graduates with higher education experience.

According to the introductions before, SOEs and government sectors across the nation were shrinking their scales and their employment. It makes the supply exceed the demand, for its attraction did not really change. Generally, education level and capability for tests are the important factors to compete for the jobs, but the results demonstrates that relative education level is also another effective method in the competition. There is no doubt that government provides at least reasonable wages to its employees, but since it is hard to detect the gray income happens frequently inside the government system, we guess this kind of income may also significantly encourage individuals to participate education competition, or, this gray income can compensate more losses resulted by education investment than income that are provided by other kinds of jobs.

To discuss the reason why people in Group3 and Group4, who are over the age of 37, did not enjoy the significant influence of their ECAS on the possibility of having government relevant jobs, we should not forget the rule that China forbids individuals above age of 35 to participate the formal examination for government official jobs. This rule implies that for people above age of 35, setting aside the special cases such as relative connections, they are only allowed to get out, not get in.

2.6.2. The change of the effect of ECAS along with the time.

As the time passed, influence of ECAS became weaker. More specifically, for people of similar ages but from different year, ECAS in 2003 had stronger effect on individuals' wages than it did in 2017 (Table 2.4.). When we only consider the individuals of different year, but control the impact of selection bias with the Heckman selection model (Table 2.7.), the change of effect of ECAS on wage is also obvious. To give this change a name, we shall call it "horizontal change".

We have mentioned that ECAS for people with higher education has dramatically declined as the education expansion progresses. Since Group1 in 2010 and Group1 and Group2 in 2017 have been affected by education expansion, and their ECAS have no significant effect on wages, we tend to attribute this change to the education industrialization policies. However, it worth our attention that

even for cohorts without the experience of education expansion, their ECAS was still having less power in explaining its pecuniary income. For this situation, we here give two possible explanations.

The first possible reason is that as the economy grows and division of labor progresses, companies and firms have more criterions to assess the value of candidates. At the early time of 21 century, higher education experience was explained as higher ability to accomplish jobs and to adapt new environment. However, economy growth shifted the demand from scarcity to professionality, but the education expansion in higher education did not aim to help graduates to deal with the labor market, making the matching between firms and workers become harder. To respond the changing situation, firms would either set other criterions to find appropriate workers, or organize training projects to cultivate necessary working ability, and both of them will raise the cost of production and it will be partially transmitted to employees, which make their ECAS less important in their pecuniary income.

Secondly, it may because individuals in competition are facing opponents from other cohorts, other than themselves. Though we calculated individual's ECAS based on particular cohorts and area that the individual belongs, it probably does not fully cover the competition environment that particular individual is confronting with. For example, consider the situation that two workers with higher education experience compete for on job, while only the first one has been affected by education expansion, which is very possible when the industry lacks enough skilled workers in early time of "Reform and Openness". In this case, the scarcity of the first worker, that measured by ECAS based on his cohorts, is underestimated, because he is competing with other cohorts that generally has higher ECAS for higher education graduates, making himself more valuable. Vice versa, ECAS of the second person is overestimated. In other words, even particular cohorts didn't receive expanded higher education, the effect of their relative education is still becoming weaker as the social educated level increases.

2.6.3. Effect of ECAS became weaker as individual gets aged.

This tendency suggests that relative education indeed has the function of signaling, and we shall define this change in its influence as "vertical change", to distinguish from the former "horizontal change".

When a graduated student is finding his/her first job, what this student can provides to persuade employers, are only their educational diplomas. However, as the workers have other persuasive information about his working ability, relative education will gradually lose its value.

Specifically, on the one hand, as workers become aged, their wages, or the increased part of their wages, are going to have a closer relation with their ability in actual work or social occasions, than their relative education and even their absolute education level. On the other hand, change of the wages of the veteran workers may because they get a new employment, which depends a lot on their experience and profession certificates. Therefore, as the age of the individual increases, relative

education, measured by ECAS here, has weaker influences on this individual's wage.

There is another factor may cause this kind of delineation, which is the fact that education level will only increase. As the adult education develops in China, more workers of the same cohorts have the chance to improve their education, which is definitely raise the average level of the human capital of those cohorts. However, the development, though the effect is small, also makes ECAS lower.

2.7. Implications

2.7.1. Existence of job competition

The results about the analysis on ECAS in this paper reflect the importance of relative education level, and prove the existence of job queue. Though we have seen that ECAS for the relatively new generations, who had their school lives under the policies of education expansion, and their ECAS was also losing its significant effect in raising their wages, we should remember that the ECAS calculated here is very basic, meaning that it does not reveal all kind of scarcity that a certain education level can provide. In fact, apart from location and education level of the competition opponents, other factors can also affect the position of an individual with certain education experience, for example, the major in university and the industry.

Particularly, as the willingness of current young people to participate agricultural works is getting lower, young farmers with higher education and relevant knowledge will jump to the front of the job queue, even though farming in China is basically welcoming candidates. Some may claim that income from agriculture is decreasing to such a low level that no families want their children to take agriculture as their major in universities, even they can have a good position in future job queue. However, the reality is that people with agricultural knowledge and professional management skill, are having considerable income and other benefit associated with life style in China. Standing in the front of job queue here suggests gaining more resources and subsidy from governments, which will make the farming more profitable.

On the contrary, when workers gather in particular metropolitans, or industries that require little knowledge taught in schools, they are actually placed in a relatively long job queue and it is hard for their relative education level to push them to the front. All of these are not precisely considered in our setting about ECAS or our model, and they are also important to the scarcity of individual's education experience.

By saying these, we are also giving explanation to the continuing educational investment behavior of families or individuals. Because when they are able, or, believe that they are going to be able to have themselves in the front of job queue in future, they can keep their faith in the education investment, regardless of the diploma inflation caused by education expansion.

2.7.2. Benefit other than wages

Though we emphasized the relationship between income and ECAS, it is still important to remember that benefit of particular type of job is also affecting families and individuals' judgement about education investment, basically because there are benefits that cannot be reflected by pecuniary wages, or even cannot be quantified. We have introduced some kinds of benefit that can be attained through jobs in governmental sectors and we have found the positive relation between possibility of having those jobs and individual's ECAS (Table 2.5.), suggesting that benefit other than pecuniary wages is also provide much incentive for people to have more education.

We used Heckman model to avoid the impact of selection bias, in order to have more accurate results on the effect of ECAS (Table 2.7.). However, according to the results showed by two-stage selection model, even not for particular job in governmental sectors, ECAS still raises the possibility of being employment. All of these are warning us that when we try to figure out what are individuals pursuing for in their education, it is crucial to see factors other than mere pecuniary income. Otherwise, we should not make any hasty decision based on the calculation result about mere "return of education".

2.7.3. The future of popularized higher education

Relative education was losing its significant influence as time goes by, suggesting the education expansion has decreased the scarcity of graduates with higher education experience, weakening the incentive of families to send their children to higher education institutions merely for a diploma. As we have mentioned above, because of the limit of data, we here don't consider other criterions, such as industries and major subjects in higher education, to further classify the sample. Hence, it is still possible to say that higher education is giving "meaningful" scarcity to individuals that remains its significant influence on pecuniary wages, but we cannot sure about the level of this influence.

However, comprehensively, it is reasonable to suspect the further declination of the incentive of accepting higher education, especially education with relatively low equality, because if education expansion, mainly driven by the growth of higher education institutions of low quality, continues, individuals will percept the decrease in the profitability of relative education more clearly and choose higher education more cautiously. It is dangerous for China to fall into the anti-intellectualism because the economy reform is still in its early stages, and enormous amount of government money has been invested into higher education.

This reminds us, the education expansion in China may has reached a point that it requires higher equality of higher education, including enhance the relation between curriculum and employment, to compensate the decreasing benefit brought by the increasing quantity of higher education graduates, in order to keep the incentive of individuals to continuously choose higher education.

2.7.4. Gap between schools and companies

The verification about hypothesis 3 suggests effect of ECAS on individual's wage become weaker as time passes. This result helps us prove the signaling effect of ECAS, which may also imply that workers tend to not rely on relative education as his working experience accumulated. Furthermore, if training chances and promotion opportunities that have contribution to one's productivity and value can be attained through higher ECAS, then the credibility of ECAS in reflecting the ability of a person will be more doubtful.

Therefore, even ECAS is an inexpensive way to ranking the candidates, the closer between the above speculation and the reality, the less efficient for enterprises to take ECAS as a standard for raising payment and employment decisions.

This tendency will be accelerated if 1, knowledge taught by schools becomes more irrelevant to actual work, giving a higher weight of training held by companies and firms; 2, the division of labor goes further, separating the working efficiency and education equality of an individual. The later one is interesting but complicated because it strokes the current contradiction between the higher education and the job market, essentially, the economy development, but we are not going to talk about it partially because ECAS cannot provide persuasive conclusion on its own.

Once more, making ECAS more significant should not be the target of education. On the contrary, a matured market should develop its perfection in information exchange, hence weakening the economic significance of indices like ECAS. By saying this, we think that the reaction taken by companies, which is giving smaller weight to ECAS when deciding payment and employment, is not a bad thing for economy. A meaningless ECAS will force companies to search a better standard to assess a candidate, and the new, various standard will give more reasons for students and workers to make more rational choices.

2.7.5. The meaning of ECAS in China

Up to now, we have discussed the changes of influences of ECAS on pecuniary wages. We think it would be enlightening to make some deduction about some possible consequences caused by those changes. We have giving different definitions to changes of influence of ECAS, which are "horizontal change" (change with time) and "vertical change" (change with age), and there are different mechanisms behind these two kinds of changes.

Obviously, the direct reason of the "horizontal change" is because of the dramatic declination of ECAS, especially of the universities or college graduates, which deprive its ability in explaining the wage differences between individuals with different level of education experience. The fundamental reason, however, is the aggressive education expansion has led to a so-called "diploma inflation". Declination in the scarcity of higher education experience make the relative education level no longer able to promise an advantageous position in job queue, cutting the wage premium brought by position

advantage.

But the “vertical change” seems to be more complicated as there are very few changes in value of ECAS as cohorts grew. This type of change is possibly caused by other variables, including some missing variables, for they may gradually have more power in defining the pecuniary wages, as we described before. Fundamentally, ECAS carries some function of signaling, and gradually losing its credibility in representing working experience or social ability.

Because these two types of changes are driven by different reasons, it is natural to suspect that they generate different consequences to the economy of China. As for the horizontal change, it would help the macroeconomy development, for ECAS becoming lower implies more educated workers in China’s economy and strengthen the positive externality of social human capital, which is encouraging merit of education expansion. But the disappearing significance of ECAS in explaining pecuniary wages, clearly depict the situation that a university diploma itself cannot assure higher pecuniary income, while fortunately, can neither make income worth off. Considering the effect of ECAS on possibility of being hired, ECAS may still be the better choice for a long while, even not as profitable as it was.

The “vertical change”, however, may generate opposite effect to China’s economy, which means it will benefit individuals eventually, but will cast damages on long-term economy development in China. We mentioned that as gap between higher education and actual work gets wider, or division of labor steps forward, criterions other than higher education diploma will be accepted by both employers and employees, because of the low efficiency of decision making based on relative education level. Therefore, for individuals, invest themselves with new acknowledged standard will be more effective.

On the contrary, if higher education institutions cannot provide practical knowledge and ability, or, cannot persuade potential workers with the potential value of comprehensive ability that they have been keeping advocating, fewer individuals will treat higher education as unnecessary experience. In other words, higher education will be removed from the procedure of labor cultivation. Since technology evolution and social reform require years of researches and investment that may not pay off in short run, recession of higher education will almost definitely hurt the sustainable economic growth.

To summarize, the truth that the ECAS is generating weaker effect on individual’s wage and possibility of having a government relevant job, is reminding us that we should have a more profound comprehension about the education expansion and more perspectives when we observe the motivation of education investment by families or individuals.

One thing we can be sure about, is that education expansion, on vocational schools, colleges and universities will continue for a long while in China, because the ratio of people with higher education in China is still relatively low. According to investigations and data, average education year of China’s working population was over 10 in 2020. Though it has significantly increased from 1998, when the

number was 6.2. Besides, even though in 2020, the graduated students from university were about 4.2 million, 4 years ago, there were 12.7 million graduated students from senior middle schools and vocational middle schools. However, as we cultivate so many students equipped with higher education, we ought to understand why they select higher education and how we can help them to realize their value and make their knowledge contribute.

2.8. Conclusion

Since we have some doubts about the motivation of individuals in China keeping investing higher education with the return to education decreases because of the education expansion, we tried to analyze the phenomenon from the perspective of relative education, and empirically detected its effect on individual's pecuniary income and possibility of having a governmental relevant job.

To represent relative education in econometric model, we calculate ECAS to do the job. From empirical results, we found:

(1) ECAS have significant influence in increasing people's pecuniary income, possibility of being employed, and possibility of having a government relevant job.

(2) As time passes and age increases, explaining power of ECAS on pecuniary income is getting weaker.

With these findings, we make our conclusions:

(1) Scarcity of education experience in labor market can still generate detectable benefit to individuals. Since we only calculated ECAS in a very simple way, neglecting market division and differences between industries, it is still persuasive that relative education is working well and there are plenty reasons for individuals to keep their educational investment.

(2) The dramatic declination of ECAS weakened its explaining power on the division of individual's pecuniary income. Though it has raised the human capital level of the country, incentive of investing in higher education would be reduced.

(3) ECAS has the function of signaling, because as age increases, the influence of ECAS on wages become smaller. We suggest it is because people tend to rely on working experience and social ability, instead of education level, to attain a higher wage or better job.

We should be sober and rational about the tendency that education expansion will be continued for a long while in China, because people with higher education, even senior-middle school education are still or minority, leaving alone the quality of education. Therefore, we have to pay more attention on quality and specialty of education, the realization and application of knowledge, in order to compensate the increasing cost of families, and avoid the expansion of anti-intellectualism that would hurt to long-term development of China's economy.

2.9. Reference

English:

Cai, F. (2010). Demographic transition, demographic dividend, and Lewis turning point in China. *China Economic Journal, 3(2)*, 107-119.

Cai, H., Chen, Y., & Zhou, L. A. (2010). Income and consumption inequality in urban China: 1992–2003. *Economic Development and Cultural Change, 58(3)*, 385-413.

Chan, K. W. (2010). The household registration system and migrant labor in China: Notes on a debate. *Population and development review, 36(2)*, 357-364.

Chan, K. W. (2019). China's hukou system at 60: Continuity and reform. In *Handbook on urban development in China* (pp. 59-79). Edward Elgar Publishing.

Fleisher, B. M., & Wang, X. (2004). Skill differentials, return to schooling, and market segmentation in a transition economy: the case of Mainland China. *Journal of Development Economics, 73(1)*, 315-328.

Hansen, M. H., & Woronov, T. E. (2013). Demanding and resisting vocational education: a comparative study of schools in rural and urban China. *Comparative Education, 49(2)*, 242-259.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica: Journal of the econometric society*, 153-161.

Heckman, J. J. (2005). China's human capital investment. *China Economic Review, 16(1)*, 50-70.

Hirsch, F. (2005). *Social limits to growth*. Routledge.

Keung Wong, D. F., Li, C. Y., & Song, H. X. (2007). Rural migrant workers in urban China: living a marginalised life. *International Journal of Social Welfare, 16(1)*, 32-40.

Li, W., & Putterman, L. (2008). Reforming China's SOEs: an overview. *Comparative Economic Studies, 50(3)*, 353-380.

Li, X., Cai, G., & Luo, D. (2020). GDP distortion and tax avoidance in local SOEs: Evidence from China. *International Review of Economics & Finance, 69*, 582-598.

Liang, Z., & Chen, Y. P. (2007). The educational consequences of migration for children in China. *Social science research, 36(1)*, 28-47.

Liang, Z., Li, Z., & Ma, Z. (2014). Changing patterns of the floating population in China, 2000–2010. *Population and development review, 40(4)*, 695-716.

Lin, K. J., Lu, X., Zhang, J., & Zheng, Y. (2020). State-owned enterprises in China: A review of 40 years of research and practice. *China Journal of Accounting Research, 13(1)*, 31-55.

Liu, T., & Sun, L. (2016). Pension reform in China. *Journal of aging & social policy, 28(1)*, 15-28.

Liu, Y., Sang, B., Liu, J., Gong, S., & Ding, X. (2019). Parental support and homework emotions in Chinese children: mediating roles of homework self-efficacy and emotion regulation strategies.

Educational Psychology, 39(5), 617-635.

Liu, Z. (2005). Institution and inequality: the hukou system in China. *Journal of comparative economics, 33(1)*, 133-157.

Ma, C., Zhang, Y., Li, Y., Wang, Y., Jiang, Y., Wang, X., & Ma, S. (2020). Healthcare, insurance, and medical expenditure of the floating population in Beijing, China. *Frontiers in Public Health, 8*, 375.

Mincer, J. (1974). Schooling, Experience, and Earnings. Human Behavior & Social Institutions No. 2.

Ming, H. (2014). Migrant Workers' Children and China's Future: The Educational Divide. *The Asia-Pacific Journal, 12(9)*, 4.

Montgomery, J. L. (2012). The inheritance of inequality: hukou and related barriers to compulsory education for China's migrant children. *Pac. Rim L. & Pol'y J., 21*, 591.

Qian, Y. (1996). Enterprise reform in China: Agency problems and political control. *Economics of Transition, 4(2)*, 427-447.

Shen, J., & Huang, Y. (2003). The working and living space of the 'floating population' in China. *Asia Pacific Viewpoint, 44(1)*, 51-62.

Song, Y. (2016). Hukou-based labour market discrimination and ownership structure in urban China. *Urban Studies, 53(8)*, 1657-1673.

Sorensen, A. B. (1979). A model and a metric for the analysis of the intragenerational status attainment process. *American Journal of Sociology, 85(2)*, 361-384.

Sun, Q. (2022). SOE wage premium in China: new evidence. *Empirical Economics*, 1-27.

Szamosszegi, A. Z., & Kyle, C. (2011). *An analysis of state-owned enterprises and state capitalism in China (Vol. 7)*. Washington, DC: US-China Economic and Security Review Commission.

Thurow, L. C. (1975). *Generating inequality*. Basic books.

Triventi, M., Panichella, N., Ballarino, G., Barone, C., & Bernardi, F. (2016). Education as a positional good: Implications for social inequalities in educational attainment in Italy. *Research in Social Stratification and Mobility, 43*, 39-52.

Wang, X. (2008). Analyzing work attitudes of Chinese employees: A comparison between state-owned and privately-owned enterprises in China. *Chinese Management Studies*.

Wang, X., & Woo, W. T. (2011). The size and distribution of hidden household income in China. *Asian Economic Papers, 10(1)*, 1-26.

Wang, Y., & Ross, H. (2010). Experiencing the change and continuity of the college entrance examination: A case study of Gaokao County, 1996-2010. *Chinese Education & Society, 43(4)*, 75-93.

Wübbeke, J., Meissner, M., Zenglein, M. J., Ives, J., & Conrad, B. (2016). Made in china 2025. Mercator Institute for China Studies. *Papers on China, 2*, 74.

Xie, G. (2004). *Market transition of xiagang (laid-off) workers in urban China*. The Johns Hopkins

University.

Xinle, T., Zhen, W., & Xinting, L. (2022). The influence of government subsidy on enterprise innovation: based on Chinese high-tech enterprises. *Economic Research-Ekonomska Istraživanja, 35(1)*, 1481-1499.

Yang, C. (2016). Relocating labour-intensive manufacturing firms from China to Southeast Asia: a preliminary investigation. *Bandung, 3(1)*, 1-13.

Yang, G. L., Fukuyama, H., & Song, Y. Y. (2018). Measuring the inefficiency of Chinese research universities based on a two-stage network DEA model. *Journal of Informetrics, 12(1)*, 10-30.

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.

Zhang, Y. (2013). Does private tutoring improve students' National College Entrance Exam performance? — A case study from Jinan, China. *Economics of Education Review, 32*, 1-28.

Zhao, Y. (1999). Labor migration and earnings differences: the case of rural China. *Economic Development and Cultural Change, 47(4)*, 767-782.

Zhu, C., Qiu, Z., & Liu, F. (2021). Does innovation stimulate employment? Evidence from China. *Economic Modelling, 94*, 1007-1017.

Chinese:

丁小浩，于洪霞, & 余秋梅（Ding, Yu & Yu）. (2012). 中国城镇居民各级教育收益率及其变化研究: 2002~ 2009 年

黄斌，高蒙蒙，& 查晨婷（Huang, Gao & Cha）. (2014). 中国农村地区教育收益与收入差异. 中国农村经济, (11), 28-38.

刘万霞（Liu）. (2011). 我国农民工教育收益率的实证研究——职业教育对农民收入的影响分析. 农业技术经济, (5), 25-32.

王明进, & 岳昌君（Wang & Yue）. (2009). 个人教育收益率的估计与比较: 一个半参数方法. 统计研究, 26(6), 51-59.

张锦华，王雅丽，& 伍山林（Zhang, Wang & Wu）. (2018). 教育对农民工工资收入影响的再考察——基于 CHIP 数据的分析. 复旦教育论坛, 16(2), 68-74.

张永丽，李青原, & 张河森（Zhang, Li & Zhang）. (2018). 贫困与非贫困家庭教育收益率的差异及原因分析--基于甘肃省 14 个贫困村 1749 个农户的调查. 教育与经济, (3), 65-74.

赵西亮（Zhao）. (2017). 教育，户籍转换与城乡教育收益率差异. 经济研究, 12, 164-178.

3. Chapter3
Determinants of Family's Pecuniary and Time Spending in Shadow Education

3.1. Introduction

China has experienced phenomenal economic growth in the past 40 years, with phenomenal growth of inequality, unfortunately (Knight,2014; Ding & He,2018). Aiming at the expanding gap between different areas, scholars and governments have reached a consensus that human capital accumulation will alleviate the problems brought by inequality and property (Schultz,1961; Li & Yu,2014; Li,2015; Lee & Lee,2018). But recently, evidences showed that the contribution of human capital, measured by educated year, on the economic growth, or GDP, is clearly declining (Yue,2018). Meanwhile, the rate of return on human capital investment in rural area, seems to be lower than in urban area (Fang & Luo,2017; Ma, etc,2012).

Intuitively, the situation of the low return can be basically found in at least two aspects:

（1）Higher cost in the progress of human capital accumulation.

Despite of the free compulsory education policy, children of the migrant workers, who usually do not have the urban "hukou", are not assured the free education chance, which make families reluctantly join the private school that cost much more than the public ones. Even with the official documents from the State Council (2016), there are still many obstacles in the actual progress of execution.

For urban families, they are also paying lots of money for their children's education. For example, in metropolis like Beijing, education resources are allocated according to the district division, which means living in a district near a famous school has become a necessity to gain more educational resources. Therefore, the house of "school district" is usually one of the invisible cost of children's education for urban families (Hu, et al.2014; Ha, et al.2015).

（2）Lower return for a certain level of education or higher risk in return of education.

In the official documents throughout 1990s, series of policy about educational reform was interpreted as "educational industrialization" (1998), which was aiming to enlarge the government funds. Since then, university and college graduates has been rapidly increased, and its speed seemed to be much higher than of their quality and ability. At meantime, the demand for these graduates is far from strong enough, which can be inferred from the rate of unemployment of graduates (Li, et al.2014) and the urgent policy of "Mass entrepreneurship and innovation" (2018), which mainly tried to sustain the China's economic growth and to solve the employment of the young.

However, these changes and situations are not affecting the enthusiasm of families about their

children's education. In fact, in the progress of human capital accumulation, the role of shadow education is gradually becoming more important, and families are gradually accepting this way, to help their children getting better education resource (Bray,1999). However, in addition to bringing opportunities for families, shadow education is also causing many family and social problems. Confronting with these problems, it is necessary to ask: what factors significantly affect the families' choice and behavior about shadow education, and if there is possible way for government to can solve these problems.

