

On the Road to Universal Early Childhood Education: A  
Financial Perspective of the Post-2010 Developments in a  
Western Province of China

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Abstract

In 2010, China embarked on an ambitious goal to expand early childhood education (ECE) nationwide. An integral part of this plan was to substantially expand public institutions, particularly in rural areas. Using longitudinal finance data from a western province in China, we examine the development of ECE from 2008-2013. Our findings suggest that the increased investment from the government and parents anchored a rapidly-expanding public ECE sector, but this strategy became more of an extension of the existing formula, rather than a component in solving structural issues. It has kept ECE institutions under-funded compared to primary and lower secondary education, fostering other systemic issues. ECE teachers were under-compensated, public institutions had high pupil-to-staff ratios. Public financial support only constituted a small portion of the total investment in ECE, with most ECE institutions relying on out-of-budgetary sources such as fees and levies. This financing scheme has resulted in large inter-institutional disparity. We conclude that in order to achieve sustainable high-quality ECE in the next developmental stage, a change in the financing structure is necessary.

*Keywords:* early childhood, education finance, administrative data, quality, access

## Introduction

The importance of early childhood development and education (ECDE) has been recognized by the educational development community worldwide. In a call for a post-2015 action plan, UNICEF's ECDE consultative group (CG) argued that quality ECDE is the key to achieving sustainable development for the next stage of poverty reduction and social development (The Consultative Group on Early Childhood Care and Development, 2013a). Another CG report examined current progress in ECDE worldwide and concluded that "most governments still do not prioritize early childhood in their health, education, poverty reduction or other national plans, and many countries still lack early childhood development policies, strategic plans and laws" (The Consultative Group on Early Childhood Care and Development, 2013b, p. 1). CG's proposal calls for a reduction by half of the number of children under age five who fail to reach their developmental potential (The Consultative Group on Early Childhood Care and Development, 2013a), a goal that is aligned with a framework that uses measurable indicators and actionable strategies to promote sustainable development. Undoubtedly, such a goal hinges on the ability for national governments and civil societies to work together to deliver a wide coverage of early childhood education and care to their children.

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As one of the world's largest developing countries with considerably under-developed early childhood education systems, China has historically faced major challenges with promoting ECDE. Early childhood specialists have summarized these challenges into what is referred to as the "3A's" (Li, Wong, & Wang, 2010): (1) Accessibility problem (入园难): It is very tough to get into a kindergarten, especially the public ones; (2) Affordability problem (入园贵): Kindergarten tuition fees are higher than that of universities; and (3) Accountability problem (入园差): Most private kindergartens are of very poor quality.

In 2010, an ambitious national plan put ECDE under the spotlight. During that time, the Chinese central government set an ambitious goal of universalizing ECE. Historically, primary and secondary education has taken more than its fair share of public education investment (Cai & Feng, 2006), which often left ECDE practitioners comparing themselves to the maligned Cinderella. The 2010 plan involved an overhaul of existing funding, planning, and managing mechanisms of ECDE, which aimed to significantly improve ECDE within the education apparatus. Over the following five years, the Early Childhood Education (ECE) enrollment was substantially boosted. According to the Ministry of Education (MOE) statistics (Ministry of Education of People's Republic of China, n.d.), by 2014, there were 209,900 ECE institutions with 40,507,000 children nationwide, an increase of 51 percent and 52.4 percent since 2009. The gross enrollment rate reached 70.5 percent, up from 50 percent in 2009. It appears that China is moving forward by setting goals and leveraging resources to achieve universal coverage of ECE, but does the national pivot to support early childhood education actually indicate that the once under-appreciated and under-funded phase of education has now gotten the respect and recognition that it deserves? Is China on-track for universal ECE coverage? Have the governmental responsibilities been fulfilled? Has ECDE strengthened in rural areas? What lessons were learned during the post-2010 developmental process?

In this paper, we look at the financing component of ECDE in China. We aim to understand not merely the distribution of financial resources, but also the implications of financing ECE quality. While finance is widely regarded as a building block of a high quality ECDE system (UNICEF, 2011), little empirical research has been devoted to such issues in China. We probe into this issue using school-level administrative data from one of most diverse and densely populated provinces in China.