We will introduce the background of this research in Section 2, mainly about the definition of shadow education and its development and peculiar characteristics in China. Section 3 presents former researches and articles about shadow education in China and in other countries, it also introduces the studies about parents' expectation and time, which also influence children's educational activities. Section 4 is about our hypotheses, tests, mainly based on Tobit model, Heckman two-stage sample selection model. The result of hypothesis test and explanation of our test result is in Section 5. Apart from the hypothesis tests, we also try to focus on other findings in the result, which is introduced in Section 6. With all the findings in this research, in Section 7, we attempt to assess current policies in China, and we present our worry and give some advices. Section 8 is the conclusion of this thesis, where we emphasize the importance of economics in education researches again.

3.2. Background

3.2.1. Shadow education

The concept of shadow education is usually used in comparative education theory, representing the educational activities that happen outside the formal school. The basic characteristics of shadow education have been concluded as: 1, Privateness. Compared to formal school education, especially the compulsory education, shadow education is often a kind of informal voluntary educational activity. 2, Supplementation. The contents of shadow education are usually similar to contents taught in formal school, or the supplement to school contents. 3, Academic subjects. The purpose of shadow education is generally to help the participators improve their academic performance, thus raising the possibility of having better educational resource in the future (Baker,1992; Bray,1999; Baker & LeTendre, 2005). The definition of shadow education in fact came from the JUKU in Japan, which represents the afterschool private tutoring institution (Baker,1992). Through the study in JUKU, students are hoping to raise their test score in school, or to prepare the entrance examinations, mostly for high school and university. Since the main purpose of shadow education has shifted to exam preparation, and the target of shadow education services has expanded to the masses (Mori & Baker,2010), Japan's shadow education now has a mature form and ratio of participation is generally high (Entrich,2017).

Afterwards, many similar researches have been done in Korea (Choi et al.2003). Though Korea

has reformed its educational system for many times (Lee,2008), the pressure of entering to next educational stage is still massive, which forces many families to spend much on their children in the participation of shadow education (Lee,2005). In the meantime, there are also many researches outside the East Asia. Not only in developed countries in Europe and north America (Melot,2007; Klemm & Klemm,2010; Fenech,1999; Claudia et al.2010), but also in some developing countries in Africa (Nzomo and Guantai,2001).

Though shadow education is now becoming a controversial topic in many countries, it shows different features and importance to the national economy. For example, in 2012, Japan had more than 50,000 educational institution providing tutoring services, and the total profit of the tutoring industry is around 35 trillion yen, and keep an increasing rate of 1.5% (Entrich, 2015). Similarly, the market of shadow education is also enormous. From the report by Korea Modern Economy Research Institute, in 2011, Korea families paid 64.6 hundred thousand won per month in average, or 19% of the family income per month. In Europe, Bray (2011) have arranged the data of the economic scale of shadow education in European countries, and found big diverges between different countries, for example, Greece and Bulgaria have spent much in shadow education, but Finland and Germany paid less. Accordingly, shadow education plays an important role in countries relying on unified examinations. As for the situation in China, we will discuss it with China's current education system in next part.

3.2.2. Current circumstance of shadow education in China

The educational system of GaoKao (China's College Entrance Examination) have been creating the demand for shadow education since educational industrialization started. At meantime, China's government have passed several laws and regulation to encourage the social forces to invest in education, hoping to alleviate the deficiency of educational resources (2002). However, the influx of capital has also promoted the aggressive growth of shadow education industry (Wang,2017).

As mentioned in the introduction of China's education, from the very start of the founding of PRC, the responsible of managing education issues is taken by the national government alone. Since 1965, China has brought all the private educational institutions into national control and changed into public schools, which means shadow education system that ruled by capital did not exist at all. Situations changed after the market-oriented reform in 1980s, which also casted impacts to the territory of education. In 1995, the title 25th of Education Law of the People's Republic of China (《中华人民共和国教育法》) mentioned that "The country encourages firms, social organizations, and individuals to found schools and other educational institutions under the laws." Since then, capital have gained the permission of entering the education field and also the support from both national and local governments. This also became an important factor to the extraordinary growth of the shadow education industry after the 1998 announcement that practically admit the industrialization of education.

As the official statistics shows, up to late 2018, there were 401050 tutoring institutions have been investigated by the ministry of education of China[7] (2018). According to an investigation by Intelligence Research Group (智研咨询), the market size of K12[8] industry has grown up to RMB 520 billion yuan(2019), not to mention the unregistered tutoring services providers.

In this market, we can see various types of business provided by shadow education institutions. As for the size, basically the same meaning to the student to teacher ratio, there are lessons that have 200 and even more students in one classroom, and one on one teaching service. As for the contents, though the majority, or traditional private tutoring institutions still provide the lessons that similar to the subjects in formal school, whether for complement or enhancement, as mentioned above, institutions are now enriching their contents to satisfy increasing various need of China's families. From those we are familiar with, such as piano lessons, painting lessons and football training camp, to those relatively newly aroused, such as programing lessons, minority language and Olympian math, shadow education is now trying to benefit from every kind of learning activity of students.

In the meantime, shadow education is also hoping to provide services to children of every educational stage, K-12, as mentioned. It is understandable that students who are going to confront with National university entrance examination need some additional help from the private tutoring, but institutions of shadow education have also convinced students of lower grade to attend their lessons as well, mainly by magnifying the importance of competition in academic performance, and by exaggerating the influence of intelligence development in children's early age. Unfortunately, for most of China's parents, either of the propaganda by those institutions has successfully generated an atmosphere of anxiety, driving parents to put more effort, time and money, into shadow education for their children. Thus, no matter from the size, the variety or the range, we can see clearly that shadow education is having more families involve than ever before.

3.2.3. Peculiar characteristics in shadow education in China

In fact, we have seen similar characteristics and trends of shadow education in other countries, such as Korea. The situation which we will emphasize more is that apart from the features conclude by the Faculty of Education of The University of Hong Kong, shadow education in China has generated other characteristics, and they are (1) Monopoly in specific geographic area, (2) Having direct influence on the admission of formal schools, (3) Developing new functions to replace family and school.

(1) Monopoly

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[7] 教育部办公厅关于全国校外培训机构专项治理行动整改工作进展情况的通报

[8] Kindergarten through twelfth grade (in America). 12th grade in America is supposed to be the 3rd grade of high school in China.

Though the number of registered tutoring institution are growing rapidly, different areas have their own acknowledged brand of private tutoring institutions. For example, New Orientation, Xueda and Haoweilai are famous across the country, but local institutions like Shuren in Nanjing is also very popular (Cheng,2013). Such popularity gives the institution the privilege to choose the candidates by providing them some entrance examination. It can be foreseen that the price for families who want to have their children enrolled in these popular institutions will growing higher, as long as the excessive demand continues, and we can actually see the tendency.

In the city N (Cheng,2013), the average cost for private tutoring services was 3500 yuan per family for per semester, and only 13% family did not pay for it. Apart from setting higher price for every year, institutions have also taken commodity bundling pricing strategy and price discrimination to squeeze the consumer surplus.

Besides, as internet popularized, online tutoring is becoming an alternative choice for families. The institution who provides online tutoring services mainly profits by selling lesson videos, which can be very expensive if the lesson is taught by a famous teacher, for example, 2000 yuan for 16 lessons on math of primary school level[9]. Considering the average income for even urban citizens, the cost of shadow education is not a small amount.

In fact, although many online lessons are sold on different websites, they are usually designed or made by those large shadow education institutions, which is another reason for their monopoly status. Need to be noticed, the existence of monopoly is not only because of the lack of educational resources supply outside the formal school, but also inside the school, which generate another feature of shadow education in China, that we will discuss below.

(2) Influence on school admission

In 1986, China promulgated the first Compulsory Education Law, and in 2011, compulsory education has been basically ensured for every family in China. However, though there is no need to worried about the qualification of being educated in primary or middle school, the entrance examination for in these two stages still attracts parents' great attention. Fierce competitions can be observed in these examinations, especially in the entrance test for famous academic schools. This phenomenon is partially because of at least three factors: decelerated economic growth, aggravated inequality and consolidated social class, which are increasing the stress of employment for the young graduate. The stress, however, has penetrated to the early stage of people's life and thus lead more competitions in education, that brought a new business opportunity for shadow education industry.

Traditionally, the way that private tutoring casting influence on formal school is helping students to raise their tests score in school, in order to gain advantage in future entrance examinations. However, a new way has been developed, which is that the test results and awards attained in famous private

[9] https://www.xueersi.com/select-course

tutoring institutions can be provided to formal school as references in admission (Cheng,2013). Because this connection between formal schools and shadow education industries exists, many families have to participate the tutoring courses held by those acknowledged institutions, in order to make their children more competitive in entrance tests of the well-known school. In other words, test score is still important, but less persuasive in entering an academic school of high quality than ever before, thus families need to spend more on outside-school certificates and qualifications provided by different tutoring institution, which apparently increase the burden on both parents and children. Currently, the Ministry of Education[10] (2018) has announced that test score provided by tutoring institutions must not be referred in school admission. However, once the rumors came out, that tutoring test score is helpful, families are still willing to pay.

(3) Demand creation

In fact, the second characteristic suggested above creates a new type of demand for shadow education, which actually the demand for qualifications that allow students participate the examinations or contests held by those institutions. Though this kind of demand has been suspended by government, there are still other kinds of demand created by shadow education.

As mentioned before, shadow education in China has covered almost every stage of education life of a person, including early childhood education (ECE) for kids and even babies. Many problems occurred in early childhood education services, for example, teachers were lack of training, contents of curriculums were lack of scientific proof, teaching environment were not safe enough, etc. (Hu & Szente,2009; Zhu & Zhang,2008). Other problems such as overlord terms and defaults of institutions, are also reported on the news.

These problems happened not only because of the immaturity of kids or the carelessness of parents, but also the omission of government participation, such as making relative laws and regulations. In contrast, German government involves in its early childhood care and education (ECCE), and emphasize the “free play” instead of “intelligence development” (Leu & Schelle,2009; Faas, Wu & Geiger,2017) to ensure healthy and natural growth of babies.

Apart from the healthy issues, early childhood education services, and other tutoring services that aim at early education stage, are actually trying to transmit the ideas of rat race to parents. At least in China, there has been existing a popular concept in early education stage, which is the “Start Line”. This concept emphasizes the feature of competition in education activities, and make families believe that the result, which is the rank of test in most cases, is far more important than the learning procedure, because nobody want to lose in the very start of the race.

Once this concept is accepted by families who are pecuniarily capable for children’s extra tutoring courses, the core motivation of educational spending will inevitably become to win the educational

[10] 教育部办公厅关于做好 2018 年普通中小学招生入学工作的通知

competitions, and ironically, their demand will be met by those tutoring institutions who promoted the concept of "Start Line", with services like intelligence training and even antenatal education.

Still, some people believe that when talking about choice of being educated, more is always better than less. However, there are at least two problems in the choice of early childhood education. The first one is who makes the choice, and the second one is how much will the choice pay off. It is hard to believe that a child of 3-5 years old has the right to make a choice about education, not to mention his/her ability of measuring the future pay-off. Besides, since most parents can hardly find evidence for the benefit and creditability of every ECE service, they have no choice but believe the propaganda of those institutions. In short, the choice to participate early childhood education is neither made by the education acceptor nor from a rational mind. Therefore, although early childhood education has its value, a big part of those demand is created by the shadow education industry.

3.2.4. Problems that shadow education bring about to China

Having the characteristics above, shadow education has caused many problems inside the families, and these problems can be mainly classified in two aspects.

(1) Family economic problems

In 2011, an investigation is done by the China Youth & Children Research Center, in which the "extended payment" for education that happens outside, is about 6031.4 yuan per year, 68.7% of the average educational expenditure, 8773.9 yuan. Particularly, 63.3% of the "extended payment" is for kinds of private tutoring services. In 2016, The Chinese Society of Education reported that a report that 31.6% of families (who have children studying in compulsory or high schools) were determined to have their children participate private tutoring at all costs, while 26.6% of families were willing to give half of income in those services, which mean over a half of families have strong willingness of related spending[11]. According to the CIEFR-HS 2017 data[12], 48% students of compulsory or high school have been receiving private tutoring services (for subjects or hobbies), and their average spending was 5616 yuan per year. In other words, for all students of these stages, the average was 2697 yuan per year. After that, a near research, done by Tencent, showed that 14.6% families have paid over 50% of income on children's education[13].

In 2016, Xinhua News Agency, as one of the China's governmental presses, emphasized the economic burden of private tutoring on families, and defined the private tutoring as the "drug" that

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[11] 中国辅导教育行业及辅导机构教师现状调查报告(2016) (Report on private tutoring industry and condition of its teachers)

[12] China Institute for Educational Finance Research-Household Survey, (CIEFR-HS)

[13] 中国商业教育辅导市场消费力报告(2019) (Purchasing power of family on private tutoring market)

was corroding the society[14]. Ironically, in the same year, as another famous report about private tutoring[15] introduced, there were fierce competitions around the qualification to attend a particular lesson, in which family had to draw a lottery for a chance to pay the high price, which means in many situations, even though the cost may have already been enormous for a family, money is sometime not the sufficient condition for attending a tutoring class.

(2) Health problems, including health of children and health of the relationship between family members.

In the report of PISA (Programme for International Student Assessment) 2018 by OECD, students of Beijing, Shanghai, Jiangsu, Zhejiang (B-S-J-Z(China): city or province on the eastern area of China) had the greatest performance in reading test, but also had 57 hours learning time per week. Students of Japan, in which private tutoring has a profound influence, though had 10% less reading scores than students of B-S-J-Z(China), had only 42 hours per week in learning, even lower than the OECD average,44 hours. It implies the relatively low study efficiency of students and they are under the heavy pressure in learning. Meanwhile, as CIEFR-HS 2017 data shows, students of compulsory or high school, were having 5.9 hour per week in private tutoring during semesters, and the number become 15 during the summer vacations, not even including the time on traffic and homework assigned by private tutoring classes.

Apparently, the long learning time will hurt the satisfaction of students, as showed in PISA 2018. The well-being of students from B-S-J-Z(China) came to the seventh to last of all participated countries. Under the study pressure, common problems like lack of sleep, family quarrel between parents and children, mental and physical health issue, are reported frequently. However, worse things are happening, which is the suicide among Chinese children and adolescent. It has been proved that reason for children suicide is not pure mental vulnerability, but the general mental breakdown caused by study anxiety, where the “Gaokao” system and private tutoring system should take the blame (Yang, Huang, Deng,2014). In fact, problems are more serious than the reported number of suicides, there were 32.09% of children and adolescent reporting suicide ideation and study anxiety is a significant factor (Tan, Xia, Reece,2018).

From above, we can see clearly the development of shadow education industries has casted serious negative influence on families, directly or indirectly. However, instead of paying attention to the problems happened in micro level, researches are used to emphasize the shadow education’s effect from a macro view, and focus on problems like capital transmission within generations, and solidification in social stratum. In fact, as we have seen above, compared to those theoretical future problems, there are already urgent problems for families to solved immediately.

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[14] 校外补课也是侵蚀社会风气的“毒品”。 新华每日电讯

[15] 疯狂的学而思，疯狂的校外培训，疯狂的中国家长。都市快报(2016)

Apparently, finding solutions to these problems within families are on the top of government's agenda, and researches from a microeconomic perspective will be significant in finding out the reasons for their behavior about shadow education investment. Moreover, these researches will provide evidences for governments when they make restrictions and laws on the operations of shadow education.

Shadow education in China has not only presented its features that have been observed in many other countries, but also developed many unique characteristics, based on Chinese culture and recent economic development. Its development, however, has change the shadow education problem, which was mainly a consumer decision-making problem, into an economic and social problem. In the meantime, many concealed problems in education system and economy growth are revealed by the development of shadow education. To find the solutions of these problems, it is necessary to start from realizing the factors that influence the family demand for shadow education. If we can understand what factors influence the family expenditure and how these factors work, it would be possible for governments and other social departments to make specific laws or regulations, and help the families to adjust their spending decision, and to avoid negative effects from the shadow education system.

3.3. Former Studies

Private tutoring, as its name tells, is held by private individuals or institutions outside the formal schools. If formal school is defined as educational institutions held by government or country, then private tutoring has been existed since ancient time (Chen,2009). In fact, before industrialization revolution, knowledge required by human is much fewer than afterwards, hence the informal education organized by private sectors, like family and workshop, were actually the majority of all education forms.

The situation changed since governments started to realize the significance of science and technology. They passed laws and regulations about education, and the education provided by private sectors were formalized or absorbed to be a part of formal education. Therefore, more students were able to be educated in formal institutions, and school education became the most important part in education system.

However, according to Doepke and Zilibotti (2019), another change happened since around 1970s, mainly because of the exaggerated inequality situation appeared in many countries. Parents, include authors themselves, found that the education received by current students is quite different from theirs. Comparing with their time, their children now have more homework, tutoring and other extracurricular activities, and all of these are becoming a considerable part of the education life of students.

In 1992, Baker and Stevenson (1992) studied the private tutoring system in Japan called "Juku". He found that "students from higher socioeconomic backgrounds are more likely to participate in

shadow education" and "students who participate in certain forms of shadow education are more likely to attend university". Meanwhile, Southgate (2009) also studied the factors that affect the purchase activity of families on shadow education, and demonstrated that "Families with high levels of cultural capital and high levels of social capital are more likely to purchase shadow education".

Since their researches provided many inspirations and evidences about shadow education, we first follow the results and start with the one of the most important factors: family income.

3.3.1. Family income on shadow education expenditure

As the result of former study showed, socioeconomic background of a family is an important factor that affect the participation in shadow education, which implies that the participation implies a series of consumption activities, including education services consumption and learning material consumption. In this perception, shadow education and formal school education have similar relation to family income, because many uses of shadow education institution are driven by the limited access or lower levels of fundings of formal schooling (Baker,2001). Since we have introduced the definition of shadow education, the similarity between shadow education and formal schooling is clear, and it has been proofed in other studies as well (Schneider, et al.,2000; Yung,2019; Zhang & Bray,2020).

Furthermore, Li (2019) have proved that there is a substitution between formal school education and shadow education. This clarification helps us to understand at least two realities about shadow education.

(1) Since China has implemented the "nine-year compulsory education" program, the tuition fee of primary school and middle school are free for every family. From the view of diminishing marginal utility, same amount of further consumption on education now gains fewer utility compared to those days when the education of this stage was not free. Particularly, for the lower income family, since their consumption usually stays at relatively low level, the marginal utility of their goods consumption is usually higher than educational consumption, which means they do not have spare money to pay for private tutoring services. Therefore, the substitution between school education and shadow education can partially explain the circumstance that many families still spend nothing on any kind of private tutoring.

(2) Based on the substitution relation, it is reasonable to assume that the relationship between family income and formal schooling consumption can also be observed between family income and consumption on shadow education. In fact, spending on shadow education reflects the demand for school education as well. Specifically, since formal schooling usually has rigid regulations on study time, contents and tests, some sorts of demand may not be satisfied through mere school education, which gives rooms for shadow education to fully make use of its advantage: flexibility.

When school education is important but not assured by government, families tend to spend money

and time in formal schooling. But when basic education or even higher education can be achieved easily, capable families will purchase extra education resources or services from elsewhere, which mostly refers to private tutoring market. Thus, if a family is in a better financial status and its increasing demand cannot be caught by formal schools, it will spend more to increase the quantity or the quality of education, using channels provided by shadow education.

3.3.2. Parents expectation on shadow education expenditure

As we hope to discriminate the education investor and education receiver and discuss their behaviors separately, it is necessary to discuss the reason why the investor is willing to invest. When the investors suggest parents, it is always taken for granted that they should offer economic helps on their children's education, especially during the compulsory stage. In spite of this kind of belief, parents differ in their attitude, partially because of their endowments. We can see the difference in how much the parents can afford their children's education fee. It is obvious that families of lower income are paying less than those who have considerable wealth. For example, A poor family may not have the capacity to afford a local public university, while a wealth family is willing to send their children aboard.

However, to be noticed, a rich family do not necessarily pay more on the children's education than a poorer one, which means that the payment difference not only depend on the family income but also the expectation about children's education.

Why parents' expectation should promote family investment on its children in China? It is well acknowledged that families in countries of East Asia have stronger motivation in paying children's education and high expectation about children's educational qualification. Even set the well-discussed "Culture Background" aside, we can still have plenty of reasons to explain the tendency. The very traditional reason is the so-called "Raise children to provide against old age" or "Parenting for retiring"(养儿防老), suggesting that the purpose of raising children is to ensure a satisfying retirement life (Boldrin & Jones,2002; Xue,2016). Because the welfare system for retired workers as well as the financial system for individual investment is still not well constructed, parenting, especially for the relatively poor, is treated as a main substitution for various types of insurance (Zhang & Goza,2006).

Altruism and paternalism are also playing essential rolls in the parents' expectation, and the later one is more common in China. According to Doepke and Zilibotti (2019), altruism comes from the empathy with children, which suggest that parents can gain satisfaction from the growth or success of their children. Paternalism, however, comes from ration, which lead parents to judge children's behavior from a view of long-run benefit. That is why Chinese parents always say "do you good" when they force their children to follow their orders, even violate their children's will.

To remember, either the traditional egoism, the altruism or the paternalism, is only the inner factor that affect the parent's expectation, and each of these is quiet sensitive to the outside environment,

eventually influence the expectation. For example, as mentioned before, a well-founded financial system can alleviate the dependence on parenting a successful son or daughter, thus weaken the willingness of paying that comes from egoism (Cigno,1992).

Similarly, the perception and explanation about the social inequality can affect the intensity of paternalism, since severe inequality urges family to ensure their children staying at the upper social level in the future, regardless of the happiness during their youth time, which is why Doepke and Zilibotti (2019) claim that social inequality promote the intensity of parenting. Other outside environment factors, such as social responsibility and laws about parenting also affect parent's expectation on children's education as well. Thus, because of the different social environment, what we observed about shadow education in China may not happens in other countries,

Briefly, parents' expectation, affected by egoism, altruism or paternalism, explains why parents, as the investors, are willing to pay for their children's schooling and shadow education in China, even some of the pecuniary return is relatively low. However, these expectations are sensitive to outside world, which reminds us to consider the social environment in China when explaining results and drawing conclusions.

3.3.3. Time on shadow education

"Time is money". In spite of the importance of time, analyses that from economic perspective are surprisingly deficient. Veblen (1973) introduced how the nobles spent their time and the meaning of spending time in his "The Theory of the Leisure Class". Although he mentioned the relationship of time spending and wealth, he didn't go further in the value of time in productive activities.

Since then, the most famous research about time in economic field was considered to be the Becker's article (Becker,1965). Even though the Nobel prize owner emphasized the importance of time in economic research, few economy scholars and statistics take time as their main object of their researches. One possible reason for the indifference may be that time cannot be traded while maintaining its original form like other goods. People trade time basically in two forms: spend time in their work for money, and use money to purchase services (essentially other individual's time).

In researches about education, time usually exists in form of self-study time after class, or homework time (McMullen,2007; Copper & Robinson,2006; Natriello & McDill,1986). Mischo & Haag(2002) found evidences that extra learning time after school positively influence the students' academic performance, and afterwards, PISA tests proved the relationship as well. The reason why the focus is on after-school time is that study time requested in formal school is relatively rigid, and independent with family pecuniary spending. Therefore, although time is an important factor in studying, it is not an important object in economic analysis about formal schooling. However, time in shadow education can be extremely essential because of its flexibility.

First of all, although shadow education has many similarities to formal schooling in its contents

or courses, its business activities are almost independent from the formal education system (Zhang,2019). This kind of independence, on the one hand, brings vigor and profit to the shadow education industry. Since it has dodged many strict supervisions or restrictions that are always implemented on formal schooling, it has more creativity than the formal education system. On the other hand, the sensibility to market demand and the flexibility in its form, allow it to meet various needs for education that have not been satisfied in school. Upon these characteristics, we think that the income elasticity of demand, both in form of money or time, in shadow education market should be higher than in formal school. To realize the difference, we can firstly see the relationship between the money expenditure and school education. Clearly, there is barely no space for extra expenditure, neither in money nor time, but we can see contrary situation in shadow education.

When time is considered in education, at least two issues should be emphasized. One of them is the cost of time, and the other is the upper limit of time. Although time of parents that is spent in children's education is also important (Sayer & Bianchi,2004; Hallberg & Klevmarken,2003; Sayer & Gauthier,2004; Guryan, et, al.,2008), here we mainly discuss the time of children or students.

(1) Cost of time

Despite of the significance of sleep and entertainment of children (Owens, et, al., 2000; Burriss & Tsao,2002), there is barely no research can quantify the effect of those activities on children's future health or wealth, in a way that economists are keen on. As a result, the importance of sleep and entertainment is generally neglected by parents and schools, which coincides the realities that have been observed currently in China[16] (2018). To ensure the rest time of children and parents, Chinese government have made announcements (2018; 2021) to control the school hours and tutoring hours. These phenomena indicate that the cost of children's time for education, no matter in or after school, is generally very low. It is worth mentioning that compared to their parents, children are usually powerless in the negotiations on deciding the value and allocation of their time. The rights to judge whether their time are being used efficiently or meaningfully or not is kept by their parents. Like mentioned before, because of the existence of paternalism, parents tend to decide the allocation of time, and advise or even force children to follow.

According to Doepke and Fabrizio (2019), in the past 50 years, "arbitrary" parents, who tend to use their power to control the children's behaviors, have been decreasing, however the vacancy was filled by the "authoritative" parents, who are proficient in persuading their children to accept the reasonable choice provided by authorities, which mostly suggests parents. It means although the situation that parents directly decide the allocation of children's time has decreased, the parents' participation and its power does not really change. As a result, from the cost judgement to the time allocation, almost every decision involving time using is literally authorized to the parents, which

[16] 《2018 年中小学生减负调查报告》

indicates that attitude and behavior of both parents and children about shadow education are reflecting the cost of children's time.

(2) Upper limit of time

Even though the cost of time may be measured in different way by children and parents, the upper limit of time has more similarities for the both. If the discussion about time is trying to figure out how to maximize the short-term or long-term benefit, then the upper limit of time is about the health, and more important, the nature of human beings.

It sounds exaggerated because people tend to believe that they have the total control of their time or at least assure that their working time will not conflict their normal life. However, the truth, common overtime working, heavy homework and longtime tutoring, shows that the control that people have on their time, is far more powerless than their control on the money.

Many laws about working time have been passed in developed countries (Messenger, et, al.,2007), not only because efficiency declines as working time extends, but also because people find out that working is not the total value of life. China, as a developing country, does have its own labor law, but the execution has been disappointing for years (Li, et, al.,2012; Ho & Huang,2013; Mishra & Smyth,2013; Barrett,2019).

The reason for those disappointing result of execution can be seen in two aspects. First aspect is the welfare of labors. Firm's negotiating power is apparently stronger than individuals, especially in the labor market without functioning labor union. Besides, the cost of either finding a new job or suing the company is usually considerably high for common workers. These factors can make workers reluctantly accept some illegal overtime work.

Another aspect is the Chinese government. The bankruptcy and frictional unemployment cannot contribute to either economy growth or tax to the local or the country. Meanwhile, supervision on working time is costly for government. Since Chinese government are usually trying to maximize the economic benefit or their own benefit, when conflicts around working time happens, it tends to show the inclination to protect firms instead of workers.

The problem of too much "working" time also happens in the children's study, but few regulations on either homework or tutoring time has been made, let alone the execution. Besides, even there are some strict regulations and laws on children's study time, it is still difficult to guarantee their rights.

In China, a number of children are studying for too much time, as PISA showed, and they are confronting with the problem of upper limit of time since studying activities starts to occupy their sleeping time. Although spending more money in shadow education may raise the leaning efficiency, this effect will shrink if time for study cannot be extended. It is intuitive if we assume a Douglas production function with input of money and time. Therefore, time input is also an important factor of shadow education, and because of its clear upper limit, it is becoming a restrictive condition for families whose children, for different reasons, do not have spare time after school.

To conclude, formal research on shadow education started at 1990s, and after 30 years, it now becomes one of the most important topics of education across the world. In China, as educational industrialization keeps going and deficiency of educational resources becomes serious, many researchers started to notice the development of shadow education in recent 10 years. However, most of their findings are from the perspective of education, and staring at the influence of shadow education to children's academic performance (Zhang,2013; Guo, et al.,2020), while their conclusions on whether the shadow education is good or bad to children diverge in many cases (Sun, et al.,2020; Zhang, et al.,2021).

Since both money and time are essential parts of household economy, and the over input to shadow education has caused many economic and even healthy problems inside families, economic perspective will be helpful in understanding and solving the problems brought by shadow education, especially in understanding the pressure of families from the point of view of time cost. Moreover, results of related economic researches will provide useful evidences and suggestions for government in helping family adjust their input in shadow education to a reasonable level.

3.4. Econometrical Analysis

3.4.1. Hypothesis

In this thesis, the main target is to test two hypotheses, corresponded to the aspects we mentioned in the part about former studies.

(1) **Family income generate positive impact on both pecuniary and time spending in shadow education**

(2) **Higher parents' expectation will lead to more pecuniary and time spending in shadow education**

3.4.2. Model and Data

(1) Tobit model:

The first problem that should be noticed is that, we cannot observe positive shadow education expenditure in every family. Even shadow education industry in China has grown to such a scale that more than 62%[17] students are accepting types of private tutoring, many families, especially families in poor areas, are still not participating. The reason may be the diminishing return of education spending, or lack of such institutions that are able to meet the demand of families. Anyway, what is emphasized here is that the samples with 0 expenditure in shadow education should not be neglected, otherwise the result will at a great chance, be biased.

[17] 2018 中小学生减负调查报告

Tobit model is a proper method to avoid such bias (Tansel & Bircan,2006). Tobit is usually applied in analysis of demand for endurable goods (Tobin,1958; McDonald & Moffitt,1980). A classic example is the demand for private cars. Clearly, many families still do not have their private cars, but it doesn't mean that these families can be ignored or be treated as identical in the study, because some of them may be less willing to pay than the others, despite of the same zero spending that being observed. On the contrary, considering people who choose not to pay will lead us to a more precise answer about how people react to the assumed factors. It is the same in the situation of shadow education research, and some researches have chosen Tobit to find the significant factors that influence families' spending (Kim & Park,2010; Kim & Lee,2010; Liu & Bray,2017). Here, we follow Kim (2007) to test the pecuniary spending and time spending on shadow education as well.

Hence, the specified Tobit we used is as follows:

$$Y_i^* = \beta' X + \varepsilon_i \quad (1)$$

$$Y_i = 0 \ \ if \ Y_i^* = 0 \quad (2)$$

$$Y_i = Y_i^* \ if \ Y_i^* > 0 \quad (3)$$

where Y_i^* is the latent variable and Y_i is the observed counterpart. X is a vector that depicts characteristics of families, and β is a vector of parameters. ε_i is the error term that follows distribution of $N(0, \sigma^2)$.

(2) Heckman Two-Stage Sample Selection model:

Apart from Tobit, Heckman two-stage sample selection model (Heckman,1979) is also an alternative method to explain the samples of zero value. This model emphasizes the sequence of choosing behind the observed data. Traditional research that used this model is the research on the wage of female labors (Killingsworth & Heckman,1986). Data shows that a number of females of working-age have very low working income or no income at all, but it doesn't directly suggest the discrimination in labor market or the low ability of female labors. It is also important to notice that there are other factors that affect the participation of female labors, such as children and housework, and even partner's salary. These factors probably do not directly influence female's actual wage, but they should not be neglected if we want to fully understand the working situation of female labors. Making decision on shadow education spending is probably following these steps as well, for there are factors, such as test scores and school quality, that affect the family decision on whether participates shadow education or not, while have little direct relevance to the amount they pay for the tutoring courses.

Particularly, the Heckman two stage selection model used here is written as:

Selection mechanism: $Z_i^* = \gamma' W + u_i, Z_i = 1 \ if \ Z^* > 0 \ and \ 0 \ otherwise$ (4)

Regression model: $Y_i^* = \beta' X + \varepsilon_i \ observed \ only \ if \ Z_i = 1,$ (5)

$$E(Y_i | Z_i = 1, X) = \beta' X + \rho \sigma_u \sigma_\varepsilon \lambda(\gamma' W) \quad (6)$$

where $\lambda(\gamma' W_i)$ is the inverse Mill's ratio. W is the vector that contains characteristics that have influence on the binary decision, and X is the vector of family characteristics that affect the actual amount of spending.

As we can see in the basic model, apart from being a contrast to Tobit model, Heckman two stage selection model can reflect how parents' expectation affects the participation to shadow education, which is one of target of this paper. Precisely, parents' expectation maybe only affects the binary selection stage, but have little influence on the spending decision stage.

Beside of Tobit and Heckman two stage selection model, OLS model will also be used to show the difference in result compared with the former two, and to indicate the spending behavior of the families who have already been involved in shadow education industry.

In short, the part of Tobit mainly follows Tansel (2006) and Kim (2010). Based on Tobit test, this paper also uses Heckman two stage selection model and OLS as supplements.

(3) Data:

CFPS2016 (China Family Panel Studies 2016) will be used in this paper. The data is based on the result of random sampling surveys on Chinese families from different provinces[18]. Basically, there are two reasons for this choice. Firstly, though CFPS started from 2010 and released every two year, questions of some aspects have few differences between years, and the survey in 2016 have advantage in showing the assets of families, education level of children and most importantly, the shadow education spending precisely. Secondly, 2017 was a year that Chinese government announced relatively rigid announcement in regulation towards tutoring and shadow education industry, so data of 2016 can show many important characteristics of families' decisions and the situation before they were influenced by government regulations.

3.4.3. Two main manipulations have been done on the data.

The first one is only keeping the families who had only one child. From 1978 till 2016, one child policy was executed by constitution law in China, which means basically, a person was of Han nationality and was under 38 in 2016 should be the only child of his/her families. Besides, even we consider the families with several children, the control variables such as sex, age, educated experience of every child, the resource allocation within children, will be enormous, thus weakening the power of explanation of the result.

The second manipulation is that among the above families, we only choose the families whose children were studying in compulsory education stage. In fact, many students of high school and even kindergarten are now accepting afterschool tutoring courses, but the standard is various throughout these education stages in China, which require us to control more variables, such as the type of high

[18] http://www.isss.pku.edu.cn/cfps/

school and the study time in high school for each day. Various characteristics in high school will definitely affect the spending decision of families about the shadow education.

For example, the Nearby Enrollment Policy for compulsory education does not work in high school stage, and because of the expanding gap in quality (usually the famous university enrollment rate) between high schools, more families chose a high school in other cities or even other provinces, which greatly change the economic structure of the families as well. Notice that in China's high school, "self-learning" courses in evening and supplementary courses in weekend are generally required to a certain extent, which change the situation of students and their after-school time a lot. On the contrast, students of compulsory education have more commons in these aspects, such as similar study time in school, and going to a school nearby. Meanwhile, compulsory education has more regulations and common standards, and has covered almost every child of proper age, thus weakening the demand for other various control variables.

Besides, paying more attention on shadow education of compulsory education stage is still significant for relevant policy making. Since compulsory education is assured by laws, and its aim is to raise the education level of all citizens. If the families spend a lot of money and time in shadow education, it may suggest that there is a need for formal school education system to reform itself, or, the government should be careful about the dangerous impact of shadow education industry on school education system, family finance and children's health.

3.4.4. Further explanation on sample data

Because of the design of survey questions, some clarifications are necessary. About the amount of money spent on tutoring courses, the survey asked total amount since a year ago, but for the time used in tutoring courses, the questions are on the current status. This difference indicates some possible confusing results, among which is that the families who are not participating shadow education but have a plus spending amount on tutoring.

Besides, according to the survey's result, families whoever participate shadow education have a plus amount in time spending, but do not necessarily have money spent. This may be because some tutoring courses are free, such as courses organized by formal school, or trial courses provided by tutoring firms.

The above situations show us that pecuniary expenditure and time expenditure do not necessarily exist together in shadow education. Therefore, we guess that in Heckman two stage selection model, the same factor may cast different influence on money spending decision and time spending decision.

Follow other researchers' findings (Zhao,1997; Hannum,1999; Qian & Russel,2008; Zhang,2017), we think whether a family is in rural area is also an important control variable in testing the expenditure in shadow education, but instead of area, here we want to focus the families actually engaged in agricultural production for the following reason. A general phenomenon in agricultural families is that children use their spare time in farm work and other housework, in order to help

families (Chang, et al.,2011; Ye & Lu,2011; Shen, et al.,2013), which will considerably decrease their motivation in studying and attending tutoring courses afterschool.

Another clarification is on the representation of test score and the family expectation. The school academic performance is divided into 4 level in the survey, but reversely ordered in answer, which means the higher the order number given in answer, the lower academic performance of the child. As for family expectation, many Chinese investigations on parents about their adolescent children's education show that, 46% parents in China give high priority to enhancing their children's compacity in competition, while 67% parents hoped children to be versatile (2015), which will be an advantage in enrollment (Cheng,2013). 86% of the participated students were taking lessons about school subjects (2019), which suggests the importance of high school and college entrance examination. Besides, in Another type of expectation is that on the studying aboard plan, which is supposed to be closely related to the demand for tutoring, and the money spending is generally much higher than ordinary lessons.

Table 3.1. Descriptive statistics of the Sample

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Log of Pecuniary spending in shadow education	149	7.454	1.241	1.609	10.60
Log of Family income	841	9.700	0.976	0.916	14.23
Log of Time spending in shadow education (Tobit)	841	1.742	2.688	0	8.235
Log of Time spending in shadow education (OLS)	255	5.745	0.896	3.258	8.235
Children's gender	841	0.599	0.490	0	1
Chinese performance*	841	2.018	0.933	1	4
Math performance*	841	1.957	0.974	1	4
Size of class	841	45.24	16.01	0	91
Education stage	841	0.260	0.439	0	1
Last year of the certain education stage	841	0.170	0.376	0	1
Agricultural family	841	0.259	0.438	0	1
Education level of the interviewee	841	3.042	2.008	0	7
Parent's expectation on education level	841	5.951	0.911	2	8
Parent's expectation on foreign education	841	0.234	0.424	0	1
Eastern area of China	841	0.334	0.472	0	1
Urban area	841	0.635	0.482	0	1

Table 3.2. Tobit, Heckman two-stage sample selection and OLS model estimation

Dependent Variable: Log pecuniary expenditure in shadow education

VARIABLES	(1) Tobit	(2) Heckman Selection	(3) Heckman Regression	(4) OLS
Log Family income	1.802**	0.157**	0.453**	0.554***
	(2.43)	(2.28)	(2.50)	(3.23)
Children's gender	-1.654	-0.165	0.319	0.285
	(-1.46)	(-1.53)	(1.58)	(1.48)
Chinese performance*	1.423*	0.133*		
	(1.93)	(1.89)		
Math performance*	-0.739	-0.073		
	(-1.02)	(-1.05)		
Size of class	0.039	0.004		0.005
	(1.07)	(1.00)		(0.71)
Education stage	0.399	0.032		0.116
	(0.32)	(0.26)		(0.53)
Last year of the	1.487	0.139		0.148
certain education stage	(1.04)	(1.02)		(0.62)
Agricultural family	-2.909*	-0.277*		0.034
	(-1.83)	(-1.85)		(0.11)
Education level of	-0.028	-0.006		0.098**
the interviewee	(-0.10)	(-0.23)		(2.00)
Parent's expectation	1.052	0.091		0.235**
On education level	(1.57)	(1.43)		(2.00)
Parent's expectation	-1.276	-0.128		0.305
On foreign education	(-0.96)	(-1.01)		(1.28)
Eastern area of China	0.860	0.082		-0.097
	(0.71)	(0.72)		(-0.43)
Urban area	0.955	0.084		0.149
	(0.68)	(0.63)		(0.62)
Lambda (Mills)			-1.091*	
			(-1.75)	
Constant	-36.354***	-3.214***	4.288*	-0.401
	(-4.17)	(-4.08)	(1.74)	(-0.23)
Observations	841	841	149	149
Sigma/R-squared	11.032***		0.163	0.236

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.3. Tobit, Heckman two-stage sample selection and OLS model estimation

Dependent Variable: Log Time spending in shadow education

VARIABLES	(1) Tobit	(2) Heckman Selection	(3) Heckman Regression	(4) OLS
Family income	1.213***	0.221***	0.044	0.030
	(3.30)	(3.35)	(0.53)	(0.40)
Children's gender	-0.561	-0.086	-0.000	0.047
	(-0.97)	(-0.85)	(-0.00)	(0.40)
Chinese performance*	-0.127	-0.018		
	(-0.33)	(-0.27)		
Math performance*	-0.790**	-0.138**		
	(-2.04)	(-2.07)		
Size of class	0.033*	0.006*		-0.004
	(1.74)	(1.78)		(-0.93)
Education stage	-0.622	-0.127		0.049
	(-0.95)	(-1.10)		(0.36)
Last year of the	0.287	0.032		0.137
certain education	(0.38)	(0.24)		(0.88)
Agricultural family	-3.045***	-0.478***		0.001
	(-3.46)	(-3.23)		(0.01)
Education level of	0.484***	0.089***		-0.036
the interviewee	(2.87)	(3.01)		(-1.01)
Parent's expectation	0.573	0.105*		-0.108
On education level	(1.64)	(1.72)		(-1.41)
Parent's expectation	1.181*	0.228**		0.025
On foreign education	(1.83)	(1.99)		(0.20)
Eastern area of China	-0.467	-0.064		-0.244*
	(-0.76)	(-0.59)		(-1.94)
Urban area	1.960***	0.314**		-0.031
	(2.62)	(2.45)		(-0.18)
Lambda (Mills)			0.343*	
			(1.67)	
Constant	-19.779***	-3.646***	4.963***	6.466***
	(-4.65)	(-4.91)	(5.10)	(7.55)
Observations	841	841	255	255
Sigma/R-squared	6.338***		0.013	0.038

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.5. Results

3.5.1. The influence of family income on its expenditure to shadow education

The result shows that income is significantly associated with the family expenditure of money and time, on shadow education.

For the factors that affect pecuniary expenditure in Table 3.2, we found a significant coefficient of 1.8 of family income in Tobit result, showing the high total expenditure elasticity of all families including none participants. Since only 18% of the families in our sample have paid money for shadow education, it is still the income that acts as a main constraint on family spending decision.

Currently, shadow education is not a necessity for every family, so it is natural that family of low income will choose not to participate. However, as result shows, higher family income can result higher expenditure on tutoring or stronger willingness to spend money in shadow education system, which means that tutoring is attractive to families but there is a threshold for this kind of expenditure.

When we focus on the Heckman two stage selection model, we can find pecuniary expenditure will rise for 0.54% as income increase for 1%. This result contradicts to Tansel (2006) who found a unitary elasticity in Turkey, but is consistent with the result of Psacharopoulos and Papakonstantinou (2005) about Greece and Liu and Bray (2017) about China. Besides, in the first stage where family decide whether attend shadow education or not, family income, a bad Chinese test performance have positive impact, while agricultural work is resulting less participation, which provide evidences for the reality that families are indeed making two-stage selection in making spending decision.

Next, we will focus on the influence of family income on the time expenditure. Since there are families who didn't pay money for children's tutoring courses, further explanations on how time expenditure correlated with income are needed. An immediate thought is about mechanism of opportunity cost of time. Time for learning is always costly, especially for students whose parents cannot afford daily lives. This situation suggests that the opportunity cost occupies a considerable part, especially for low-income families which need children do housework occasionally.

Another reasonable explanation for the relationship is that even we exclude the money and opportunity cost of tutoring courses, the action of attending tutoring is still far from free. In other words, other consumption behaviors will occur if family is attending private tutoring (Cheng,2013), such behaviors are obviously related to the wealth of family.

For example, although there are some free tutoring courses, the cost of textbook, writing materials and even electronic devices (for online tutoring) are usually far from free. Besides, when courses are held at a remote place, students have to arrive the location in advance, where traffic cost and time cost always happen, especially for rural areas and countryside. In urban area, however, a weekend tutoring course is always accompanied by restaurant dinners or entertaining events. Hiring a family teacher can probably avoid these costs, but the choice itself is already far more expensive than other forms of

private tutoring. Anyway, we can see that the activity of attending tutoring courses is costly for families, which means time spending is supposed to be influenced by family income.

Precisely, when we focus on Heckman model, we found that 1% income increase will lead to 0.22% probability of participation, which is consistent with the result of Kim (2007), showing that family income influences the attending decision significantly. However, we did not see significant influence on the amount of time spent in shadow education. It is partially because that time is finite as mentioned before and probably, it has become difficult to allocate more time in private tutoring. We will explain the reason later in detail after we see the performance of OLS model.

3.5.2. The influence of parents' expectation

Since we use expectation on children's future level of education and expectation on children's studying aboard plan to represent the parents' expectation, the influences of these two independent variables are important in the testing of the second hypothesis. The result showed that parents' expectation presents different effect across models.

Specifically, parents' expectation doesn't generate significant influence on family pecuniary expenditure on shadow education, either in Tobit or Heckman model. However, these two variables significantly affect the time spending. In Heckman model, particularly, two factors both significantly affect the decision in a positive way of whether spend time in shadow education or not.

The result shows that when other conditions stay unchanged, parents with higher expectation will tend to increase their children's time spent in tutoring, instead of money. Precisely, when family expectation goes to the next level, such as high-school to college, the possibility of attending will rise for 10%, and parents with plan to send their children aboard raise 23% probability in attending shadow education. It is worth to emphasized again that it is the children who accept the tutoring, which suggests that unlike money, the time spent in tutoring in principle belongs to children, instead of parents. With this confirmation, we suppose that the reason of this inclination is that parents decide to participate but not much willing to pay money, is because the opportunity cost of time of students in compulsory education stage is relatively low. In other words, their time are not very productive even they give up their study time for other jobs. Therefore, when parents' expectation becomes higher, it is easy to make such a choice that spend their children's time instead of their own money in shadow education.

In fact, there are many kinds of expectation that cannot be transformed into scalars easily, such as the expectation on the type of work, or the city to live in. However, with the background of Chinese parent's attitude on education, and the current low average educated year of all citizens, the expectation on children's educational level in future is still a persuasive representator for parent's expectation.

More importantly, since there are only a few researches on how family spend their time, including children's time, we were used to neglect the influence of parent's expectation on their children's

behavior. In fact, both the influence of parent's expectation and how it works deserve more attention, for our result have showed that the economic implication of parents' expectation is not less important than those of family income.

3.6. Other discoveries

Apart from the main objects of this research, which are the influences from family income and parents' expectation, other variables, including control variables, are also presenting interesting results that worth further explanations.

3.6.1. agricultural work families

First of all, we can see that if the family are doing agricultural works, less possible for their children to participate the tutoring classes after school. An obvious reason is that agriculture works are general organized in less developed area in China. Since these areas have lower population density and thus less service sectors, suggesting that shadow education industry that mainly led by private capitals, are also providing less services (Tansel,2006).