### **A historical review of ECDE in China**

In China, early childhood education is provided by kindergartens for children 3-6 years-old. ECE in China has always suffered from major systemic problems of quality and sustainability. Prior to 2010, ECE in China went through two separate downward developmental cycles due to political turbulence and government mismanagement (Li, Yang, & Chen, 2016). The first cycle was a chaotic period from 1958-1977 when the country went through the "Great Leap Forward" (1958-1960) and the "Cultural Revolution" (1966-1976). During this period, most Kindergartens were closed down while children were sent home, and teachers were sent to re-education through laboring (Li & Wang, 2008).

During the second cycle from 1994-2009, government privatized kindergartens and

shifted the responsibility of funding ECE to the private sector or non-governmental organizations. After deciding that private sector as the main ECE provider, Chinese government organizations encouraged NGOs and private providers to take over existing public institutions. Many public kindergartens were spun off their public sector affiliates and converted into market-driven and self-funded private institutions. This move put the remaining public kindergarten operating in a very disadvantaged position. The central government only allocated a fraction of total education funding to ECE, which accounted for less than 1.3% of the entire national educational budget (Cai & Feng, 2006). The extreme lack of financial resources seriously impeded ECD in China (Li & Wang, 2008; Zhu & Wang, 2005). Due to lack of financial investment, the ECE workforce has low status and poor training. Many qualified teachers chose to leave the profession as unprofessional and untrained teachers filled in newly emerged private kindergartens. Li and Wang (2008) coined the term “silent revolution” to describe this cycle of ECDE. In two decades, Chinese kindergartens moved from a public dominated system to a privately dominated one. This cycle has left negative impact of both the quality and quantity of ECE in China (Cai, 2008; Li & Wang, 2008).

By 2010, ECE in China was plagued by the aforementioned 3A’s problems. There were many factors that contributed to these issues, among which was the lack of a fair and adequate funding system (Li et al., 2016). To solve these problems, the Chinese State Council issued two important policy directives in 2010: *The Outline of China’s National Plan for Medium and Long-term Education Reform and Development (2010-2020)* (hereinafter referred to as “the Plan”), and *the Several Views on the Development of Preschool Education by the State Council* (hereinafter referred to as “the Views”).

Three development missions and strategic goals were set by the Plan and the Views. First, the basic universality of ECE: By 2020, the gross enrollment rate (GER) for those taking 3-years of ECE must be 70%. Second, clarity of government responsibilities: Even though ECE is non-compulsory, it shall be mainly funded, planned, and managed by the government. ECE shall be funded, planned, and managed. Furthermore, greater efforts should be made to develop public kindergartens and to support non-governmental ones. Teachers’ social status, salaries, and benefits as well as the quality of ECE programs shall be guaranteed by relevant laws. Finally, the third mission dictated the strengthening of ECE in rural areas: All the children left behind by parents working away from their home villages shall have access to kindergartens. Rural ECE resources shall be replenished by all means (Li et al., 2016).

### Financing ECE in China

After the establishment of the People’s Republic of China in 1949, ECE was regarded as welfare for workers and public officers. The responsibility of financing ECE thus fell on state-owned enterprises (SOE), government departments at various levels, and collectives (Cai & Feng, 2006; Zeng, 2005). As a result, few resources were deployed from fiscal appropriation. Starting in the 1980s, when SOE and the public sector underwent a series of structural reform, ECE institutions were jettisoned from their previous affiliations and

driven to the education market. A burgeoning private ECE sector emerged during this period, which was entirely self-funded (Cai & Feng, 2006).

Both the Plan and the View envisioned a universal ECE that would be jointly supported by both public and private systems. In addition to pledging more financial input from the central government, local governments were also asked to fairly distribute public funding for ECE by subsidizing the education of young children from poor and needy families and prioritizing the development of ECE in rural and western areas. For instance, educational authorities jointly invested 50 billion RMB (around 8.3 billion USD) into ECE from 2011 to 2015 in order to support ECD in the rural areas of middle and western China. Still, the overall governmental input in ECE was inadequate when compared to ECE expenditures in most developed-and developing-countries (Li, 2014).