There are also other reasons that people have been overlooking: children in an agricultural family are always helping farming or other works inside the family, or, children of primary school age may have been gathered together in a boarding school in a nearby town (Rao & Ye,2016). The former one indicates a higher economic value of the children to their agricultural families, which eventually raise the cost of participating private tutoring courses. The later one is more like an indirect reason but of adequate importance. When agricultural families (reluctantly) send their children to boarding schools, it became the situation that the school are taking the responsibility to take care of the children, which means there are barely no outside school activities that are allowed, not to mention the private tutoring.

However, at present, reasons are less important than consequences. In current educational phenomenon, children of agricultural families are going to become less competitive in sorts of entrance examinations, if they cannot receive enough education services outside the school. The expanding gap of academic performances will make it harder for agricultural families, most of them are rural families, to change their social and economic status. Here we can see, that imbalance in economic development between urban and rural areas in China has expanded to the domain of education. In other words, the commoditization of the academic performance (test score) provides a channel for social to transmit its income inequality into educational inequality (Cheng,2013). Although government keeps emphasizing the importance of equality in compulsory education, realities have explicitly showed that with the participation of market and private capitals, no rigorous equality would be ever achieved. Of course, even without capital's participation, the development of education in China is still far from equal, especially in educational facilities and teachers (PISA2018).

3.6.2. Families who are involved in shadow education

Secondly, in the OLS results, we found that for families who have been participating shadow education, income has no significant influence on time spending, but does has positive impact on pecuniary expenditure, as mentioned in the result of hypothesis test. A possible explanation for this is that there are several thresholds throughout the tutoring course participation, in other words, private tutoring institutions sometime have basic requirements on student's academic performance or available time.

Since most of the shadow education services are designed by the providers, the receivers, here we suggest the parents and children, have few choices in how much time they plan to spend in shadow education. This kind of relationship between sellers and buyers result in a situation that once a family decides to join the shadow education, basically it is supposed to devote a considerable amount of time in it (Yang, et al.,2014).

Because of the spare time of a student is limited, especially after devoting his/her time into a series of tutoring courses, the remaining time is usually not enough for extra courses or curriculums, even the money cost of those courses may be still affordable.

This result suggests that the capable families will face the time constraint earlier than the money constraint. It indicates that a more reasonable arrangement of student's time can alleviate the problem of over-investment in shadow education, such as providing longer school services or after school activities in public institutions, or prohibit some late private tutoring activities. More possible solutions will be discussed when we consider the relevant policies in the next section.

3.6.3. More factors affect time spending decision

The last discovery is from the Heckman two-stage sample selection model. We can see that there are more factors significantly influencing time spending, instead of money spending. In the discussion about the parents' expectation, we have found that spending time is an easier choice to made, compared to spending money, just because (children's) time spent in shadow education is actually of low opportunity cost for the parents. However, there may be more potential reasons for that.

One reason is that time is more productive than money in the "production" of higher score. Evidences and experience have showed that under the background of test-oriented education, spending time in repeating the homework exercises is an effective way to raise scores. Repetitions can make students familiar with different questions, thus saving their thinking time and calculating time in the tests.

Another reason is that, as an investigation[19] showed, shadow education is not merely a place that provide lectures to raise test score, but also an occasion for children's social activities. When the classmates or friends of a student are accepting shadow education services in holiday or weekend but

[19] http://www.sznews.com/zhuanti/content/2018-08/23/content_19940375.htm

he/she isn't, he/she will probably have less chances to communicate with fellows of their ages. Considering this reason, parents are probably not giving much attention to the quality of shadow education services. Instead, what they are demanding is a type of social occasion that the shadow education can provide. Therefore, families may do not have intention to pay for an expensive course, but they are willing to send their children to receive those education services with other children, which result in more time spending instead of pecuniary expenditure.

This finding is reminding us, that many features of the family, that can influence the decision and thus lead to observable result, are not merely influence the money spending. Actually, when factors change, the time arrangement may be more volatile than those of money, which current researches tend to ignore.

3.7. Implications and Policies

In early years, especially before 2010, compared to the enthusiasm and desperateness of families, government seems to be uninterested in the governance on shadow education. However, in recent years, government started to announce a series of policies to supervise the actions and developments of shadow education (Ministry of Education,2010,2014,2015), where we can realize that the attitude of Chinese government towards outside-school educational activities has changed.

In spite of these regulations, the growth of shadow education industry didn't really slow down, and the worry and intense of families seem not to be alleviated. To suppress the fast growth, in 2021, Chinese government, specifically, the General Office of the State Council of PRC, has made a series of extremely rigorous regulations on shadow education industry (双减), which basically forbid almost every commercial activity of current and future tutoring services.

We should admit there are plenty reasons to restrict the scale of shadow education, and in the result of this research, we already see at least two negative effects of shadow education.

First one is that the expansion of shadow education is putting heavier pressure on families, as we saw both in the background introduction and the result, especially about time. Remember that the time is finite and richer families tend to spend more on tutoring services, it means that there lies a possibility that if shadow education services become cheaper (online education), or the poor families become richer (further urbanization), higher ratio of time will be used in the shadow education. This not only raise the worry and tensity within the family, but also lead to the second problem.

The second problem is that the development of shadow education, supported by capital, is compressing the living space of the formal education. We have seen the substitution between shadow education and the formal one in the function of raising test scores, and the shadow education may even perform better. Because of the importance of the test scores in university entrance examination in China, it is rational for a family to choose an institution that can improve academic performance with

higher efficiency.

Although public education has almost covered the compulsory education stage in China, many schools are criticized for its low quality in teachers and facilities, and the inefficiency in managing capital and human resources. In the contrast, shadow education in China were able to operate with barely no influence from government, and its target is always the benefit. Thus, we believe that the resources will be allocated more efficient and "unfortunately", it actually does[20], not only in providing the technics of dealing with test and teaching hobby stuff, but also in recruiting capable teachers and students, which directly damaging the public schools.

Again, since the result shows that when the family financial condition is improved, more time will be allocated into the shadow education, in other words, less time, as well as less effort will be devoted into formal schools and knowledge taught by those schools.

With such developments of shadow education, a predictable future is that formal school and its teachers, especially for the infamous public schools, will have lower incentives to improve theirs teaching quality, because the performance of students are becoming less related to their efforts. Meanwhile, because of the inefficiency in capital and human resource management, capitals and teachers tend to leave the public education system and search profit in private schools and shadow education institutions, and eventually, majority of the public schools will become the synonym of low-quality. This is in other words, the "Latin-Americanization of Education" (Wang, 2017).

At present, famous and high-quality universities are basically under the control of ministry of education of PRC, which means formal schools, at least for now, are still keeping the function of providing certificates for students to receive university entrance examinations. Once study experience and performance in shadow education institution are generally admitted, shadow education will come into front and replace, or become a dispensable part of formal education. In fact, we have already introduced the impact of performance in private tutoring on the admission of formal school, as well as the impact of internet lessons on the schools of rural areas. To avoid formal education being replaced by shadow education and controlled by capital, it is necessary for Chinese government to be more seriously in supervising the shadow education, and correct or not, the answer is the "双减" and it shows the determination.

However, these policies are too strong and too rigid that government should prepare for many potential problems in the future.

3.7.1. How to deal with the suppressed demand

Throughout the policy document of "双减", we did not see any term about the "university entrance examination", which is thought to be the most important reason that drives family fanatical

[20] 杨东平：警惕新一轮的"教育产业化". https://www.sohu.com/a/214223591_112404

about private tutoring. Thus, we can realize that the demand for raising test score won't disappear immediately, which means the tutoring (legal or not) after school will exists for a considerable period of time. Besides, our results from Heckman model have showed that expectation and the education background of parents also promote the participation, and these factors receive little impact from existing policies.

Demand always finds its way out, and government knows. In fact, government has guarantee that compulsory school will provide some after-class services, in order to satisfy family's demand. However, government will also set a reference price, which will be generally lower than now, for those companies who provide educational services. With the result of this paper, it is predictable that both urban and rural families will increase the demand for private tutoring, or at least be more willing to participate in shadow education system.

Therefore, apart from the effort to satisfy the students within schools, government has to make other policies to change the parents' expectation about education. These policies should include, raising the quality of vocational schools and colleges, reforming admission policy of universities, and even improving the living standard of the manual workers.

3.7.2. How to deal with a heavier government financial burden

Because the policies require the compulsory schools, basically held by local government, to take responsibility to organize more after-school activities, it is inevitable that teachers' working time will be extended and government will have to purchase services from private sectors for the schools that are not so "versatile". Either way, government is trying to expel the capitals from education territory, and to undertake the provision of educational service that can be done by private sectors. However, although government will expand its power and responsibility in education, it will take a great financial burden, with the declination of tax from this industry. We know that the policy is trying to protect China's education environment from capitals, but it is undeniable that government will need much more monetary support to carry out the plan, especially with an aging population. To ensure enough funds for education, government can try to, increase the type of taxation and the tax rate, raise more government deficit, or allow private capital to participate some state-owned industries to improve their efficiency.

It is possible that the policies will generate more serious imbalance and inequality between areas. As we know in China, the compulsory schools are basically funded by local government instead of the central government. When we say local, it goes down to the city or even the county level. However, currently, there are still many problems remaining unsolved in compulsory education, especially in rural counties, and most of the problems are related to the lack of government funds. Besides, even in urban areas that have sufficient funds, education of the floating workers' children is still not covered by the local government.

With the current financial condition of the government, the policies of providing extra educational services in school will only impede the improvement of school's quality, and even negatively impact the teaching standard of basic subjects. Truly, our result shows that agricultural families demand less such services from shadow education system that other families do, but it partially because there are few institutions that provide educational services in rural areas. It means when after-class services can be attained inside the school, current situation will change and more agricultural families will tend to participate.

Therefore, government should not only improve the financial conditions, but also raise the level of transfer for local education. Meanwhile, in order to prevent corruption happening in education system, supervision and instruction on the use of government funds should also be enhanced.

3.8. Conclusion

It is a legitimate right for people to accept proper education. When families are not satisfied in formal schools or public education system, they will attempt to attain extra educational services from the market. From history, we can say that there is always a close relation between the expansion of shadow education and the increasing demand of families. The expansion is so rapid that it has caused many social and family problems in China, and has drawn much attention of Chinese government. This research uses Tobit and Heckman two stage model with CFPS data of 2016 to analyze the determinants in family, that affect the family's expenditure on shadow education. It is worth to be noticed that family does not only spend money but also time in the progress of receiving educational services provide by shadow education institutions. As there are no clear substitutionary or complementary relation between these two types of spending behavior, here we tested the determinants' effect on pecuniary and time spending separately.

In the results, we found that higher income is resulting more pecuniary and time spending of families in China, which is basically consistent with other former researches. Parent's expectation is another important factor, especially in the participating decision. We also found that agricultural families tend to spend less money and time in shadow education than other families do.

The results imply the existence of plenty of potential demand for private educational services. Predictable future is that with higher income or lower price of private educational services, more family that used to be non-participants will be observed frequently in this education market. Apart from how pecuniary expenditure being influenced, the change in time spending is also worth attentions. Since result shows higher income family will tend to spend more time in receiving private educational services, which also means they will distribute more effort into the shadow education system, and it is obviously generating devastating impact on education in formal schools.

With the result about how parents' expectation functions, we can also assess some of the current

policies about education in China. Aiming at the increasing pressure of families and chaos in education system brought in by private and even foreign capitals, the government announced many strict policies. However, despite the determination in protecting the position of formal education system, government barely mentioned the reform of current university admission system, or the permission to allow private schools to alleviate the shortage of education resources, which means that the important factor, parents expectation won't really change. Therefore, with these strict policies, at least in short run, we are about to observe a decline in money and time spending in shadow education, but the potential demand won't decrease in the same pace.

Knowing that it is necessary to relief the suppressed demand under the government's supervision, the policies also promised that governments will provide after-class services during the compulsory education stage. It is admirable that China's government make its mind to fix the shadow education system, but it will cast a heavier burden on government finance since government actually wipe out almost every inch of living space of private tutoring institutions, and, when government acts as player and supervisor simultaneously, the service quality will be doubtful. Despite the considerable amount of execution cost and opportunity cost of the plans, this thesis does not intend to discuss the financial condition of China's government. However, considering that the governments are relying on the taxation or government deficit to provide social services, it is hard to determine whether this reform about shadow education system can particularly make the lower-class and middle-class people better off or not.

In the end, it should be emphasized again that the economic perspective is still significant in the researches on problems that happens in education field, and China's policies about shadow education just have confirmed that. More importantly, this thesis has demonstrated that analysis on time spending can provide valuable and even indispensable information which we can hardly find in researches that merely focus on pecuniary expenditure. In fact, the value of time is still being neglected not only in the field of education research, and it is the reality reminding us that we should pay more attention on it, especially in the field about household economy, once again.

3.9. References

English:

Aysit Tansel, Fatma Bircan (2006) Demand for education in Turkey: A tobit analysis of private tutoring expenditures. *Economics of Education Review, 25 (2006),* 303–313

Baker, David P., Motoko Akiba, Gerald K. LeTendre, and Alexander W. Wiseman. "Worldwide shadow education: Outside-school learning, institutional quality of schooling, and cross-national mathematics achievement." *Educational Evaluation and Policy Analysis 23, no. 1 (2001)*: 1-17.

Barrett, Eamon. 2019. 'China's "996" Overwork Culture Fueled Its Tech Engine: Why Workers Are

Finally Burning Out?" Fortune, 24 April. http://fortune.com/2019/04/24/china-996-overwork-culture-tech

Becker G. S. A. Theory of the Allocation of Time[J]. *The Economic Journal, 1965, 75 (299)*: 493–517

Boldrin M., Jones L. Mortality, Fertility and Saving in a Malthusian Economy[J]. *Review of Economic Dynamics, 2002, 5(4)*：775–814.

Bray, M. (2011). *The challenge of shadow education: Private tutoring and its implications for policy makers in the European Union*. Brussels, Belgium: European Commission.

Burriss, Kathleen Glascott, and Ling-Ling Tsao. "Review of research: How much do we know about the importance of play in child development?". *Childhood Education 78.4 (2002)*: 230-233.

Chang, Hongqin, Xiao-yuan Dong, and Fiona MacPhail. "Labor migration and time use patterns of the left-behind children and elderly in rural China." *World Development 39.12 (2011)*: 2199-2210.

Choi, S. K., Kim, Y. B., Ryu, H. G., Kim, H., Lee, H., & Lee, J. (2003). *Analysis of private tutoring: status and its expense scale*. KEDI Research Report CR 2003-19. Seoul: Korean Educational Development Institute. (in Korean).

Cigno, Alessandro. "Children and pensions." *Journal of Population Economics 5.3 (1992)*: 175-183.

Claudia Buchmann, Dennis J. Condron and Vincent J. Roscigno (2010) *Shadow Education, American Style: Test Preparation, the SAT and College Enrollment.* Social Forces, Vol. 89, No. 2 (December 2010), pp. 435-461

Cooper, Harris, Jorgianne Civey Robinson, and Erika A. Patall. (2006) "Does homework improve academic achievement? A synthesis of research, 1987–2003." *Review of educational research 76.1 (2006)*: 1-62.

D Baker, GK LeTendre (2005) *National differences, global similarities: World culture and the future of schooling*. Stanford University Press, 2005

Dawson, Walter. (2010) "Private tutoring and mass schooling in East Asia: Reflections of inequality in Japan, South Korea, and Cambodia." *Asia pacific education review 11.1 (2010)*: 14-24.

Doepke, Matthias, and Fabrizio Zilibotti. (2009) *Love, money, and parenting*. Princeton University Press, 2019.

Faas, Stefan; Wu, Shu-chen & Geiger, Steffen (2017). The importance of play in early childhood education: A critical perspective on current policies and practices in Germany and Hong Kong. *Global Education Review, 4 (2)*, 75-91.

Faculty of Education, The university of HongKong. *https://cerc.edu.hku.hk/special-interest-groups/about-shadow-education/*

Fenech, Nadja & Spiteri, Carmen (1999): *Private Tuition in Malta.* BEd (Honours) dissertation, Faculty of Education, University of Malta.

Guo, Yuhe, et al. "Does private tutoring improve student learning in China? Evidence from the China

Education Panel Survey." *Asia & the Pacific Policy Studies 7.3 (2020)*: 322-343.

Guryan, Jonathan, Erik Hurst, and Melissa Kearney. "Parental education and parental time with children." *Journal of Economic perspectives 22.3 (2008)*: 23-46.

H Ding, H He (2018) *A tale of transition: An empirical analysis of economic inequality in urban China, 1986–2009*, Review of Economic Dynamics, 2018

Hallberg, Daniel, and Anders Klevmarken. "Time for children: A study of parent's time allocation." *Journal of Population Economics 16.2 (2003)*: 205-226.

Hannum, Emily. "Political change and the urban-rural gap in basic education in China, 1949-1990." *Comparative education review 43.2 (1999)*: 193-211.

Hans Rudolf Leu & Regine Schelle (2009) Between education and care? Critical reflections on early childhood policies in Germany, *Early Years, 29:1*, 5-18, DOI: 0.1080/09575140802689034

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica: Journal of the econometric society*, 153-161.

Ho, V. H., & Qiaoyan, H. (2013). The Recursivity of Reform: China's Amended Labor Contract Law. *Fordham Int'l LJ*, *37*, 973.

Mori, I., & Baker, D. (2010). The origin of universal shadow education: What the supplemental education phenomenon tells us about the postmodern institution of education. *Asia Pacific Education Review*, *11*, 36-48.

Lee, J. W., & Lee, H. (2018). Human capital and income inequality. *Journal of the Asia Pacific Economy*, *23*(4), 554-583.

Li, J., & Yu, H. (2014). Income inequality and financial reform in Asia: the role of human capital. *Applied Economics*, *46*(24), 2920-2935.

Jiliang, Xue. (2016). The Research on Fertility Properties: Demands or Investments? From the Perspectives of Family Time Configuration and Income. *Journal of Shanghai University of Finance and Economics, 18(06)*, 28-41.

Jingzhong, Ye, and Pan Lu. "Differentiated childhoods: impacts of rural labor migration on left-behind children in China." *The Journal of peasant studies 38.2 (2011)*: 355-377.

John Knight (2014) *Inequality in China: an overview*, The World Bank Research Observer, 2014

Killingsworth, Mark R., and James J. Heckman. "Female labor supply: A survey." *Handbook of labor economics 1 (1986)*: 103-204.

Kim, I. (2000). Private tutoring in Korea: a cultural analysis. *Paper presented at the annual conference of the Comparative & International Education Society, San Antonio, Texas, USA*, 8–12 March.

Kim, Ji-Ha, and Daekwon Park. (2010). The determinants of demand for private tutoring in South Korea. *Asia Pacific Education Review, 11.3*: 411-421.

Kim, Ji-Ha. "The Determinants of Demand for Private Tutoring in South Korea." (2007).

Kim, Sunwoong, and Ju-Ho Lee. (2010). Private tutoring and demand for education in South Korea.

Economic development and cultural change, 58.2: 259-296.

Klemm, Klaus & Klemm, Annemarie (2010): *Ausgaben für Nachhilfe: teurer und unfairer Ausgleich für fehlende individuelle Föderung [Expenses for Tutoring: Costly and Unfair Compensation forMissing Individual Support]*. Gütersloh, Germany: Bertelsmann Stiftung.

Lee, C. J. (2005). Korean education fever and private tutoring. *KEDI Journal of Educational Policy, 2(1)*, 99–107.

Lee, Chong-Jae and Jang, Hyo-Min.（2008）*History of Government Policy to Shadow Education*, 09th International Conference on Education Research; Asia & Europe Dialogue in Education Research, 2008

Li, Hongbin, et al. (2012). The end of cheap Chinese labor. *Journal of Economic Perspectives 26.4*: 57-74.

Li, Jiali. (2019). Substitution or complementation: The relationship between school education and shadow education. *Best Evid Chin Edu, 4.1*: 411-424.

Liu, Junyan, and Mark Bray. (2017). "Determinants of demand for private supplementary tutoring in China: Findings from a national survey." *Education Economics, 25.2*: 205-218.

M Bray (1999), *The shadow education system: Private tutoring and its implications for planners*, Fundamentals of educational planning 61. Paris: UNESCO International Institute for Educational Planning

McDonald, John F., and Robert A. Moffitt. (1980). The uses of Tobit analysis. *The review of economics and statistics*: 318-321.

McMullen, S. (2007). The impact of homework time on academic achievement. *The University of North Carolina at Chapel Hill*, *30*, 2019.

Melot, Ludovic. (2007). *Le Marché du Soutien Scolaire [The Market for Schooling Support]*. Paris: Precepta.

Messenger, Jon C., Sangheon Lee, and Deirdre McCann. 2007. *Working time around the world: Trends in working hours, laws, and policies in a global comparative perspective*. Routledge.

Mischo, Christoph, and Ludwig Haag. (2002). Expansion and effectiveness of private tutoring. European journal of psychology of education, 17.3, 263-273.

Mishra, Vinod, and Russell Smyth. (2013). Working hours in Chinese enterprises: evidence from matched employer–employee data. *Industrial Relations Journal, 44.1*, 57-77.

Natriello, Gary, and Edward L. McDill. (1986). Performance standards, student effort on homework, and academic achievement. *Sociology of education*, 18-31.

Nzomo, J., Kariuki, M., & Guantai, L. (2001). *The quality of primary education: some policy suggestions based on a survey of schools—Kenya*. Paris: UNESCO International Institute for Educational Planning SACMEQ Policy Research Report No. 6.

Owens, Judith A., et al. (2000). Sleep habits and sleep disturbance in elementary school-aged children.

Journal of Developmental and Behavioral Pediatrics, 21.1, 27-36.

OECD. (2018). *PISA 2018: Insights and Interpretations. https://www.oecd.org/pisa/PISA%202018%20Insights%20and%20Interpretations%20FINAL%20PDF.pdf*

PM Carneiro, JJ Heckman. (2003). Human capital policy, *NBER Working Paper* No. 7288

Psacharopoulos, G., & Papakonstantinou, G. (2005). The real university cost in a "free" higher education country. *Economics of education review, 24(1)*, 103-108.

Qian, Xiaolei, and Russell Smyth. (2008). Measuring regional inequality of education in China: widening coast–inland gap or widening rural–urban gap? *Journal of International Development: The Journal of the Development Studies Association, 20.2*, 132-144.

R Wang (2017). Annual Report on New Types of Education Suppliers (2017), *Social Sciences Academic Press*

Rao, Jing, and Jingzhong Ye. (2016). "From a virtuous cycle of rural-urban education to urban-oriented rural basic education in China: An explanation of the failure of China's Rural School Mapping Adjustment policy." *Journal of Rural studies, 47*, 601-611.

S Li, J Whalley, C Xing (2014) China's higher education expansion and unemployment of college graduates, *China Economic Review*, 2014

SR Entrich (2015). The decision for shadow education in Japan: Students' choice or parents' pressure? *Social Science Japan Journal*, 2015

Sayer, Liana C., Anne H. Gauthier, and Frank F. Furstenberg Jr. (2004). Educational differences in parents' time with children: Cross-national variations. *Journal of marriage and family, 66.5*, 1152-1169.

Sayer, Liana C., Suzanne M. Bianchi, and John P. Robinson. (2004). Are parents investing less in children? Trends in mothers' and fathers' time with children. *American journal of sociology, 110.1*, 1-43.

Schneider, Friedrich, and Dominik H. Enste. (2000). Shadow Economies: Size, Causes, and Consequences. *Journal of Economic Literature, vol. 38, no. 1, American Economic Association, 2000,* pp. 77–114.

Southgate, Darby E. (2009). *Determinants of shadow education: A cross-national analysis*. Diss. The Ohio State University, 2009.

Steve R. Entrich. (2017). *Shadow Education and Social Inequalities in Japan: Evolving Patterns and Conceptual Implications*. Springer International Publishing AG 2018

Stevenson, David Lee, and David P. Baker. (1992). Shadow education and allocation in formal schooling: Transition to university in Japan. *American Journal of sociology, 97.6*, 1639-1657.

Sun, Lunxuan, et al. (2020). Are there educational and psychological benefits from private supplementary tutoring in Mainland China? Evidence from the China education panel survey,

2013–15. *International Journal of Educational Development, 72*, 102144.

TW Schultz (1961) *Investment in human capital*, The American economic review, 1961

Tan, Ling, Tiansheng Xia, and Christy Reece. (2018) Social and individual risk factors for suicide ideation among Chinese children and adolescents: A multilevel analysis. *International journal of psychology, 53.2,* 117-125.

Tobin, James. (1958). Estimation of relationships for limited dependent variables. *Econometrica: journal of the Econometric Society,* 24-36.

Veblen, Thorstein, and John Kenneth GALBRAITH. (1973). *The theory of the leisure class*. Boston: Houghton Mifflin, 1973.

Whitebread, David, et al. (2012). The importance of play. *Toy Industries of Europe*, 1-55.

Yung, Kevin Wai-Ho. (2019). Learning, teaching, and researching in shadow education in Hong Kong: an autobiographical narrative inquiry. *ECNU Review of Education, 2.1*, 64-76.

Zhang, Huafeng. (2017). Opportunity or new poverty trap: Rural-urban education disparity and internal migration in China. *China Economic Review, 44*, 112-124.

Zhang, Wei, and Mark Bray. (2020). Comparative research on shadow education: Achievements, challenges, and the agenda ahead. *European Journal of Education, 55.3*, 322-341.

Zhang, Wei. (2019). Regulating private tutoring in China: Uniform policies, diverse responses. ECNU *Review of Education, 2.1*, 25-43.

Zhang, Y., Dang, Y., He, Y., Ma, X., & Wang, L. (2021). Is private supplementary tutoring effective? A longitudinally detailed analysis of private tutoring quality in China. *Asia Pacific Education Review*, 1-21.

Zhang, Yu. (2013). Does private tutoring improve students' National College Entrance Exam performance? — A case study from Jinan, China." *Economics of Education Review, 32*, 1-28.

Zhang, Yuanting, and Franklin W. (2006). Goza. Who will care for the elderly in China? : A review of the problems caused by China's one-child policy and their potential solutions. *Journal of aging studies, 20.2*, 151-164.

Zhao, Yaohui. (1997). Labor migration and returns to rural education in China. *American Journal of Agricultural Economics, 79.4*, 1278-1287.

Chinese:

陈青之（Chen）.（2009）.《中国教育史》，中国社会科学出版社，2009.1

程平源（Cheng）.（2013）.《中国教育问题调查》，清华大学出版社；第 1 版（2013 年 7 月 1 日）

方超，罗英姿（Fang & Luo）.（2017）.《中国农村居民的教育回报及其变动趋势研究———兼论农村地区人力 资本梯度升级的现实意义[J]》. 南京农业大学学报(社会科学版）, 2017, 17(3) :74－ 85，157. 3.

哈巍; 吴红斌; 余韧哲（Ha）. (2015).《学区房溢价新探——基于北京市城六区重复截面数据的实证分析》,《教育与经济》2015 年第五期，第 3-10 页

胡婉旸; 郑思齐; 王锐（Hu）. (2014).《学区房的溢价究竟有多大:利用"租买不同权"和配对回归的实证估计》,《经济学》（季刊）2014 年第 13 卷第 3 期，第 1195-1214 页

李晓嘉（Li）. (2015).《教育能促进脱贫吗——基于 CFPS 农户数据的实证研究[J]》. 北京大学教育评论,2015,13(4):110-122+187.

马岩，杨军，蔡金阳，王晓兵，侯麟科（Ma, et, al.）. (2012).《我国城乡流动人口教育回报率研究［J］》. 人口学刊，2012(2) :64－73.

企鹅智库. (2019). 中国商业教育辅导市场消费力报告 https://tech.qq.com/a/20190813/007782.htm

全国人民代表大会（The National People's Congress of the People's Republic of China）. (1998).《面向 21 世纪教育振兴行动计划》，中国共产党第十五次全国代表大会

全国人民代表大会（The National People's Congress of the People's Republic of China）. (2002) 中华人民共和国民办教育促进法，第九届全国人民代表大会常务委员会第三十一次会议

搜狐教育.(2015). 2015 中国教育行业消费者调查报告, https://www.sohu.com/a/119527789_117344

田竹山（Tian, 2016）. 校外补课也是侵蚀社会风气的"毒品"，新华网,

魏奋、韦嘉蓉、张娜、胡信昌、林碧波（Wei, et, al.）. (2016). 疯狂的学而思，疯狂的校外培训，疯狂的中国家长，都市快报,2016-11-16

杨东平，黄胜利，邓峰（Yang）. (2014).《教育蓝皮书：中国教育发展报告(2014)》, [Annual Report on China's Education] 社会科学文献出版社

岳昌君（Yue）. (2018).《改革开放 40 年高等教育与经济发展的国际比较》 教育与经济 2018 第 34 卷 第 6 期 9-17

智研咨询.(2018). 2019-2025 年中国校外培训行业运营态势及未来发展趋势报告 https://www.chyxx.com/industry/201908/773162.html

中国教育三十人论坛学术委员会. (2018).《2018 年中小学生减负调查报告》, http://edu.people.com.cn/n1/2018/1212/c1053-30461257.html

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2021).《关于进一步加强中小学生睡眠管理工作的通知》

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2008).《关于 2008 年规范教育收费进一步治理教育乱收费工作的实施意见》，教监〔2008〕7 号

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2010).《国家中长期教育改革和发展规划纲要（2010-2020 年）》

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2014).

教育部等五部门关于 2014 年规范教育收费治理教育乱收费工作的实施意见。教办〔2014〕6 号

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2015). 教育部关于印发《严禁中小学校和在职中小学教师有偿补课的规定》的通知。教师〔2015〕5 号

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2018). 教育部办公厅等四部门关于切实减轻中小学生课外负担开展校外培训机构专项治理行动的通知。教基厅〔2018〕3 号

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2018). 教育部办公厅关于全国校外培训机构专项治理行动整改工作进展情况的通报(截至 2018 年 12 月 15 日）教基厅函〔2018〕100 号

中华人民共和国教育部（Ministry of Education of the People's Republic of China）. (2018). 教育部办公厅关于做好 2018 年普通中小学招生入学工作的通知. 教基厅〔2018〕5 号

中华人民共和国中央人民政府国务院（General Office of the State Council of the People's Republic of China）. (2016). 《关于统筹推进县域内城乡义务教育一体化改革发展的若干意见》（国发〔2016〕40 号）

中华人民共和国中央人民政府国务院（General Office of the State Council of the People's Republic of China）. (2018). 《关于推动创新创业高质量发展打造"双创"升级版的意见》

中华人民共和国中央人民政府国务院（General Office of the State Council of the People's Republic of China）. (2018). 《国务院办公厅关于规范校外培训机构发展的意见》，国办发〔2018〕80 号

中华人民共和国中央人民政府国务院（General Office of the State Council of the People's Republic of China）. (2021). 中共中央办公厅 国务院办公厅印发《关于进一步减轻义务教育阶段学生作业负担和校外培训负担的意见》

4. Chapter4
How government educational expenditure on different stages influence the family educational spending

4.1. Introduction

We have discussed how families' inner factors affect their educational spending in Chapter 3, especially on extra education services for their children, such as tutoring courses that outside schools. Surely, as a common sense, we know economic, cultural and political environment are casting impact on families' decisions on education, mostly their spending decisions. Among all effect, the government finance plays the most important role and can directly affect the number of family's educational spending in China. Question is that, there is no promised pattern about how government expenditure affects the direction nor the amount of family's spending, and it is the same in the field of education.

Therefore, after we demonstrated why and how family compete in offspring's education, we now turn to the role played by government in such competition game, and find out how government finance affects family, hoping to show that the amount, as well as the distribution of government educational expenditure, are both fairly important. Section 1 is the background of educational finance. Section 2 is former researches about government educational policies and expenditures of China. Section 3 introduce some clarification for the construction of model. Section 4 is the hypotheses, the model and empirical tests. Section 5 is the result and explanation of the tests. Section 6 talks about other discoveries from the result. Section 7 discusses some possible policies for government. Section 8 is the conclusion.

4.2. Background

4.2.1. Why emphasize educational finance

Nowadays, government finance has very profound influence on national educational undertakings, especially on the so-called compulsory education. However, support from government has not been synchronized with the development of education, until governments realized its indispensable role in the social and economic development, and we can actually notice that education is treated as private good for a long period by the judge of government (Gillard D,2018; Chen,2009). It is in the 20th century, in which we had two world wars, that government has shocked by the power and possibility of national education. Started from the engineering and physics, government has been keeping spreading it impact to every conner of education and researches (Meyer, etc.,1992). Afterwards, since more researches have confirmed the importance of human capital and its positive

externality to societies (Schultz,1961; Becker,1962; Carneiro, etc.,2003; Borjas,1994), governments are required to take the responsibility to correct the market failure happens in education fields. Meanwhile, (Johnstone,1986) explain the necessity of not only governments but also companies and firms' support on education, because they all are gaining benefit from the people who are well educated, thus they have the duty to pay both the certain employee and the education system. With the human capital theory and the cost-sharing theory, government educational finance has been formally researched and executed.

Besides, as social and political development continues, right to education is advocated and defined as one of basic human rights in many countries and organizations (Assembly,1948; Hubsch,1992; Bitensky,1991; Morsink,2010). To respond, national governments have made many laws and policies to protect this right of their citizens (Beiter,2005). From this perspective, the government educational finance can be treated as a sort of an extension of relevant laws and policies. To ensure national governments of different countries can seriously protect human rights, relevant conventions was enacted by many international organizations (Heyneman & Lee,2016), including UNESCO, WHO, UNICEF and the World Bank. in which the target ratio of government expenditure on education is also set for especially the developed countries (Mundial, etc.,2016). By the end of 2018, the average ratio of government educational expenditure on the country's GDP was 4.9% for OECD, which implies the how these countries emphasize on their educational goals.

From the former narrations, we can conclude that there are at least two targets that government educational finance has: 1, to drive a sustainable development of economy and society; 2, release the burden on citizens in education to protect their human rights. It has been taken for granted that these two goals supported each other, thus they should be always achieved in the same time (Friedman,1955; Deming,2018). However, being doubted on the relationship between these two goals is sometime reasonable, for things may go wrong if the return to education for the society become lower, or if the government educational finance itself bring about a more serious social inequality. Before we go specific, it is necessary to review some important contents and mechanism of the government educational finance, in order to find evidences that can explain how the relationship of government's two goals change overtime. However, we are not capable to introduce educational finance of all the countries in the world. Since developed countries, like OECDs, have achieved basic requirements that casted on their educational finance, it is more interesting and enlightening to focus on the developing countries. In fact, governments in developing countries have to face more dilemmas when making educational policies and financial plans, for they are usually limited by not only their national income, but also the amount of education resources. They also have great pressure in solving social inequality problems and reforming economic, and even political system, to ensure the growth of their countries. All of these factors, big or small, can possibly lead to confliction of two goals of educational finance.

To this extent, China's current situation is very appealing, not only because it is now an enormous

economy in the world with a kind of glamorous growth history, but it also has fairly different political system compared to the rest of the world. We will see soon after, that this unique combination of economic and political system has been generating great influence on its education. Besides, as a country with a population of almost 1.4 billion, there is no doubt that it has many urgent issues in its educational finance (Wang,2010). Therefore, China will be the objective of this research, and before the analysis, we are going to make a brief introduction of China's history of its educational finance.

4.2.2. Features of educational finance in China

The reason why we start with history of China's educational finance, is that we are going to show that educational expenditure of China's government did not always have positive or at least ideal effect as government thought (Tsang,1996; Kang,2004).

To start with, there are several present conditions of China's educational finance should be mentioned. First of all, although China has experienced fast economic development, and also has great enthusiasm on education just as other East Asian countries do, China still stays in a relative low level of government educational expenditure compared to other countries (Li,2014). In 1990s, China's government has set a goal about the level and growth of its educational expenditure, which include the target that raise the ratio of government educational expenditure on GDP to 4%. However, the goal which was supposed to be accomplished before 2003 was actually achieved in 2012, with a big push in the year before.

Secondly, researchers have found that there exists an obvious difference in the distribution of government educational expenditure to each educational stage. China had a very higher ratio of government expenditure on higher education to its total financial expenditure (Yan,2017; Qu,2009). Take the comparison of government expenditure on university and primary schools per student for example, the OECD average was 1.27, and China was 2.63 (Yang & Liu,2019). In this perspective, we can learn an important fact that China's government is actively emphasizing its higher education, for many reasons we will talk about in detail later in this section. Nevertheless, we will see that this strategy on the development of education is a big potential reason for the conflict between the educational goals.

Besides, the poor execution of the educational finance, in such as the distribution and actual use of the educational funds and other transfer payment for education, shows some drawbacks in China' educational and financial system. The first one is the deficient income of local government, which became worse after several policies like, the implement of new tax distribution system (Wong,2000), the reform of agricultural tax (Chan,2006), the policy of free compulsory education (Xiao, et, al.,2017; Tang, et, al.,2020). Since it is the local government of "Xian" level, not national or provincial government to take the responsibility of providing compulsory education, the policies mentioned above all had negative impacts on its revenues (Wong,2007). Then, lack of supervision, arbitrary

financial plans and corruption, are also having great damage on the efficiency of government finance (He,2000). How these related to the influence of government educational expenditure will be discussed in next section.

After explaining some current features of China's educational finance, we here introduce some near history, which has a close relation with the current policies and environment. When the People's Republic of China (PRC) is founded, all of the educational institutions are incorporated and managed by the national government, which means the monopoly of formal educational resources (Tsang,2000). However, in another perspective, national government were undertaking all the expense and cost of every citizen's education, who are at the education ages. A noticeable thing is that, to gather the scarce educational resource for efficient use, and to cultivate elites for the future development of this very young country, government announce the project of constructing key schools, which would enjoy more support and consideration (Xu,2014). This has great similarity to nowadays' key university which directly governed by the national MOE (Ministry of Education).

After Cultural Revolution, although the university entrance examination system came back to alive[21] (Davey, et, al., 2007), China's government started to allow other capitals to take part in the education system (Que,2019). Along with the Reform and Open policy, Chinese families were becoming able to afford more education of their children. From then, family's educational spending became important part of all the consumption, and government has a new different role in the education system, which is an influencer instead of a controller.

Another important part of the background is the policies. An educational policy, that has most profound influence, was made during the early year of the Reform and Open period, which is the Industrialization of education (Wang, 2000). Though there were no explicit words in government document use "Industrialization of education", it was thought to be starting with the policy that promote private education[22]. Though government's facial reason is to gather the government resource to construct high level universities of the world, many researchers considered it as a policy to relief the financial pressure of government and to motivate the family consumption (Zhang, 2000; Wu, 2002; Yang, 2004).

From data we can see that since 1999, the number of university and college enrollment students has been growing very fast, from 11 million in 1998 to 97 million in 2020, not only because more universities and colleges have been built, but also because of the lower educational fee compare to the increasing family income. However, this policy brought several problems soon later, mainly because of the lack of supervision and proper matching policies in the educational market. These problems

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[21] the State Council in China (1977),《关于一九七七年高等学校招生工作的意见》(Opinions on the Enrollment Work of Colleges and Universities in 1977)

[22] the State Council in China (2004)《中华人民共和国民办教育促进法》(Non-governmental Education Promotion Law, revised in 2021)

include, extra education fee on school selections (Hu, et, al., 2008), famous public school use its name to operates private schools (Cao, 2009), housing problem in school district (Zhu, 2011), and examination factories (Zhang, 2015), which were all resulting heavier financial burden on families. China's government has introduced many policies and laws to fix these problems, but since it neither really solve the deficiency nor the imbalanced distribution problem of education resource, it did not really effective, especially to the people who in real need, such as rural families and migrant families in urban area. Moreover, many researchers have observed the inefficiency of the use of government funds for education projects (Wang, 2004), which generally worsen the education quality of particularly compulsory schools, and even let families to pay for their bills (Wang & Yuan, 2002). From what has been discussed above, we can learn that government educational policies, and its educational expenditure as well, does not always give ideal result, while sometime put families in a worsen situation. These give us a crucial reason that we have to examine the effect of government educational expenditure carefully.

4.2.3. Family educational spending in China

We have known that government took over the education in the early year when PRC was founded, which means there were nearly no educational spending of families at that time. However, from other views, it means that families were not affected by the educational policies at all, and they were not allowed to the purchase more education services to satisfy any further demand, but this situation changed since Reform and open policy has been implemented.

From the view of economic ability, Chinese family became capable for more education services. During that period, China's family income increased in a high speed along with the economic growth, and the weight of family income in GDP also raised dramatically, from about 40% in 1978 to over 70% in 1996 (Statistical Year Books). Meanwhile, as the savings of families stably increased during that period, Chinese families have more resources to invest in education. Also remember that the one child policy had been written in constitution in 1982. According to the theory from Becker, as the number of children decreases, family will have more educational spending per child (Becker, 1981).

The situation was similar from the view of motivation. With the end of Cultural Revolution in 1976, the academic cycle came to alive again, and start to discuss the educational policy and finance, and refer to the relevant western researches. After lots of discussions, China past its first law of compulsory education in 1986, and start to support the construction of compulsory schools, which increase the supply in public education services. Meanwhile, being affected by government policy and traditional thoughts, families were also willing to have their children accept more education, which increase the demand for education.

Then, after the industrialization of education started around 1999, families have more chances to participate higher education, and government decide to use social capital's helps to accelerate the

development of education in China, and these policies naturally raised supply of education, and allows more families to pay for education. However, as the national financial condition became better, mainly because of the reform of taxation in 1994, the national government were capable to kept increasing the government expenditure on education, especially on the national universities, which makes universities of 985 and 211 program[23] become the most popular universities among Chinese families, and thus lead to the continuing educational competition.

The competition around the university entrance examination has been gradually dropping from high schools to even preschool education. Though government promulgated some policies to change the environment of over competition in lower education stages[24], it doesn't work well. Meanwhile, instead of reducing the economic burden of families, local governments actually were profiting from the families spending, by using its monopoly power in education and lands (Ye & Wu, 2014).

Then, recently, basically since 2010, the market of private education started to boom, and families have more extra spending in private education (Zhou, et, al., 2018). Unfortunately, as usual, relevant policies didn't successfully regulate the education market. Eventually, in 2021, China's government announced the policy to go further in reducing the students' burden in school study and private tutoring[25], which basically expelled social capital from the education market.

Therefore, the family's educational spending has been growing extremely fast since the industrialization of education, even faster than the growth of government educational expenditure. Some people generally believe that the tendency will be stopped with the strictest policy in 2021, but it is tricky because more private educational services will go underground and it becomes harder to measure the relevant consumption (Yang & Chen, 2021).

Anyway, these changes implied that, in recent China, apart from the income effect, external environment also has great influence on the family's educational decision. As we can see in the change of character that social capitals played in China's education market, one of the most obvious external environmental changes is that China's government educational policies and educational finance were gradually being crucial to the development of education. Because of this change, we are going to observe a closer relationship between families and governments in the educational issues in China. Therefore, to understand how policies and government educational expenditure have influenced

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[23]关于继续实施"985 工程"建设项目的意见（Opinion of 985 project)；"211 工程"总体建设规划(Plan of 211 Project)

[24] Ministry of Education of People's Republic of China (2004),"五坚持，五不准"；国家中长期教育改革和发展规划纲要(2010-2020) (National medium and Long-term educational reform and development project, 2010-2020)

[25] 关于进一步减轻义务教育阶段学生作业负担和校外培训负担的意见 (Opinions on Further Reducing the Burden of Students' Homework and Off-campus Training in Compulsory Education Stage)

families educational spending, is an important and instructive work for the government to makes future educational policies and plans.

4.3. Former researches

We have introduced the change of China's educational policies and family's educational spendings, we can see that policies were having significant but different impacts on families. To understand why government policies have influenced family's decision in education investment and relevant consumption, it is important to go further in the mechanism behinds those policies, by referring to former researches about some of them.

4.3.1. Problems in China's educational policies

From the history, we can see that families were affected by China's educational policies that were made for mainly three aspects: expanding higher education, improving of compulsory education in middle and western China, and reducing family's pressure from education. Therefore, we are going to follow this trace to discuss their effects.

(1) Expanding of higher education

In 1998, deflation happened, and in 1999, the China's government decide to implement the industrialization of education, which is thought as one of the methods to promote domestic demand. Many scholars discussed the potential consequences of this policy (Meng, 1999; Wang, 2000; Li, 2000; Yang, 2004; Ji, 2006), such as rent seeking, making education luxury good, losing school's credibility, and they are generally becoming truth.

(2) Improving of compulsory education

The educational quality in middle and western China is always being researched. China has achieved its goal of popularizing nine-year compulsory education in 2000, but left many problems to be solved, and we here introduce three of them. The first one is the policy of closure and merger of rural schools[26], it brought many problems to the economic condition to families and the health of students (Ding & Zheng, 2015; Hou, et, al., 2018), and the policy finally caused school bus tragedies to the students of rural families[27]. Though the government didn't mention the policy again since 2012, the quantity of compulsory schools kept decreasing. The policy was thought that the policy was supposed to improve the financial condition of local governments, but because of the autonomy without supervision (Cai & Kong, 2014), corruption and embezzlement make the families to pay for the consequences (Xie & Zhang, 2022; Chen, et, al., 2014).

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[26] 关于基础教育改革与发展的决定

[27] 撤点并校政策让农村学生陷入困境, http://www.chinareform.net/

The second one is quality of rural education, as mentioned, Wang and Zhao suggested that since the policies like reform of tax distribution, cancellation of agricultural tax and free compulsory education, most local governments were losing its financial ability to provide public services, including education (Yu, et, al., 2018; Wang & Zhao, 2012).

The third one is the problems caused by Hukou system, migrant students that follow their parents find it is very hard and expensive to enter a school (Montgomery, 2012). Guo thought this situation is deteriorating the quality of compulsory schools (Guo, 2001), and Xiang thought that local government should cover the assure the rights of migrant students (Xiang, 2006). Fu and Ren found that the migrant students have lower return to education (Fu & Ren, 2010), probably because of the low quality of education that they are able to accept.

(3) Reducing family's pressure from education

Because of the disparity between compulsory schools, the policy of entering the nearest schools ironically cause the problem of housing in school district (Wen, et, al., 2017). The problem makes scholars to consider housing cost in the total educational spending of families (Feng & Lu, 2013). Chen and Miao think that housing in school district enables families with enormous asset to transfer their advantage and capitals to their children, by having them accept education of better quality (Chen & Miao, 2021). Here, we can see that despite of the great expenditure by government on the key schools, it didn't really reduce the economic burden of families of compulsory stage as it supposed to do.

4.3.2. Educational finance and family spending:

Particularly, what is the numeric effect of government educational expenditure on family spending? Many researches have examined the effect of government expenditure on consumption, and made conclusion that in general, the substitutive effect and complementary effect are obviously, but the relative power decide the final result (Bailey, 1971; Kormendi,1983; Barro, 1990; Linnemann, 2006).

It also fit the education, which requires us to analyze the substitutive effect and complementary effect of government educational expenditure separately. Wu used the data of Hubei Province and proved the substitutability (Wu, 2011), while Cai found the influence of public educational expenditure is different from general government spending, and is able to promote family educational spending (Cai, 2014).