The funding structure of ECE is very different from primary and lower secondary education which are streamlined and less variable across schools. For ECE, not only is there a smaller proportion of government funding overall, but even at the school level, some schools receive more government financial support than others, leaving the less fortunate schools to look for other funding sources. The per-pupil funding level is the best indicator for illustrating this point. Before 2010, urban ECE institutions took the lion's share of public ECE resources, as its per-pupil funding level was even higher than that of primary education. In contrast, rural ECEs received almost none of the public resources (Hu & Roberts, 2013). In the past few years, public funding for rural ECE has gradually increased, but there has not been systematic evidence that rural ECEs have benefited from the overall boost of public investment post-2010. Whether there is a significant urban-rural gap in ECE funding in China post-2010 is one of the questions to be addressed by the present study.

The Plan and the View charted a new direction for ECDE but also raised much skepticism. As there are very few studies that critically and comprehensively analyze these policy changes and the impact during the post-2010 period, this paper is dedicated to addressing this research gap by understanding how the Plans and the Views were put into practice since 2010 from a financial perspective, and whether the three developmental goals were achieved. Therefore, the questions we sought to answer in this piece are threefold: First, what are the changes in ECE development post-2010? Second, how is ECE financed compared to primary and secondary education in the post-2010 development stage? Third, what are the issues associated with the current ECE financial scheme for sustainable development toward universal coverage of ECE?

## Method

### Data

We use an administrative dataset from Province J, a large, diverse, and densely populated (over 20 million) province in western China. It is not economically developed (it is ranked middle tier on per capita GDP among all provinces), and has had low ECE coverage in the past. This data comes from a larger project that uses administrative information

Table 1  
*Data description*

ECE	Rural				Urban			
	Schools	Students	Staffs	Ratio	Schools	Students	Staffs	Ratio
2008	191	72,694	2,540	29	32	9,426	1,058	9
2009	166	73,848	2,381	31	30	9,274	1,046	11
2010	2,099	316,377	3,083	49	139	25,881	1,479	11
2011	2,120	349,563	3,800	42	136	27,301	1,488	11
2012	2,115	356,066	4,006	44	140	29,142	1,486	9
2013	2,075	328,737	4,348	44	131	27,937	1,467	9
Primary								
2008	2,093	1,877,552	107,897	17	189	196,330	12,202	16
2009	2,086	1,711,247	104,047	16	186	200,293	12,218	16
2010	2,073	1,631,753	101,307	15	186	202,368	12,326	16
2011	2,082	1,590,295	99,754	15	188	206,677	12,613	16
2012	2,073	1,574,993	98,474	15	192	210,221	12,973	16
2013	2,083	1,614,801	98,201	15	198	217,671	13,297	16
Lower Secondary								
2008	783	850,277	51,406	16	35	37,428	3,290	11
2009	784	830,438	52,340	16	37	43,098	3,790	11
2010	755	787,939	52,162	15	36	42,188	3,624	11
2011	712	721,354	51,772	13	36	41,643	3,613	11
2012	711	651,201	52,138	12	39	46,124	4,159	11
2013	696	588,842	50,977	10	40	46,996	4,319	11

to study school finance in China. The data is at the school-level and spans from 2008-2013. There are several unique features about this data. First, it contains every publicly funded educational institution, therefore constituting a complete census. This provides a complete picture of how ECE is funded in a provincial system. Secondly, the longitudinal nature gives us a rare opportunity to study how ECE funding has changed over time. In particular, considering that ECE is not funded on a large scale, this dataset captures the finance situation prior to the reform and during the initial stage of ECE expansion (2008-2013) after the implementation of the Plan and the View had taken place. Thirdly, this dataset collects all the financial details that any public education institution has had to comply with. The revenue and expenditure categories came directly from school financial reports and therefore could be an accurate reflection of how schools mobilize and utilize resources. Lastly, the same dataset also includes comparable financial information from elementary and lower secondary schools, enabling us to make a meaningful comparison between ECEs and other provisions of public education.

The data is summarized in Table 1. On average, we have about 2000 ECE schools in rural areas and 130 in urban areas each year.

## Measures

We have several variables to characterize each school, including the number of students and staff at the end of the year, as well as the school location (urban or rural). For financial information, we have data on categorical revenues and expenditures. Based on these variables, we calculate per-pupil spending, student-staff ratio, and average teacher salary. Additionally, although the ECE institutions in our dataset are public, current financial regulation allows them to collect revenues based on fees and levies to support themselves. In the financial data, expenditures were further categorized as budgetary and out-of-budget, the latter reflecting the amount that was not part of the government planning but from schools themselves.