Researchers have considered the heterogeneity of families (such as income and education background), and found some evidences of different reactions towards same government expenditure project (Wu, 2011). However, few researches discussed the effect of different kind of educational expenditure of government, and how government expenditures are changing the environment for family of different educational stages of areas. When we talk the environment of education, we suggest

the intensity of competition for enrollment chance, as mentioned before.

4.3.3. Positional competition and family educational spending

Talking about competition, we here refer to theories about the positional competition from Thurow and Hirsch, because they all considered education as a sort of positional goods. (Hirsch, 2005; Thurow, 1976). According to their discussion, positional goods are limited in their supply, or of total inelasticity, which means they only become more expensive when the economy continually grows.
They also claim, the reason why families are willing to pay for positional goods, is that the society rewards people in relatively higher position. Researcher tend to calculate the rate of return to education in China, and found that the return is lower in rural area (Fang & Luo, 2017; Ma, et, al., 2012; Johnson & Chow, 1997), but the rewards are not only in wages, but in status and health. China has both inequality in both economy and educational resources across the country, which generate multiplied effect on the necessity to positional competition (Guo, et, al., 2019).
Therefore, we should not neglect the competition in education, and also the government expenditures that affecting this competition.

4.4. Clarifications on Government educational expenditure

We have seen that China has made some mistakes in its educational policies and thus having its educational expenditure generate unwilling impacts. These truths remind us that policies and expenditures are generating different and sometime surprising influences, even though they may be identical across different area. Therefore, it is necessary to make some clarification about government expenditures, in order to assure that our model can explain the reality properly.

4.4.1. Supportive and Resistant finance

Talking about government finance, people tend to refer to its influence on public schools. However, government has also made many policies, in order to deal with the problems brought by rapid growth of private education. To make it clear, we define “Supportive finance” to suggest the expenditure and funds that aim to finance public schools, and “Resistant finance” to suggest the government expenditure that tends to confront with the problems caused by irrational behaviors in educational market. Using these definitions, we will explain the difference of impact that these two types of government expenditure cast on families.

Basically, the former one is supposed to alleviate the social inequality, by giving financial support to those compulsory schools with low quality, fully take advantage of the positive externality of social education level, and cultivate talents to achieve mainly national political and industrial policies. Therefore, from the motivation of this kind of government expenditure, it should be a compensation

to the lack of social education caused by neglect about positive externality, and we will think it as positive finance. If everything goes well, families that in need for government help will have more chances to enjoy education services of higher quality, and thus reduce its educational spending, like housing expenditure and selection fee.

As for the later one, which we will explain more, the “Resistant finance”, its main target is to solve the chaos in the educational market, which make it passive. For example, the recent strict rules for the private education market, which will cost government a lot to fulfill the education demand that has been satisfied by private institutions (Gu & Yu, 2021). The result, however, may forces many families to pay more.

To be more specific, it is necessary to emphasize the educational system in China again. Being dominated by the university entrance examination, Chinese families have few choices but demand for extra education services to improve their children’s test scores. In this aspect, private education institutions have more advantages to the public schools, by hiring experienced teachers with higher wages, and teaching more techniques for particular questions or tests (Lu, et, al., 2019). Moreover, some institutions even using scholarships to instigate student to compete for higher scores, or using propaganda to cast more anxiety on parents, which are all charging the public schools and the whole education system as well.

To offset these negative impacts, local governments who has responsibility in compulsory and most senior middle school, were forced to raise its educational expenditure, in order to improve the facilities for education activities, and pay a more generous amount to teachers to keep them from being scouted by private education. Though the strict policy is implemented, it currently has only expelled capital from the market, and doesn’t really change the education system, which implies the university entrance examination for most cases. Therefore, the demand for extra tutorial causes is not really changed.

From what has been discussed, we are able to foresee that, government is going to afford more public education services, to fill the blank caused by the withdraw of private education institutions, and this will definitely generate greater fiscal burden on government’s budget. Besides, there are also other several reasons that government will confront with problems in the progress, which will eventually increase the family’s educational spending. On the one hand, though government has forbid the profitable operation of educational institutions, it cannot provide the various service to meet the demand, which will make the private educational service go to underground, costing much more for the provider and thus the purchaser. One the other hand, since government will probably use public bidding to buy services from the private providers, it is going to inevitable face the corruption problems, which raises the government expenditure but may not solve the problems of lack of education resources.

Instead of reform the education system, making proper laws and regulations, enforce the market

supervision, China's government choose to use administration orders to suppress the supply of social education resources, and try to take the duty belongs to market. It will cost government much more and possibly lead to only very slight improvement in the quality of schools because of the latent problems discussed above.

In conclusion, with incomplete laws and regulations, this kind of "Resistant finance" of government is going to cost government to do things that can be done effectively by well-regulated market, and the result is some families may be able to get rid of endless tutoring since there no available ones, other families, most of them are richer, have to pay more for other types of tutoring, such one-to-one courses, to maintain its competitiveness in university entrance test. So, the total effect of the increased "Resistant finance" on family educational spending may possible be positive, meaning that families should may more. However, currently there is no perfect way to separate these two kinds of government educational finance, but it is still important for us to bear in mind that government educational finance can have effect in surprising different directions.

4.4.2. Stages of education Classification

Another necessary classification is the stages of education. Typically, government expenditure on compulsory schools is supposed to have different effect compares to that on higher education. Take the former one for example, if the government is trying to raise the level of education of the nation, it has to reduce at least the cost of basic education, whether using the subsidy or providing free education services. Thus, it is easy to see a tendency that government expenditure gradually reduces the family's spending.

As for the rear one, the situation is much more complicated so that needs more explanations. As mentioned before, China has been distributing many resources and efforts into higher education. To analyze the effect of the government expenditure of this stage, different points of view are needed.

At the first place, governments are providing subsidy to university, in order reduce the cost of families when receiving higher education. Though it is not free as in the Mao's time, China's family is paying relatively much less tuition than western countries in average (Li & Wei,2000). To this extent, the government expenditure is playing the same role as it does in compulsory education.

In the meanwhile, however, government are also creating benefit premium for students of particular universities, such as the universities directly operated by the MOE, as mentioned before. Compared to the cost of receiving higher education, the benefit, including pecuniary profit and social status is much higher, which consistently drive families to pay more in education. To be noticed, the families are willing to pay more for children's education, not only in higher education stage, but also in middle and even primary stages, by which we mean that the cost happens in university or college is far from total spending that family is paying for higher education.

More specifically, in order to enjoy the benefit brought by the top universities in China, families

must have their children performance extremely well in university entrance examination, which requires plenty of preparations, including housing in school district and extra tutoring services provided by individuals or private institutions. Hence, the increase in government expenditure to higher education is possibly resulting more family spending.

Besides, even the government finance may be capable for infinite increase in educational expenditure, available education resources is limited in China. In fact, education resources are so scarce in some area that government finance can hardly provide any help (Guo, et, al.,2020). Apart from that, since almost every university and college are following government's orders to different extent, many educational expenditures are flowing to departments of administration or daily affairs. One example for the obedience is that schools are always trying to achieve the numerical goals set by governments, such as the employment rate of graduates and number of published papers. Thus, it changes the inclination of schools using their funds, from provision of education of high level and quality, to activities that are related to government's goals.

This inclination also leads to another problem that happens in labor market, which is homogenization of graduates. To be competitive in labor market, apart from the title of university graduates, families have to go further on their children's education, by sending them to study abord or receiving more tests for other certificates. This effect can be particularly strong is because these sorts of competition among graduates are being transmitted to lower education stages, even to compulsory education. Not surprisingly, schools in these lower stages are also focusing merely on the enrollment rate of their graduates. Therefore, a senior middle school with more students enrolled by, say, national universities, will be more attractive to families, stimulating them to spend more in their children's academic performance.

Now we can see that government expenditure on higher education can possibly make families pay more, if it is, 1, raising the benefit to graduates of a few certain universities; 2, paying to achieve the numerical goals set by government, instead of improving school's quality; 3, neglecting the characteristics of students, and promote homogenization of students. In fact, there are researches and discussions having concluded that this is exactly the plan of Industrialization of education, which was to make families spend more on education to drive the consumption (Yang, 2004). To this extent, it would be reasonable to assume that government expenditure on higher education is promoting the educational spending of families.

4.4.3. Enrollment competition and Relative government expenditure on higher education

We have discussed the importance of university entrance examination in the China's education system, and the homogenization of graduates of higher education and even senior middle school. These directly cause the severe educational competition in China. For this reason, it is necessary to consider how government expenditure cast influence to the current competitive environment.

It has been confirmed that geographic educational inequality has its significance on the educational attainment of individual, and the gaps between areas is getting wider (Hannum & Meiyan, 2006; Zhang & Kanbur, 2009). Including education, many aspects that rely on government expenditure generate spatial inequality in China, and many of them can be attribute to the government fiscal policies since Reform and Openness (West & Wong, 1995). In other words, when we discuss how government expenditure affect family's decisions, it is important consider the influence of regional disparity in government educational expenditure, not only the absolute amount. However, few researches discussed how imbalance in government educational expenditure affect family's educational spending, especially on the higher education stage.

To measure the imbalance, we are going to calculate the comparison of government expenditure between different areas, and define it as relative government educational expenditure. Besides, we focus on the government expenditure on university and college, because most families do not consider entering schools in other province when they are before the stage of higher education.

Why these variables can reflect the influence of government expenditure on education competition, and why families are caring about these kinds of variable. For the answer of these two questions, further explanation on university entrance test will be inspiring.

In China, those families who have conditions, would like to choose participating university entrance examination and set goals for their children's test performance, because of the relative high payoff of entering universities. A different thing of entrance test, comparing to western countries, is the admission rules of universities. Take national universities for example, these universities have a quota, less than 30%, on the students from the local province. For students from other provinces, the university will take the population, the quality of students and the scores of entrance examination of past years into account, and based on the above information, it will declare its admission plan to the MOE. After receiving permissions, it can have its plan implemented.

As we also know that students are only allowed to participate university entrance examination in the province that identical to its Hukou (registered permanent residence), students in different provinces are clearly facing inequality in the enrollment to same university, leaving alone the regional disparity in education. Moreover, there is also an extreme imbalance in the geographical distribution of national universities, where most universities of 985 and 211 program are located in eastern area of China (Liu, 2015). Because of these enrollment rules and inequality situations, the education competition is enhanced to a new level, and this kind of inequality can be clearly shown by the disparity between government expenditure to universities and colleges of different provinces.

As for Chinese families, they are supposed to react and make decision based on the disparity because they care about the position in the educational competition and believe that the higher quality of higher education will promise better status in the society of social stratification (Yeung, 2013). In this case, the absolute number of government expenditure to universities in local province will not be

able to provide complete information for families to judge the cost and benefit of accepting higher education. The decision of education spending will also rely on the comparison with the level of government expenditure, because it suggests the disparity in the quality between higher education institutions.

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4.5. Empirical Analysis

4.5.1. Hypothesis

Since we have introduced some of the possible impacts that government educational finance can have on family educational spending, here we make 4 hypotheses:

1. Government educational expenditure on stages of compulsory education generates stronger substitution effect and decrease the family education spending.
2. Government educational expenditure on stages of non-compulsory education generates stronger complimentary effect and increase family education spending.
3. Rural families are more sensitive than urban families in their educational spending, when facing the change of government expenditure.
4. Families also react to the relative government expenditure on higher education between different areas in China.

4.5.2. Models

To empirically test the hypotheses above, we are going to follow the models that are used to test government expenditure on household consumption (Kormendi,1983; Ho,2001; Chu & Yan,2009; Wu,2011), and we have a basic model like:

$$edu_{it} = \beta_0 + \beta_1 income_{it} + \beta_2 uni\_central_{it} + \beta_3 uni\_local_{it}$$
$$+\beta_4 vsmid_{it} + \beta_5 smid_{it} + \beta_6 jmid_{it} + \beta_7 pri_{it} + a_i + \theta X_{it} + u_{it}$$

The explanations of these variables and variables in following contents are introduced in Table

4.1, and all these variables are in logarithm form.

Especially, we have seen that family are probably making education spending decision based on the inequality in higher education quality between areas, they will refer to the comparison of government expenditure in different provinces and areas. To test the influence of the imbalanced distribution of higher educational resources on family's education spending, we calculate the relative government educational expenditure on university and college respectively.

By saying relative, we need to set some reference standards, and the standards here are Y_{1t}^* and Y_{2t}^* in our model, where Y_{1t}^* is the average number of government expenditure on central university[28] per student of the area (East, Middle, West), that includes province i, and Y_{2t}^* is the average number of government expenditure on central university per student of the whole country. Y_{3t}^* and Y_{4t}^* are defined similarly to Y_{1t}^* and Y_{2t}^*, but for local university and college[29]. Therefore, we have:

$$edu_{it} = \beta_0 + \beta_1 income_{it} + \beta_2 uni\_central_{it} + \beta_3 uni\_local_{it} + \beta_4 vsmid_{it} + \beta_5 smid_{it} + \beta_6 jmid_{it} + \beta_7 pri_{it} + \gamma_1 ln(Y_{cit}/Y_{1t}^*) + \gamma_2 ln(Y_{cit}/Y_{2t}^*) + \gamma_3 ln(Y_{lit}/Y_{3t}^*) + \gamma_4 ln(Y_{lit}/Y_{4t}^*) + a_i + \theta X_{it} + u_{it}$$

Particularly, as all the variables take logarithm form, $ln(Y_{cit}/Y_{1t}^*)$ can be wrote as $y_{cit} - y_{1t}^*$, suggesting the comparison between the government expenditure on national university of province i and the average government expenditure on national university per student of the area.

Take the example of Beijing. Since it belongs to eastern area of China, families of Beijing are supposed to compare the government educational expenditure per students between Beijing and eastern China, and between Beijing and whole China as well.

There are other factors that also measure the inequality in the opportunity of being enrolled by universities. We take these variables into the model, in order to control the difference in chance of having higher education for families. We have known that higher government expenditure per student in a province doesn't necessarily means more chances for the local families. Take Anhui and Henan Province for example, they both used to be a province with very high educational expenditure per

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[28] Central university is the short for "Institutions of Higher Education directly under the State Departments of China", including universities from 985 and 211 project. Since these universities are built to provide the top quality of education, research, and social services in China, no college is involved. There were only less than 120 central universities in 2020, of all 2738 higher education institutions.

[29] Local university and college are financed by local governments, and the number of them is about 2500 in China. They have bigger disparity within them, and their quality are generally much lower than central universities.

student on national universities, but the enrollment rates in these two provinces are always left behind. Therefore, the enrollment rate of higher education is a proper control variable. However, because of the lack of data sources, we will calculate two ratios for each province to replace the enrollment rates, in order to represent the chance of having higher education for families. One is the amount of university enrollment on the number of senior middle school graduate; and the other is the amount of college enrollment on the number of senior middle school graduate graduates. Since these ratios do not take the enrolled students from other provinces into account, here we call these replacements as "quasi"-enrollment rate.

Table 4.1. Variables Explanation

VARIABLES	Definition
policy2010	Dummy of "National mid-long term educational reform and development plan"
edu	family spending on education per capita
income	family income per capita
urban_unemp_rate	Urban registered unemployment rate
uni_central	government expenditure to central owned university/national university
uni_local	government expenditure to local(province) university and college
smid	government expenditure to local(province) senior middle school
vsmid	government expenditure to local(province) vocational senior middle school
jmid	government expenditure to local(province) junior middle school
pri	government expenditure to local(province) primary school
college_pop_ratio	Ratio of population who have higher education certificate
undergrads_adm_ratio	"quasi"-enrollment rate of universities
college_adm_ratio	"quasi"-enrollment rate of colleges
ln_cen_area_comp	per student government expenditure on national higher education of the province / per student government expenditure on national higher education of the area
ln_cen_nation_comp	per student government expenditure on national higher education of the province / per student government expenditure on national higher education of the whole nation
ln_local_area_comp	per student government expenditure on local higher education of

	the province / per student government expenditure on local higher education of the area
ln_local_nation_comp	per student government expenditure on local higher education of the province / per student government expenditure on local higher education of the whole nation

4.5.3. Data

This analyze uses panel data of 30 China's provinces, excluding Tibet, from 1999-2018, mainly collected from statistics year books of those provinces and China's statistics year book of education. To keep the differences between urban and rural areas, every province data that measure the average number of the families will be divided into urban and rural parts. Specifically, we use data about government expenditure on urban and rural schools of compulsory education stages separately, but we have the rural and urban families in same province to share independent variable of government expenditure on other education stages[30].

Since we are considering the average government expenditure on particular areas as reference group, we need to make it clear on the area division, which is showed in Table 4.3.

Table 4.2. Division of areas in China

Eastern China	Beijing, Shanghai, Tianjin, Shandong, Guangdong, Jiangsu, Hebei, Zhejiang, Hainan, Fujian, Liaoning
Middle China	Anhui, Shanxi(山西), Jiangxi, Henan, Hubei, Hunan, Jilin, Heilongjiang
Western China	Yunnan, Inner Mongolia, Sichuan, Ningxia, Guangxi, Xinjiang, Gansu, Guizhou, Chongqing, Shanxi(陕西), Qinghai

From data, we found that Beijing, Shanghai, and Tianjin have extremely high government expenditure on higher education per student, mainly because these three places have lots of universities and colleges. Therefore, we have other models, excluding these three municipalities. Meanwhile, in the models without 3 municipalities, we include the semi-enrollment rate of higher education, to control the opportunity, or possibility of having higher education for families for particular province. Because the data of enrollment of universities and college was not available until 2005, therefore these models will use data from 27 provinces from 2005 to 2018.

Another important treatment, is that we test the hypotheses for families of urban areas and rural

[30] The sources of variables are from <China Statistical Yearbook> and <Educational Statistics Yearbook of China>, and those yearbooks of provincial level, which are showed precisely in Appendix A.

areas separately, because there are so many differences, from economic to political, between these two areas.

Table 4.3. Descriptive statistics for 30 provinces from 1999-2018

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
year	1,200	2,009	5.769	1,999	2,018
policy2010	1,200	0.450	0.498	0	1
edu	1,200	6.042	0.793	3.559	7.805
income	1,200	9.086	0.857	7.217	11.13
urban_unemp_rate	1,200	3.517	0.718	0.620	6.500
uni_central	1,200	6.797	4.457	0	11.09
uni_local	1,200	9.082	0.669	7.651	11.09
smid	1,200	8.344	0.989	6.660	14.01
vsmid	1,200	8.404	0.937	6.286	10.91
jmid	1,200	8.217	1.244	5.796	11.42
pri	1,200	8.000	1.199	5.251	10.70
college_pop_ratio	1,200	0.0945	0.0679	0.00859	0.487
ln_cen_area_comp	1,200	-13.24	9.537	-29.96	-5.126
ln_cen_nation_comp	1,200	-6.426	9.712	-21.96	0.898
ln_local_area_comp	1,200	-8.309	0.699	-9.543	-6.077
ln_local_nation_comp	1,200	0.00429	0.399	-0.888	1.478

Table 4.6. Descriptive statistics for 27 provinces from 2005-2018 without Beijing, Shanghai, Tianjin

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
year	756	2,012	4.034	2,005	2,018
policy2010	756	0.643	0.479	0	1
edu	756	6.262	0.718	4.340	7.594
income	756	9.343	0.729	7.537	10.93
urban_unemp_rate	756	3.547	0.571	1.730	5.620
uni_central	756	6.488	4.686	0	11.09
uni_local	756	9.192	0.591	7.719	10.43
smid	756	8.638	0.758	7.015	14.01
vsmid	756	8.742	0.701	6.982	10.17
jmid	756	8.735	0.813	6.744	10.02
pri	756	8.505	0.769	6.570	9.742
college_pop_ratio	756	0.0944	0.0374	0.0272	0.207
undergrads_adm_ratio	756	0.407	0.144	0.179	0.894
college_adm_ratio	756	0.367	0.0881	0.139	0.690
ln_cen_area_comp	756	-14.31	9.983	-29.96	-5.785
ln_cen_nation_comp	756	-7.397	10.13	-21.96	0.898
ln_local_area_comp	756	-8.670	0.427	-9.543	-7.422
ln_local_nation_comp	756	-0.0718	0.260	-0.764	0.892

Table 4.4. Educational spending of rural families 1999-2018

Dependent variable: Log average rural family educational spending

VARIABLES	(1)FE edu	(2)RE edu	(3)FE edu	(4)RE edu	(5)FE edu	(6)RE edu
income	1.951***	1.575***	2.076***	1.634***	2.514***	2.176***
	(20.48)	(19.19)	(21.34)	(19.48)	(21.74)	(20.55)
uni_central	-0.009	-0.010*	-0.008	-0.009*	0.206**	0.215**
	(-1.47)	(-1.87)	(-1.31)	(-1.71)	(2.41)	(2.49)
uni_local	-0.076*	0.002	0.002	0.050	-0.813***	-0.610***
	(-1.70)	(0.03)	(0.04)	(0.98)	(-6.37)	(-4.90)
smid	-0.030	-0.043	-0.008	-0.029	-0.000	-0.017
	(-0.76)	(-1.06)	(-0.22)	(-0.72)	(-0.00)	(-0.47)
vsmid	-0.042	-0.002	-0.027	0.017	-0.054	-0.032
	(-0.69)	(-0.03)	(-0.43)	(0.27)	(-0.92)	(-0.54)
jmid	-0.652***	-0.589***	-0.628***	-0.569***	-0.527***	-0.494***
	(-7.59)	(-6.79)	(-7.47)	(-6.59)	(-6.54)	(-6.12)
pri	0.214***	0.304***	0.187**	0.296***	0.363***	0.380***
	(2.74)	(3.92)	(2.41)	(3.81)	(4.32)	(4.79)
policy2010			-0.194***	-0.144***	-0.096*	-0.129**
			(-3.96)	(-2.94)	(-1.77)	(-2.27)
college_pop_ratio			-1.602***	-1.116**	-1.278***	-1.265***
			(-3.21)	(-2.49)	(-2.73)	(-2.94)
urban_unemp_rate			0.025	-0.005	0.067**	0.021
			(0.89)	(-0.19)	(2.38)	(0.81)
ln_cen_area_comp					0.344***	0.360***
					(3.44)	(4.86)
ln_cen_nation_comp					-0.629***	-0.654***
					(-5.50)	(-6.02)
ln_local_area_comp					0.462***	0.330***
					(5.46)	(4.20)
ln_local_nation_comp					0.396***	0.278***
					(3.78)	(2.70)
Constant	-6.120***	-5.059***	-8.050***	-6.198***	-2.619***	-2.917***
	(-18.89)	(-16.19)	(-15.47)	(-12.28)	(-2.92)	(-3.75)
Observations	600	600	600	600	600	600
R-squared	0.878		0.885		0.899	
Number of location	30	30	30	30	30	30

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.5. Educational spending of urban families 1999-2018

Dependent variable: Log average urban family educational spending

VARIABLES	(1)FE edu	(2)RE edu	(3)FE edu	(4)RE edu	(5)FE edu	(6)RE edu
income	1.197***	1.157***	1.300***	1.196***	1.363***	1.313***
	(18.47)	(20.53)	(19.47)	(20.76)	(16.63)	(18.19)
uni_central	-0.008**	-0.002	-0.008**	-0.002	0.054	0.073
	(-2.46)	(-0.89)	(-2.47)	(-0.73)	(1.08)	(1.51)
uni_local	0.022	0.023	0.021	0.040	-0.085	-0.135**
	(0.98)	(1.02)	(0.79)	(1.52)	(-1.22)	(-1.98)
smid	-0.021	-0.022	-0.013	-0.014	-0.013	-0.013
	(-0.99)	(-1.04)	(-0.60)	(-0.66)	(-0.63)	(-0.64)
vsmid	-0.000	-0.008	0.026	0.005	0.019	0.004
	(-0.01)	(-0.24)	(0.75)	(0.14)	(0.54)	(0.11)
jmid	-0.422***	-0.393***	-0.417***	-0.388***	-0.394***	-0.369***
	(-8.88)	(-8.45)	(-8.96)	(-8.39)	(-8.31)	(-7.93)
pri	0.215***	0.212***	0.181***	0.203***	0.177***	0.193***
	(4.93)	(5.10)	(4.13)	(4.85)	(3.62)	(4.30)
policy2			-0.013	-0.040	-0.005	-0.011
			(-0.49)	(-1.54)	(-0.16)	(-0.35)
college_pop_ratio			-1.449***	-0.736***	-1.422***	-0.766***
			(-5.15)	(-3.03)	(-5.06)	(-3.10)
urban_unemp_rate			-0.003	-0.001	-0.000	-0.005
			(-0.20)	(-0.04)	(-0.02)	(-0.31)
ln_cen_area_comp					0.101*	0.071*
					(1.73)	(1.75)
ln_cen_nation_comp					-0.182***	-0.168***
					(-2.72)	(-2.73)
ln_local_area_comp					0.013	0.050
					(0.25)	(1.06)
ln_local_nation_comp					0.104*	0.151***
					(1.81)	(2.71)
Constant	-3.228***	-3.037***	-4.119***	-3.622***	-3.675***	-3.066***
	(-9.85)	(-10.29)	(-9.98)	(-9.62)	(-7.04)	(-6.95)
Observations	600	600	600	600	600	600
R-squared	0.927		0.931		0.932	
Number of location	30	30	30	30	30	30

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.7. Educational spending of rural families 2005-2018 Without Beijing, Shanghai, Tianjin

Dependent variable: Log average rural family educational spending

VARIABLES	(1)FE edu	(2)RE edu	(3)FE edu	(4)RE edu	(5)FE edu	(6)RE edu
income	2.423***	1.827***	2.254***	1.717***	2.547***	2.264***
	(21.45)	(18.25)	(18.63)	(14.83)	(19.17)	(17.92)
uni_central	0.006	-0.010	0.008	-0.005	0.071	0.136
	(0.57)	(-1.38)	(0.75)	(-0.68)	(0.59)	(1.09)
uni_local	-0.209***	-0.182**	-0.090	-0.038	-0.519***	-0.528**
	(-2.85)	(-2.39)	(-1.26)	(-0.50)	(-3.40)	(-3.55)
smid	-0.040	-0.020	-0.038	-0.025	-0.033	-0.031
	(-1.06)	(-0.49)	(-1.06)	(-0.64)	(-0.99)	(-0.88)
vsmid	-0.171**	-0.065	-0.156*	-0.124	-0.137*	-0.125*
	(-2.28)	(-0.83)	(-1.96)	(-1.54)	(-1.83)	(-1.70)
jmid	-0.567***	-0.622***	-0.415***	-0.518***	-0.334***	-0.419**
	(-5.29)	(-5.54)	(-4.05)	(-4.80)	(-3.40)	(-4.25)
pri	0.072	0.413***	0.087	0.450***	0.261**	0.442***
	(0.65)	(3.78)	(0.79)	(4.19)	(2.46)	(4.47)
undergrads_adm_ratio			-1.216***	-0.652**	-1.362***	-0.941**
			(-3.72)	(-2.35)	(-4.36)	(-3.63)
college_adm_ratio			1.907***	1.353***	1.959***	1.754***
			(5.59)	(3.96)	(6.09)	(5.64)
policy2			-0.196***	-0.255***	-0.118**	-0.158**
			(-3.84)	(-4.72)	(-2.19)	(-2.88)
college_pop_ratio			0.126	1.625**	0.321	0.721
			(0.16)	(2.01)	(0.45)	(0.99)
urban_unemp_rate			0.040	0.066	0.063	0.045
			(0.95)	(1.55)	(1.61)	(1.18)
ln_cen_area_comp					0.458***	0.350***
					(3.04)	(3.66)
ln_cen_nation_comp					-0.538***	-0.518**
					(-2.70)	(-3.12)
ln_local_area_comp					0.718***	0.666***
					(5.55)	(5.44)
ln_local_nation_comp					-0.078	-0.022
					(-0.42)	(-0.13)
Constant	-7.452***	-5.863***	-8.911***	-7.366***	-1.287	-1.520
	(-19.56)	(-15.62)	(-14.38)	(-11.44)	(-1.04)	(-1.61)
Observations	378	378	378	378	378	378
R-squared	0.887		0.904		0.918	
Number of location	27	27	27	27	27	27

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.8. Educational spending of urban families 2005-2018 Without Beijing, Shanghai, Tianjin

Dependent variable: Log average urban family educational spending

VARIABLES	(1)FE edu	(2)RE edu	(3)FE edu	(4)RE edu	(5)FE edu	(6)RE edu
income	1.458***	1.319***	1.381***	1.233***	1.369***	1.319***
	(19.80)	(21.28)	(16.66)	(18.25)	(13.92)	(16.15)
uni_central	-0.010*	-0.001	-0.010*	-0.002	0.067	0.100
	(-1.83)	(-0.33)	(-1.86)	(-0.70)	(0.96)	(1.46)
uni_local	-0.006	0.002	0.004	0.039	0.006	-0.085
	(-0.17)	(0.06)	(0.09)	(1.03)	(0.06)	(-1.05)
smid	-0.033*	-0.032*	-0.040**	-0.038*	-0.041**	-0.040**
	(-1.74)	(-1.67)	(-2.06)	(-1.96)	(-2.16)	(-2.12)
vsmid	0.012	0.013	-0.018	-0.041	-0.008	-0.035
	(0.31)	(0.35)	(-0.43)	(-1.04)	(-0.19)	(-0.90)
jmid	-0.389***	-0.371***	-0.358***	-0.344***	-0.341***	-0.337**
	(-7.24)	(-7.08)	(-6.45)	(-6.49)	(-6.10)	(-6.39)
pri	0.092*	0.143***	0.119**	0.166***	0.152**	0.172**
	(1.70)	(2.86)	(2.00)	(3.33)	(2.53)	(3.43)
undergrads_adm_ratio			0.094	0.206*	0.040	0.175
			(0.53)	(1.66)	(0.22)	(1.39)
college_adm_ratio			0.313*	0.057	0.366**	0.228
			(1.76)	(0.37)	(2.07)	(1.45)
policy2			-0.026	-0.054**	-0.045	-0.047
			(-0.92)	(-2.04)	(-1.44)	(-1.57)
college_pop_ratio			0.181	0.999***	0.191	0.770**
			(0.44)	(2.58)	(0.47)	(2.01)
urban_unemp_rate			-0.006	0.007	-0.006	-0.007
			(-0.28)	(0.34)	(-0.25)	(-0.32)
ln_cen_area_comp					0.257***	0.089*
					(2.99)	(1.91)
ln_cen_nation_comp					-0.359***	-0.217**
					(-3.16)	(-2.45)
ln_local_area_comp					0.163**	0.115*
					(2.21)	(1.77)
ln_local_nation_comp					-0.148	0.028
					(-1.41)	(0.31)
Constant	-4.790***	-4.150***	-4.424***	-3.741***	-2.427***	-2.972**
	(-13.25)	(-13.38)	(-8.98)	(-8.76)	(-3.25)	(-5.90)
Observations	378	378	378	378	378	378
R-squared	0.919		0.921		0.924	
Number of location	27	27	27	27	27	27

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.6. Result

4.6.1. The effect of government expenditure on compulsory schools

From the result, we observed significant coefficient in government expenditure on both junior middle schools and primary schools for both urban and rural areas (Table 4.7. and Table 4.8.). The question is that although these two stages are both belong to compulsory education, the government expenditure is casting influence in different directions. Particularly, the result of government expenditure on junior middle schools are generating expected effect as the hypothesis suggested, which lead to a decline in family educational spending.

However, in the primary schools, the empirical result comes opposite of the hypothesis. Theoretically, in the policy level, there is barely no special treatment on primary schools. It suggests that there exist other effects of government expenditure that overwhelm its substitution effect. To explain these effects, it would be better to discuss the cases of urban and rural families respectively, because the reasons behind these areas can be very different.

As for urban areas, the result shows that the government expenditure in this stage have greater complimentary effect than its supplementary effect. Two perspectives can be referred to explain this situation. The first one is the junior middle school enrollment problem in China, and the second one is the school selection problems.

In China, only about 50% of graduates of junior middle school can go to the senior middle schools that provide the qualification for university entrance examination. In the meantime, quality of junior middle schools differs greatly within the urban area, and entering a superb junior middle school almost assure the qualification for normal senior middle schools. However, since junior middle school belongs to compulsory stage, public schools are not allowed to select students by their academic performance.

Therefore, as government expenditure in primary schools increases, more families have capability to participate the enrollment competition (Chi & Qian, 2016). In order to get into a better junior middle school, families are required to have their children prepared and more competitive, by sending them to receive piano lessons, painting lessons and other private education services.

The second reason, school selection problem, has been existing for a long period (Wu,2013). As mentioned before, families are paying many kinds of fee in education, including the school selection fee, “jiedu” fee[31](Lin, 2011). The former one is paid when families hope to send their children in another school that not belongs to their district (school district). Because the assigned school may not have desired quality, or the school is not the nearest one, families tend to pay extra fee to enter other

[31] the fee for a place in public schools that are “borrowed” by migrant families to allow their children to study

desired schools, which is called “school selection fee”. The later one is usually charged from the migrant families. As the migrant workers usually don’t have the local Hukou, which put their right of receiving compulsory education out of the protection by local government. Therefore, even entering the local public schools require a lot of money from those families, which is the “jiedu” fee.

Besides, though urban areas receive little influences from the policy of closure and merger of rural schools, the gap of government expenditure between different primary schools is getting bigger along with the increase government expenditure (Sun & Li, 2009), which potentially increase the priority of families to choose a better primary school, and raise the school selection fee and “jiedu” fee and thus the families educational spending.

As for the situation in rural area, it would be difficult to cover every possible reason in details. Therefore, we here only introduce two main reasons to this result, according to existed researches. The first one is the low efficiency in the use of government funds, including corruption and diversion of funds. These problems happen especially in primary schools, mainly because there is barely no identical standard for the quality and even form of rural primary schools, comparing to senior middle schools. In other words, local governments, who is generally in charge of the construction of primary schools, have great authority to verify its expenditure plan. Without proper supervision from higher government, they tend to divert the funds to other fields (Huang,2009), because primary education is far less profitable than other investment for local government. Thus, even we have observed the increase in educational expenditure per student in rural primary schools, families may not enjoy the increase in school quality, and the worse is when government divert the funds that used to be the school maintenance fee, the cost of operating a school will comes to the families, which lead a higher spending in education.

The second possible reason is attribute to the policy of merging primary and junior middle schools (Mo, et al., 2012). Since the policy has been implemented from 2001, number of primary schools in China declined from about 500,000 to 160,000 during the following 20 years, most of the disappeared schools are those in rural areas. In order to satisfy the policy makers, local governments tended to ignore the actual need of rural families and the possible consequence, and spend a lot of money in building enormous schools in towns and gather students from remote countryside. The initial purpose of this policy is to cut down some educational expenditure of local government, but the fact is that managing enormous schools, especially the primary schools filled with children is much more costly than the policy expected. Meanwhile, more families have to send their children to a distant primary school in towns, which also increase their spending in new issues such as dormitory, transport and daily meals, with higher price in those towns (Chung & Mason,2012). Therefore, the policy of merging schools actually has raised the expenditure of local government and the spending of families simultaneously, as the empirical result shows.

4.6.2. The effect of government expenditure on non-compulsory schools

When the comparison of government expenditure on higher education is included, the analysis for all 30 provinces (Table 4.4.) shows that only for rural areas, the expenditure on national universities have significantly promote the spending of families in the local province, but the results are not consistent in other models without the control on relative government expenditure. Meanwhile, the government expenditure on local universities and colleges generates opposite effect, which means that the expenditure reduces the spending of families. These results imply that, on the one hand, government expenditure has efficiently reduced the cost of families to receive higher education, by increasing subsidy on their tuition and accommodation. On the other hand, the increased expenditure on local higher education has contributed to the level of its quality in teaching activities and facilities, and the improvement provides families with persuasive reasons to choose local schools, reducing the motivation of being enrolled by a national university (Lu, 2021). We are not denying that the expansion of higher education has had more families involved, but the subsidy and the change in motivation probably contribute stronger substitutive effect in the case of local higher education.

However, when we excluded Beijing, Shanghai and Tianjin, for those reasons that were mentioned, we find no significance in the effect of expenditure on national universities at all (Table 4.7. & Table 4.8.). It implies, the expenditure, at least the absolute amount of it, has not achieved the policy goals which expect more educational spending by families from most areas. We will see very soon later, that the government expenditure has promoted the family spending in another way.

4.6.3. The difference reaction between rural and urban areas

As we use 30 provinces to do the regression test, it is obvious that rural families are significantly affected by the government expenditure on national and local universities, but we don't see any significant effect casted on urban families. Besides, as for the dummy variable Policy2, which stand for policy changes after 2010, we can see a significant minus coefficient in regression for rural families. It means that comparing to urban area, the policies have been more effective in rural area in reducing the family educational spending, which coincides with the contents and goals in those policies[32].

As for the size of those significant coefficients, whether we exclude Beijing, Shanghai, Tianjin or not, rural families are more sensitive to the percentage change in the change of government expenditure, which suggest that rural families are still highly relying on the fiscal assist from government. This result is identical with the reality that education resources are distributed extremely imbalanced across China. In addition to resources from public education system, urban areas can provide much more private education services and choices for families. Thus, considering the

[32] 国家中长期教育改革和发展规划纲要（2010-2020 年）(National medium and Long-term educational reform and development project, 2010-2020)

advantage in the accessibility and variety of education services, in average, families in urban areas are receiving fewer impacts from government expenditure.

Besides, since education policies in China strongly affect rural families, when it generates negative effect, it may hurt rural families more badly, and cause greater inequality in education, and unfortunately, we have seen this trend in the primary schools.

4.6.4. The effect of the comparison of government expenditure

The effect of the variable of comparisons needs more explanation. As mentioned, we define 4 variables, depends on 2 dimensions. For the types of higher education, we divide into 2 types, the national university and the local university. For the standard of comparison, we define an average of the per student expenditure on local area and on the whole nation, respectively. From the result of model (5) and (6) of each table, we can see that variables *ln_cen_area_comp* and *ln_cen_nation_comp* both have significant effect, but in opposite directions. Particularly, if the comparison standard, or reference group is the average of local area, when the variable, *ln_cen_area_comp*, becomes higher, families choose to increase their educational spending.

It means that, when families focus on its area, where they have similar economic and social environment, they tend to put a bigger weight on the quality of the national universities inside the province, and the improvement of relative quality of the national university in local province is generally admitted by the families, and this effect is overwhelming the inclination of getting rid of decreasing marginal benefit of the further investment in education. To be more precise, families with these reactions are the majority or having a decisive impact to the whole province.

However, when the comparison standard comes to the average of the whole nation, we can see that families tend to increase educational spending when government expenditure on the national university in local province becomes relatively lower. That is because when families look at the distribution of higher education across the nation, they are actually facing more inequality of other fields, like economic and social inequality, not only of education. As we have discussed, families may invest more on education or escape from education when inequality is aggravated, but we see here, many families are still willing to compete for better national university even if they are in relatively disadvantage position.

Although the mind of competition worth praise, we should remember that, provinces who have disadvantage in education are usually less developed. Therefore, we will find that even if the government doesn't change the absolute number of expenditures in those provinces, with the imbalance aggravating, it will still generate more economic pressure on those families' education.

Similarly, we can see that relative expenditure on local universities and college also affect the spending decision of families, but when the comparison standard is set as the national average, the effect is not significant. It confirms the fact that local universities and college are basically services

the local families, and families are generally not fascinated by higher schools in other areas. Besides, this lack of concern by families shows that the gap between local schools and national universities is still apparent.

4.7. Other Findings

4.7.1. Middle vocational school and normal senior middle schools

Results shows that the difference between urban and rural areas is not only in how sensitive these families react to the change of government education, but also in particular education stage or system. Precisely, results in Table 4.7. and Table 4.8. may implies the policy difference towards rural and urban areas. The government expenditure on normal senior middle schools (*smid*) helps families in urban area to reduce their spending, but doesn't have significant influence on rural families. In contrast, as for vocational middle schools, which enroll students of the same age as senior middle schools do, government's financial support (*vsmid*), is only significantly affect the spending of rural families. Here, it is obvious that apart from the amount of expenditure, the way how government use its funds and how these expenditures achieve the policy goals are also important factors.

In fact, policies that emphasize the vocational education in rural areas have given us answers[33]. Meanwhile, though government also spend a lot in normal senior middle schools, it didn't precisely help the rural families, especially when we consider the low quality of rural junior middle school, and the tendency that public senior middle schools are expanding their scales and enrolling student from other provinces.

The inclination of these policies will lead to a direct result, which is more students from rural families will have to choose the vocational education instead of the education that provides chances of leaning in a university, and start an early work since they graduate from vocational schools. Considering the deficiency of proficient technical workers, it would be a possible way to improve the economic condition of many rural families. However, there is no evidence that show students of rural families are less capable for higher education than urban students do, which would bring critics on government's interference on enrollment, which disregards the ability and equality.

In the long run, the distortion will probably cause both inequality issues and inefficiency problems. However, China still doesn't show strong determination in improving the quality and the status of vocational education to make it a reasonable choice, but leaving the vocational schools be a pronoun of low-quality schools. After securing the supply of compulsory education for rural families, China should consider how to enhance the education quality and provide more chances for them, instead of separating students into different type of education merely depends on areas.

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[33] 国务院关于印发国家职业教育改革实施方案的通知

4.7.2. The effect of enrollment chance

From the results in table 4.7 and 4.8 where the models excluded Beijing, Shanghai and Tianjin, we found that quasi-enrollment rate only significantly affects the educational spending of rural families. It may suggest that families in urban areas have switched their attention from quantity, or the possibility to get into a university or a college, to the quality of schools. However, before we see the result, we are not able to determine direction of the effect of the enrollment chance. It is because on the one hand, a low university enrollment rate may increase the intensity of admission competition, thus drive families to pay more before higher education, but when the rate becomes higher, it means more families are paying the tuition fee in higher education.

To explain the opposite effect of these two quasi-enrollment rates, we should understand in advance that university is thought to be better than almost every college in China, and thus getting into a university is far more difficult than being enrolled by a college.

For the quasi-enrollment rate of university, we see significant negative effect on the spending of families. Though the variable may only approximately measure the opportunity of having university education, it reflects the reality that lack of opportunity of getting into university is still a crucial reason for the increasing educational spending of rural families. There are many episodes about students of rural families choosing to repeat the senior middle school for one more year, in order to have another chance in university entrance examination, which is generally very costly for those families.

As for colleges in China, which generally have lower quality comparing to universities. The result implies that an increase in enrollment rate of college, which continually happens since the industrialization of education policy, will cost rural families more money. Since the competition around the college opportunity is extremely weak, the effect is mainly because the increase in tuition fee of families than receiving college education. By allowing more rural families to have at least three additional years of study, government partially achieve its goal to raise the educational spending of families. However, since the urban area shows no obvious reaction to the raising enrollment rate of college, we can predict that this effect will disappear in the near future, as long as almost every family have the opportunity to study in college, if they want to. Therefore, in this special case, what worries us is not the increasing spending of rural families, but the quality of college in the future. Government must try harder to avoid higher unemployment rate of the college graduates, because their families may not have further capability to afford more study activities.

4.8. Policies

In this chapter, two main findings require government more attention. The first one is the inconsistency between hypotheses and results, suggesting that government expenditure didn’t always

work as respected. The second one is that families react to the comparison of government expenditure, which means government influences family spending not only through the absolute amount of its expenditure, but also the distribution. How would government react, and what should government do? Following suggestions warrant more considerations in future educational policies.

4.8.1. Enhance national government's responsibility in compulsory education

The outcomes of our model implies that government expenditure on junior middle schools performed well in reducing families spending, but the expenditure on primary schools cause higher family spending. This difference was explained, and we think the increasing spending of rural families warrant our most attention, because one possible reason for the situation is the imbalance in the quality of primary schools. To change this situation, national government has to take control of the construction and management of primary schools, from the local governments.

Precisely, national government should make a higher standard, or at least a reference standard of primary schools, from the facilities to the teachers. Meanwhile, improving the supervision system is also important, for it is crucial to the efficiency of the use of money. Maybe assigning local government with the responsibility of operating compulsory schools is initially based on the awkward condition of national government finance. However, the current situation: opacity in transfer payment, inefficient supervision, and conflict of interest between national and local government, is also occupying lots of government financial resources. Besides, China's local governments are always pursuing profit and political performance, it is irrational to believe that they have motivation to give priority to the compulsory schools, especially primary schools, for the good students will soon eventually become migrants in urban areas, which means there is barely no direct profit for the local government at all (Qiao, 2005). Thus, China's national government should use the deficient educational funds more properly, such as directly organizing the construction and maintenance of schools, using the national finance to pay the teachers, in order to avoid embezzlement and corruption in the progress of transfer.

4.8.2. More attention on local universities

Although China's government have been supporting the development and expansion of national university for a long period, it should be realized that the majority of the senior middle school graduates who want to continue their study, are eventually go to the local universities and colleges inside the province. Therefore, we believe that the improvement in the quality of local universities will help more families, especially rural families. However, even though some policies aim to develop vocational schools and local universities and colleges, the current government finance are still preferring the national universities. Results have told us that a deteriorated imbalance in finance toward national universities will put a heavier burden on rural families for they have face a more intensive competition, while the expenditure on local universities are helping families to reduce their

spending. Therefore, for those universities who have high popularity and quality, government should allow them to solve their financial problems by themselves and use government finance to help local universities.

When we talking about government's help, it is more than the subsidy to families, and it should involve less restriction on universities and college, to allow them financing themselves, managing their own research programs and recruiting researchers they need. This would be hard to accept for a centralize state, for they must have total control of their scholars to avoid political risks. In fact, it is the compulsory schools and high schools that will generate more potential political risks, if the students are not well taught in their early ages, and that's why government should shift their expenditure to those stages of education. Besides, even without the national government's financial help, current local government are fond of local universities for they are more profitable, and if they have more autonomy, the quality will also be improved.

4.8.3. Reconsider the position of vocational education

There are some interesting hints from the effect of government expenditure on vocational schools. As the effect is only significant to the rural families, we have concluded that it may because government holds different attitude towards urban and rural families[34]. In 2021, China's government has set goals that certain ratios of junior middle school graduates should go to vocational schools[35], which caused aggressive debate in the society and was consider as a potential source of future deteriorated inequality, because of what has been repeated, families in different areas receive compulsory education of different quality, and rural families is in disadvantage when they compete with urban families for places in normal senior middle schools.

However, the reason why people think the division as a cause for inequality, is that families to firms still tend to believe that vocational education is the pronoun of low equality. When government sets a goal for high school enrollment rate, which basically discriminates the students from rural families, may probably not lead to a desired result, for students in normal high schools is not necessarily good at academic study, just avoiding low quality education of vocational schools. Thus, although not every student must be educated in senior middle schools, government should not neglect the quality of vocational schools and characteristics of students. In conclusion, we hope to see that government expenditure on vocational schools also have significant effect on urban families.