We use three common indicators to compare equity of resource utilization: 1) federal range ratio, 2) coefficient of variation (CV), and 3) the Theil index (Odden & Picus, 2014). The federal range ratio is the ratio of 95th percentile to the 5th percentile of per-pupil expenditure. It avoids the influence of extreme values in data. The coefficient of variation is derived by dividing the standard deviation from the mean. It is one of the most common measures of horizontal equity. Equity is typical when CV is less than 0.1 (Odden & Picus, 2014). The Theil index is derived from the General Entropy class of equality index (Downes & Stiefel, 2008). It takes a value from zero to one where zero indicates total equity and one indicates total inequity. It can be further decomposed between different units, which helped us to understand the source of intra-province inequality between rural and urban areas.

## Results

### Changes in ECE development post-2010

Tables 1 and 2 present the landscape of ECE, alongside with primary and lower secondary education in province J. In 2008 and 2009, around 200 ECE institutions were directly funded by public resources, 30 or so were in urban areas whereas the rest were in rural areas. The entire public sector experienced growth in 2010, and expanded steadily over the next four years. By the end of 2013, there were 2200 public ECE institutions throughout the province, with an enrollment of more than 350,000 students, three times more than in 2009. A significant feat in itself, the coverage for all children is far from complete, public ECE only represented one side of the story. Table 2 shows that private institutions were the main ECE providers before 2010. Even after the expansion of the public sector, private institutions enrolled more children and grew very quickly. The 2010 reform did not seem to fundamentally change China's current ECE landscape where the majority of providers were privately run and of varying quality (Hu, Zhou, Li, & Robert, 2014). The government encouraged private providers to grow while significantly increasing the number of public institutions to boost overall coverage. As a result, general enrollment reached over 70 percent, almost doubling during a six-year period.

Because our data is limited to public schools, our analysis will exclusively focus on the public sector. A fast expansion in a short period of time does not come without growing

Table 2  
*ECE enrollment by public and private institutions.*

	School-aged children	Enrollment <sup>a</sup>			Enrollment Ratio
		Private	Public	Total	
2008	844,393	226,554	82,120	308,674	37%
2009	929,662	279,908	83,122	363,030	39%
2010	1,012,444	350,596	342,258	692,854	68%
2011	1,154,584	432,469	376,864	809,333	70%
2012	1,190,180	472,725	385,208	857,933	72%
2013	1,160,179	480,000	356,674	836,674	72%

Note: a) Total enrollment in public institutions is calculated by summing all year-end school enrollment figures. Private enrollment data and school-age population figures come from government report. We did not use government report for public public enrollment since their figure is about 7-10% higher than our calculation. We have no means to verify their figures therefore we use our own calculation wherever possible

pains. The first issue born out of the fast development was a high pupil-to-staff ratio<sup>1</sup> in the rural areas, where the majority of new public ECE institutions were located. After the expansion, the pupil-to-staff ratio exceeded 40:1 in rural areas, much higher than urban areas (around 10:1). This ratio is also high when compared to primary and lower secondary sectors (both at around 15:1). Another study conducted estimated 13:1 in the rural Guangdong province (Hu, Teo, Nie, & Wu, in press). Given such large class sizes, it is difficult to imagine high quality ECE is possible. In urban areas, surprisingly, the ratio is more in-line with recommended degree. This is perhaps due to the much smaller school size and subsequent student-body. Indeed, such a lopsided development clearly favors urban children.

### Financing ECE before-and-after 2010

In Table 3, we compare sources of revenue in 2008 and 2013 by averaging across all schools. For simplicity of presentation, we categorize all sources into six areas similar to the criterion designed by Wong and Bhattasali (2002). Budgetary allocation refers to overall fiscal appropriation from the general pool of the government budget. Local education surcharge is a tax that the local government collects from local business for education funding. Government fund is the revenue generated from land sales and lottery. School-generated revenues contain mostly school fees, profits from school-run enterprises, and other social services. For ECDE, school fees make up more than 90 percent of this category.