4.9. Conclusion

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[34] 《职业教育法》

[35] 《教育部办公厅关于做好 2021 年中等职业学校招生工作的通知》

The ultimate effect of the government expenditure, which we can observe in reality, depends on the interaction of substitutive and complementary effect, which is the same in the case of educational finance. Since features of these education stages and the policies on these stages are various, the relative power of substitutive and complementary effect usually changes. To find out how government educational expenditure affects different educational stages, we used the panel data in China of its province level, and our main findings are:

(1) Local government's financial help on their universities and colleges helps local families reducing their educational spending

(2) Though junior middle school and primary school are both belongs to compulsory education, government expenditures have opposite effect on families.

(3) Apart from the absolute amount of government expenditure, the relative expenditures, which represent the disparity in the distribution of higher education resources, are also affecting the spending decision of families.

(4) Government expenditure on vocational schools only helps rural families, while the expenditure on normal senior middle schools only helps urban families.

Apart from the hypotheses test, the government expenditure on vocational schools is also of interest, for it generate different effect toward urban and rural families. Towards these findings, we suggested some policies that may help.

It is fortunate for China's government, that many families are still willing to participate education, even though some of them are of least quality. The current environment of serious educational competition and difficulty in graduates' employment is now making the society turn to blame the education system and China's national government, which demand it to focus on family's real need and alleviate the inequality in education immediately.

In this perspective, this research also leaves a problem, which is how to find out the comparison standard of different families, for they may not look at the same inequality in our society. Knowing the attitude of families toward competition and how they react, will provide more information to government to make accurate policies for various families.

4.10. Appendix 4. A Sources of data and variables

Data and Variables	Period	Source
Family income, Population, unemployment rate of urban area	1999-2018	China Statistical Yearbook and provincial yearbooks
Government educational expenditure on different stages and different type of schools	1999-2018	Educational statistics Yearbook of China and provincial yearbook of education

Enrollment number of university and college separately	2005-2018	Educational statistics Yearbook of China and provincial yearbook of education

4.11. References

English:

Assembly, U. G. (1948). Universal declaration of human rights. *UN General Assembly, 302(2)*, 14-25.

Bailey,B J. (1971), *National Income and the Price Level*, New York: McGraw-Hill[J], 1971

Becker, Gary S. (1962) Investment in human capital: A theoretical analysis. *Journal of political economy, 70.5, Part 2*, 9-49.

Becker, Gary S. (1981) *A Treatise on the Family*. Cambridge, MA: Harvard University Press

Becker, Gary S. (2009) *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago press.

Beiter, K. D. (2005). *The protection of the right to education by international law: Including a systematic analysis of article 13 of the International Covenant on Economic, Social and Cultural Rights*. Brill.

Bitensky, S. H. (1991). Theoretical foundations for a right to education under the US Constitution: a beginning to the end of the national education crisis. *Nw. UL Rev., 86*, 550.

Borjas, George J. (1994). Ethnicity, neighborhoods, and human capital externalities.

Carneiro, Pedro Manuel, and James J. Heckman. (2003). Human capital policy.

Chan, J. (2006). Beijing abolishes centuries-old agricultural tax. *World Socialist Web Site*, 17.

Chen, Xinxin, Hongmei Yi, Linxiu Zhang, Di Mo, James Chu, and Scott Rozelle. (2014). Do Poor Students Benefit from China's Merger Program? Transfer Path and Educational Performance. *Asia Pacific Journal of Education 34, no. 1*, 15–35.

Chi, W., & Qian, X. (2016). Human capital investment in children: An empirical study of household child education expenditure in China, 2007 and 2011. *China Economic Review, 37*, 52-65.

Chung, C., & Mason, M. (2012). Why do primary school students drop out in poor, rural China? A portrait sketched in a remote mountain village. *International Journal of Educational Development, 32(4)*, 537-545.

Davey, G., De Lian, C., & Higgins, L. (2007). The university entrance examination system in China. Journal of further and Higher Education, 31(4), 385-396.

Deming, W. E. (2018). *The new economics for industry, government, education*. MIT press.

Easterlin, R.A., 1995. Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior and Organization 27 (1)*, 35 – 47.

Feng, H., & Lu, M. (2013). School quality and housing prices: Empirical evidence from a natural experiment in Shanghai, China. *Journal of Housing Economics, 22(4)*, 291-307.

Ferrer-i-Carbonell, A. (2005). Income and well-being: an empirical analysis of the comparison income effect. *Journal of public economics, 89(5-6)*, 997-1019.

Friedman, M. (1955). The role of government in education.

Fu, Q., & Ren, Q. (2010). Educational inequality under China's rural–urban divide: The hukou system and return to education. *Environment and Planning A, 42(3)*, 592-610.

Gillard D (2018) Education in England: a history www.educationengland.org.uk/history

Guo, L., Huang, J., & Zhang, Y. (2019). Education development in China: Education return, quality, and equity. *Sustainability, 11(13)*, 3750.

Guo, Y. Z., Zhou, Y., & Liu, Y. S. (2020). The inequality of educational resources and its countermeasures for rural revitalization in southwest China. *Journal of Mountain Science, 17(2)*, 304-315.

Guo, Y., & Zhao, L. (2019). The impact of Chinese Hukou reforms on migrant students' cognitive and non-cognitive outcomes. *Children and Youth Services Review, 101*, 341-351.

He, Z. (2000). Corruption and anti-corruption in reform China. *Communist and Post-Communist Studies, 33(2)*, 243-270.

Heyneman, S. P., & Lee, B. (2016). International organizations and the future of education assistance. *International Journal of Educational Development, 48*, 9-22.

Hirsch, F. (2005). *Social limits to growth*. Routledge.

Hubsch, A. W. (1992). Emerging right to education under state constitutional law. *Temple L. Rev., 65*, 1325.

Johnson, E. N., & Chow, G. C. (1997). Rates of return to schooling in China. *Pacific Economic Review, 2(2)*, 101-113.

Johnstone, D. B. (1986). Sharing the Costs of Higher Education. Student Financial Assistance in the United Kingdom, the Federal Republic of Germany, France, Sweden, and the United States. *College Board Publications, Box 886, New York*, NY 10101.

Kang, O. (2004). Higher education reform in China today. Policy Futures in Education, 2(1), 141-149.

Kennedy, J. J. (2007). From the tax-for-fee reform to the abolition of agricultural taxes: the impact on township governments in north-west China. *The China Quarterly, 189*, 43-59.

Knight, J., Lina, SONG, & Gunatilaka, R. (2009). Subjective well-being and its determinants in rural China. *China economic review, 20(4)*, 635-649.

Li, L., & Liu, H. (2014). Primary school availability and middle school education in rural China. *Labour Economics, 28*, 24-40.

Lin, Y. (2011). Turning rurality into modernity: suzhi education in a suburban public school of migrant children in Xiamen. *The China Quarterly, 206*, 313-330.

Ludger Linnemann. (2005). “The Effect of Government Spending on Private Consumption: A Puzzle?” *Journal of Money Credit and Banking, Oct.,2005, Vol. 38, No.7*, pp. 1715-1735

Meyer, John W., Francisco O. Ramirez, and Yasemin Nuhoğlu Soysal. (1992). World expansion of mass education, 1870-1980. *Sociology of education*, 128-149.

Mo, D., Yi, H., Zhang, L., Shi, Y., Rozelle, S., & Medina, A. (2012). Transfer paths and academic performance: The primary school merger program in China. *International Journal of Educational Development, 32(3)*, 423-431.

Montgomery, J. L. (2012). The inheritance of inequality: hukou and related barriers to compulsory education for China's migrant children. *Pac. Rim L. & Pol'y J., 21*, 591.

Morsink, J. (2010). *In The Universal Declaration of Human Rights*. University of Pennsylvania Press.

Mundial, G. B., & UNICEF. (2016). *Education 2030: Incheon declaration and framework for action: towards inclusive and equitable quality education and lifelong learning for all.*

Robert J. Barro. (1990). Government Spending in a Simple Model of Endogeneous Growth. *Journal of Political Economy, Oct., 1990, Vol. 98, No. 5*, pp. S103-S125

Roger C. Kormendi. (1983). Government Debt, Government Spending, and Private Sector Behavior. *The American Economic Review, Dec., 1983, Vol. 73, No.5*, pp. 994-1010

Saito, Takashi, Atsushi Sannabe, and Katsunori Yamada. (2005). Satisfaction and Comparison Income in Japan: evidence from data of Japanese union workers. *Economics Bulletin, Vol. 4, No. 17*, pp. 1−20

Schultz, Theodore W. (1961). Investment in human capital. *The American economic review, 51.1*, 1-17.

Tang, C., Zhao, L., & Zhao, Z. (2020). Does free education help combat child labor? The effect of a free compulsory education reform in rural China. *Journal of Population Economics, 33(2)*, 601-631.

Thurow, L. (1976). *Generating Inequality*. New York: Basic Books

Tsang, M. C. (1996). Financial reform of basic education in China. *Economics of Education Review, 15(4)*, 423-444.

Tsang, M. C. (2000). Education and national development in China since 1949: Oscillating policies and enduring dilemmas. *China review*, 579-618.

Tsung-wu Ho. (2001). The government spending and private consumption: a panel cointegration analysis, *International Review of Economics and Finance 10*, 95 - 108

Wang, W., & Zhao, Z. J. (2012). Rural taxation reforms and compulsory education finance in China. *Journal of Public Budgeting, Accounting & Financial Management.*

Wang, X. (2010). Education in China since 1976. McFarland.

Wen, H., Xiao, Y., & Zhang, L. (2017). School district, education quality, and housing price: Evidence from a natural experiment in Hangzhou, China. *Cities, 66*, 72-80.

Wong, C. P. (2000). Central-local relations revisited the 1994 tax-sharing reform and public expenditure management in China. *China Perspectives*, 52-63.

Wu, X. (2013). The school choice market in China: A case study. *Educational Research, 55(2)*, 195-218.

Xiao, Y., Li, L., & Zhao, L. (2017). Education on the cheap: The long-run effects of a free compulsory education reform in rural China. *Journal of Comparative Economics, 45(3)*, 544-562.

Xie, G., & Zhang, L. (2022). Effects of school closure on household labor supply: Evidence from rural China. *China Economic Review, 71*, 101737.

Ye, L., & Wu, A. M. (2014). Urbanization, land development, and land financing: Evidence from Chinese cities. *Journal of Urban Affairs, 36(sup1)*, 354-368.

Yuanyuan Gu & Jhorland Ayala Garcia. (2021). Educational expenditure efficiency in China: the role of the governor's characteristics. *Applied Economics, 53:25*, 2832-2847

Zhou, H., Liu, Q., Tian, J., & Li, Q. (2018). Private education in China: Achievement and challenge. *Springer.*

Chinese:

蔡伟贤（Cai）.（2014）. 公共支出与居民消费需求：基于 2SLS 模型的分析[J]. 财政研究，2014(4)：25-28.

蔡志良，孔令新（Cai & Kong）.（2014）. 撤点并校运动背景下乡村教育的困境与出路，清华大学教育研究 2014 年 4 月 第 35 卷第 2 期

曹兴泽（Cao）.（2009）. "名校办民校"：内涵，动因及问题. 当代教育论坛：宏观教育研究，(2)，91-93.

陈青之（Chen）.（2009）. 中国教育史 中国社会科学出版社

陈友华，苗国（Chen & Miao）.（2021）. 升学锦标赛、教育内卷化与学区分层，江苏行政学院学报 2021 年第 3 期 总第 117 期

储德银，闫伟（Chu & Yan）.（2009）. 地方政府支出与农村居民消费需求变动——以我国省级面板数据为例，中南财经政法大学学报 2009 年第 4 期 双月刊 总第 175 期

褚卫中，张玉慧(Chu & Zhang).（2012）. 农村义务教育"撤点并校"负面影响分析，《教学与管理》2012 年 3 月

丁冬，郑风田（Ding & Zheng）.（2015）. 撤点并校：整合教育资源还是减少教育投入？ ——基于 1996-2009 年的省级面板数据分析，经济学(季刊)，2015 年 1 月 第 14 卷第 2 期

顾秀林，余庆（Gu & Yu）.（2021）. "双减" 政策实施的可能风险及规避. 中小学校长.

郭彩琴（Guo）.（2001）. 城市中"农民工"子女受教育不公平现状透视，学海 2001. 5

侯海波，吴要武，宋映泉（Hou et al.）.（2018）. 低龄寄宿与农村小学生人力资本积累——来自"撤点并校"的证据，中国农村经济 2018.7

胡书东（Hu，2002）. 中国财政支出和民间消费需求之间的关系[J] .中国社会科学，2002，

(6) :31 —32 .
胡咏梅, 卢珂, & 薛海平 (Hu et al.). (2008). 中小学择校问题的实证研究--基于北京市中小学的调查. 教育学报, (2), 74-78.
黄 斌 (Huang). (2009).关于中国地方小学教育财政支出的实证研究. 教育研究(Educational Research) No.5 2009 General, No.352
纪宝成 (Ji). (2006). 认清"教育产业化"的理论误导与实践危害, 中国高等教育
李秉中 (Li). (2014). 我国教育经费支出的制度性短缺与改进路径 (On the Institutional Shortage and Improvement Route of Educational Funds Expenditure in China), EDUCATIONAL RESEARCH No. 10, 2014; General, No. 417
李文利, 魏新 (Li & Wei). (2000). 高等教育规模的扩大与合理的学费水平, [J].教育发展研究, 2000, (3) : 35-39
厉以宁 (Li, 2000). 关于教育产业的几个问题, 高教探索 2000 年第 4 期
陆道坤, 王超, & 丁春云 (Lu et al.). (2019). 论校外培训机构对基础教育的侵越与干扰. 中国教育学刊, 1, 79-84.
逯长春 (Lu). (2021). 中西部地方大学一流学科建设:内涵、价值、困境与策略. 黑龙江高教研究 2021 年第 12 期, 总第 332 期
孟明义 (Meng). (1999). 高等教育不能产业化, 高等教育研究 1999.6
乔宝云,范剑勇,冯兴元 (Qiao et al.). (2005). 中国的财政分权与小学义务.教育中国社会科学. 2005 年第 6 期
屈艺 (Qu). (2009). 财政教育支出水平的国际比较, 中小企业管理与科技
阙明坤, 王华, 王慧英 (Que et al.). (2019). 改革开放 40 年我国民办教育发展历程与展望, 中国教育学刊 2019. 01
孙 志军, 李 婷婷 (Sun & Li). (2009). 小学教育经费支出差异及其影响因素－－基于 3 省学校数据的分析. 教育与经济, 2009, No.4
王蓉 (Wang). (2004). 我国义务教育财政问题研究: 回顾与展望. 教育与经济, (4), 43-47.
王善迈 (Wang). (2000). 关于教育产业化的讨论(The Discussion on the Industrialization of Education), 北京师范大学学报 (人文社会科学版) 2000 年第 1 期 (总第 157 期)
王善迈, 袁连生 (Wang & Yuan). (2002). 建立规范的义务教育财政转移支付制度 (Doctoral dissertation).
吴强 (Wu). (2011). 公共教育财政投入对居民教育支出的影响分析——以湖北省城镇居民为例[J]. 教育研究, 2011(1) : 55—60.
吴素芳 (Wu). (2002). 试论我国教育消费的特点及优化教育消费的政策导向, 宁夏党校学报 2002 年 9 月 第 4 卷第 5 期
项继权 (Xiang). (2005). 农民工子女教育 : 政策选择与制度保障——关于农民工子女教育问题的调查分析及政策建议, 华中师范大学学报 (人文社会科学版) 第 44 卷第 3 期
徐菁菁 (Xu). (2014). 重点学校政策的嬗变及其启示, 教育研究与实验,2014 年第 4 期

晏成步（Yan）. (2017). 高等教育公共支出的国际比较分析——兼议高等教育财政制度转型, 中国高教研究, 2017 年第 5 期

杨 蓉,刘婷婷（Yang & Liu）. (2019). 中国教育经费配置结构分析——基于历史趋势和国际视野的双重探讨(Analysis of the Structure of Education Funding in China: Discussion Based on Historical Trend and International Perspective), 全球教育展望 Vol.48 No.6, 2019

杨东平（Yang）. (2004). 辨析"教育产业化", 教育发展研究 2004.12

杨兆山, 陈煌（Yang & Chen）. (2021). "双减" 引发的对基础教育的几点思考. 四川师范大学学报（社会科学版), 48(6).

余靖雯, 陈晓光, 龚六堂（Yu et al.）. (2018). 财政压力如何影响了县级政府公共服务供给, 金融研究 2018 年第 1 期, 总第 451 期

张济洲（Zhang）. (2015). "高考工厂" 背后的阶层焦虑与机会公平. 中国高教研究, (9), 33-36.

张建民（Zhang）. (2000). 从教育消费观的消极影响论教育应该产业化, 湖北大学学报（哲学社会科学版)第 27 卷 第 6 期; Journal of Hubei University(Philosophy and Social Science)

周卿, 王璇（Zhou）. (2011). 中小学校外培训机构的现状分析, 法制与社会, 8, 250-251.

朱敏（Zhu）. (2011). "学区房热" 现象中教育公平问题探析. 现代中小学教育, (1), 4-6.

5. Chapter 5
People need reasons for continuous educational spending

5.1. Summary on this dissertation

Because of our doubts on the motivation of families and individuals in educational spending, there researches use empirical test to explain how education benefit individuals, and what factors are affecting family' educational spending behavior.

In Chapter 2, we have proved that there are still enough reasons for families to spend money and time in education, not only because of demand on human capital or education experience, but also due to the scarcity of certain education and ranking in job queue as well.

In Chapter 3, we noticed that money is not the only way how family participate education, time spending is also significant in family's decision. Meanwhile, unlike the situation in formal schooling, in shadow education, time spending is far more flexible. Besides, unlike money, time has a rigid upper limit. It means more time attributed into shadow education, less time will be used in formal schooling, eventually squeeze the living space of formal education.

Families prefer shadow education, because Gaokao system is the only illuminant, and test score is the only standard. Considering the situation that public schools is still the majority in every educational stage, we can even doubt if the reason for family to choose formal schools, is that these schools monopolize the opportunity of receiving university entrance test, not merely because of its value in teaching activities.

In Chapter 4, we distinguish the government educational expenditure according to educational stages. The results showed us government educational expenditure on senior middle schools only helps urban family reducing their spending, and expenditure on vocational middle schools only helps rural families. This may reveal the different preference of government educational policies and create a potential factor for increasing education inequality. Besides, the significant impact of relative expenditure of government shows families do react to imbalanced distribution of educational resources, and in average, rural family are still trying to increase educational spending when facing higher inequality, maybe because it is still the only way to achieve stratum ascending, but we cannot assure there will be no reverse in this tendency.

Above empirical studies remind us, there are many reasons, more than we have mentioned, are affecting the motivation in choosing education. Because of these complicate reasons, a government announcement stressing the importance of human capital on economy will not help, when families are losing their motivation. Unfortunately, at least in China, we can already see the downward pressure on family's educational spending, especially in formal schooling: Graduates receive extra test, which has

little relevance to the major in university, to compete for a job in governmental sector; More time and money are allocated to shadow education; Quality of rural education are falling behind and reducing the expected return to education.

5.2. Two solutions to stimulate educational spending

How to solve these current problems that threaten the motivation of family in accepting education? The studies have implied two possible solutions.

(1) Commercialize all educational resources.

This solution mainly imitates the mechanism of shadow education, which are essentially selling test score to students and their families. By selling educational resources, a part of population will receive the best education in China, and use their education to sustain the economic growth of China. Hoping there will be one day in future, the charity and donation of government and social elites can raise the quality of education in those poor areas.

The benefit of this solution is, government finance will get rid of the shackle of its enormous funds on higher education, because better universities and colleges will receive more capital support from market. Meanwhile, government can collect more taxation from the economic activities of schools, such as private donation and commercial cooperation with companies. These all helps government to finance schools and areas in need. Actually, if SOEs in China can be reformed, there is no reason that public schools cannot.

We can see there are similarities between this solution and the strategy suggested in China's economic reform, and one of them is "Letting a part of population become rich first, then help others become rich later". The difference is, Hukou status did not restrict the labor migration, but decide the place of receiving university entrance test. Therefore, education under this strategy may not helping the talented but only the rich, which makes sustainable economic growth doubtful. However, it touches the efficiency of transformation from education investment to human capital, which need more tests in future.

After all, at least the history of Reform and Openness in China has shown, that as long as the society can endure the deteriorating inequality in the process, meaning poor family and even middle class can no longer access education of best quality, it is probably not an evil plan as it seems.

(2) Raise the scarcity of everyone's educational experience.

This solution is enlightened by the empirical test in Chapter 2, where we calculate the index of educational comparative advantage score (ECAS), to suggest the scarcity of a certain level of education in certain period and certain region. However, since ECAS is calculated from the individuals' educated years, it basically shares the same drawbacks with absolute level of education. Since ECAS has significant impacts on individual's income and employment possibility, we can predict in the future,

an augmented ECAS, that takes expertise, interest, social experience and even personality into account, may explain situation in a more precise way. However, calculating ECAS is not the goal, we hope the calculation can show us how to use education to help people with different characteristics. To achieve our destination, we need to decompose education to a new level. In the meantime, we need construct an education system that can discover and cultivate interests and talents of individuals. Hence, as mentioned in Chapter 2, the homogeneity of graduates from higher education in China, is currently the biggest obstacle of this solution.

People who heard news about China's economy should know that many its high-tech industries are still relying on productions designed by foreign countries, which put it in a passive position when trade friction comes. It reflects that China is still lack of talents and capable workers. In words that used in this study, there is barely no candidate waiting in job queue of those industries, which is confirming the variety of talents is significant to China's economy, and suggest the importance of related studies in the future.

However, the drawbacks of this solution are also obvious: complicated, costly, the investment cycle is long, and require aggressive reform to current education system in China.

Either solution is telling us, as economy grows, education year will no longer be the ultimate goal of families and individuals. The aim of receiving education is to realize the value of human or create new value, even the education doesn't produce useful human capital to the economy. Knowing this is the first step of making constructive and effective policies for China and other countries as well.

5.3. Market can help

In the end, I would like to say that government in China still underestimate the power of market, in popularizing education and creating educational equity. Look at the cell-phone next to us, this product that almost everyone owns and is capable for most daily entertainment and work, was a rare commodity that have mechanical buttons printed with numbers in 30 years ago. Even though, we didn't see the government announced to protect the right of "calling people wherever you are", and then monopolize the mobile phone industry. Nowadays, people can see so many choices, different prices and features in a shop selling mobile phones, and they are willing to pay for new ones, because market always try to turn potential demand into profit. Besides, no one treat mobile phone as a standard for anything, because it is a tool, not a goal.

We admit that education is special commodity, and believe that it needs protection and management by government, but education in its essence is identical to a mobile phone. It is a tool, not a goal. With the full control by China's government on its education, the gap in quality of mobile phones between urban and rural students, is much smaller than the gap in quality of compulsory school

between the regions. Meanwhile, controlling education led to the shortage and imbalanced distribution of educational resources. Diplomas and scores become the critical standard, and the goal for families, especially the poor ones. It is very possible that it is the monopoly on the right to education, especially to higher education by China's government, that lead to this woeful situation we observed in China's rural education.

On the contrary, the fast expansion of shadow education proves the power of market. If the China's formal schooling don't monopolize the right to higher education, the shadow education will replace formal education in no time, just like mobile phone replacing its fixed brother, because market will provide the reasons for individual's consumption.

We are not advocating the rule of jungle and pure commercial logic in education. The point is China should realize the function of market in producing goods and services, and in expanding itself. It would be wiser for China's government to make better use of the market to create more educational resources to society, and to reasonably distribute its own educational resources to areas and families in need. Again, all of above start from understanding the need of individual and family.