The pattern is consistent across years. ECE relied more on school-generated revenues than primary and lower secondary education, which are mostly financed by government

<sup>1</sup>In our data, there is no distinction among school's admin staff, teachers, and teaching aides, therefore we use the pupil-to-staff ratio as a bottom-line estimate of class size. Actual class size could be greater than this figure.



Table 3  
*Source of revenues by school types, 2008 and 2013*

2008	ECE		Primary		Lower Secondary	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Fiscal budgetary allocation	37%	29%	71%	15%	79%	15%
Other budgetary allocation	8%	11%	24%	14%	10%	9%
Local education surcharges	1%	5%	2%	5%	2%	5%
Government fund	0%	0%	0%	0%	0%	0%
School-generated revenues	48%	36%	1%	3%	3%	6%
Other revenues	5%	14%	2%	5%	5%	10%
2013	ECE		Primary		Lower Secondary	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Fiscal budgetary allocation	26%	27%	67%	13%	77%	13%
Other budgetary allocation	3%	9%	29%	12%	18%	11%
Local education surcharges	0%	4%	1%	5%	1%	4%
Government fund	0%	2%	1%	4%	1%	4%
School-generated revenues	67%	30%	0%	2%	0%	1%
Other revenues	2%	10%	1%	6%	2%	7%

appropriation. This status of school finance at these two levels is a result of a recent initiative to recentralize resource allocation as a means to ensure sufficient and equitable funding (Ding & Xiao, 2013). Since the ability to collect fees vary from school to school, it is not surprising that there is great variation in the proportion this category contributes to the overall revenue. Therefore, for ECE, not only do smaller proportions of income come from the government, but also certain schools are better supported by government funding while others have to rely more on themselves. This funding structure is very different from primary and lower secondary education which are streamlined and less variable across schools.

How many resources were invested in ECE as a whole? In Figure 1, we calculated the percentage of expenditure of each level of education as total public spending in education. For instance, in 2008, ECE only accounts for less than 2 percent of total education spending, whereas primary education accounted for 40 percent, and lower secondary education accounted for 19 percent. ECE attracts a significant amount of investment post-2010. In 2013, ECE accounts for 3.6 percent of total spending, compared to primary education's 39.6 percent and lower secondary's 16.8 percent. By no means is such growth small. Total spending on ECE grew more than 500 percent from 248 million yuan in 2008 to 1347 million yuan in 2013, but at the same time, the expenditure at the primary and secondary levels also almost doubled, thus percentage wise, ECE still only accounts for a small percentage of total education spending.

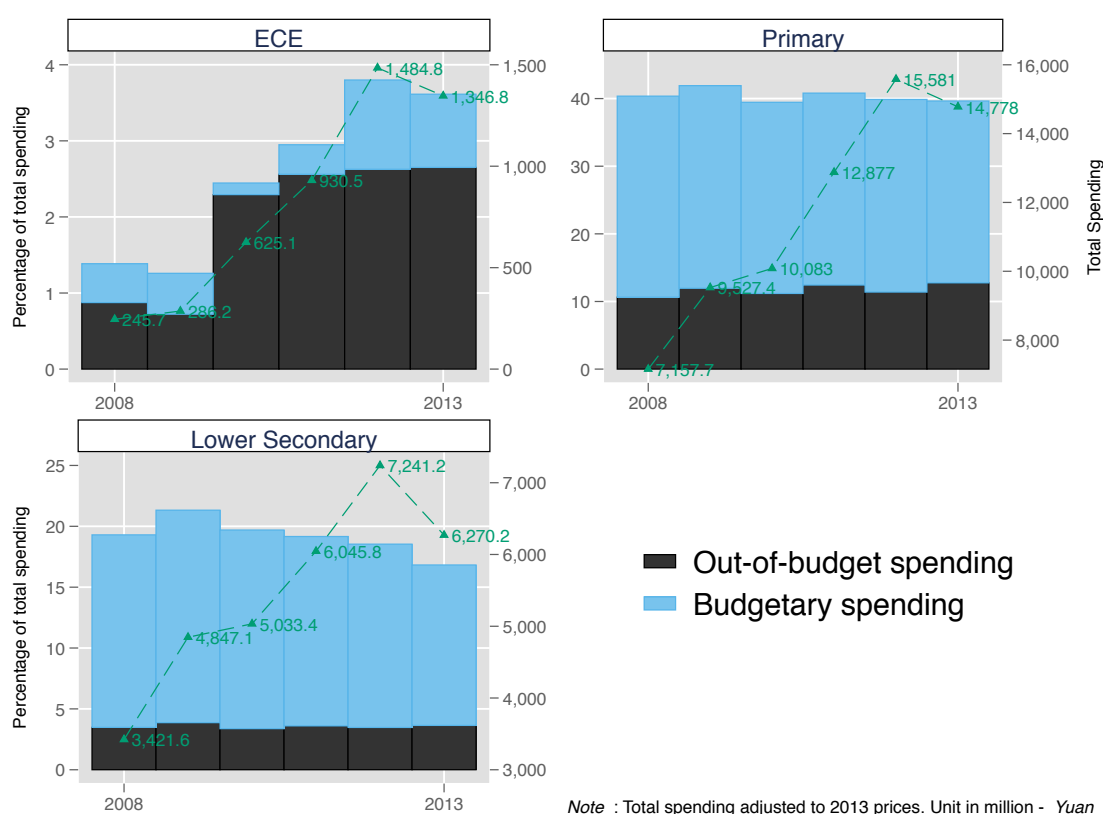


Figure 1. Expenditure on ECE as percentage of total educational expenditure, compared with primary and lower secondary level

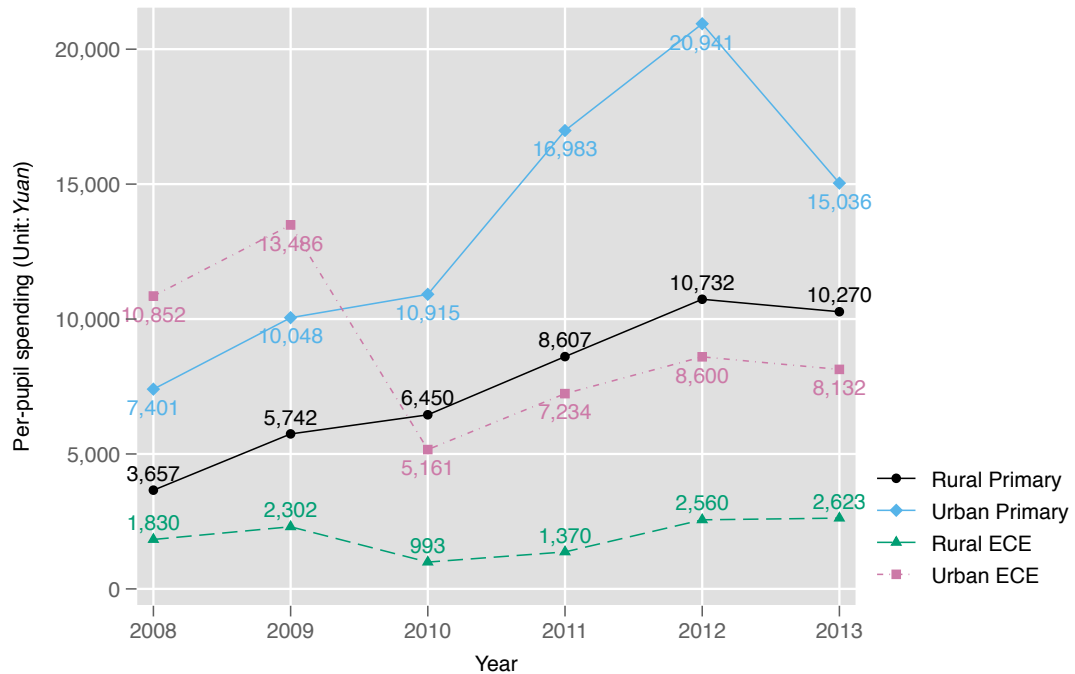
### Issues associated with current ECE financial scheme

The first issue is that although ECE experienced significant growth, at the per-pupil level ECE is still under-invested. Figure 2 compares per-pupil expenditure at the ECE and primary levels. It is clear that most of the resources were concentrated in urban ECE institutions before 2010 as the per-pupil funding level was higher than primary education. After the expansion, the indicator dipped and slowly recovered. As for rural ECE, we saw a steady increase in funding, but the figures are lower than urban institutions. Per-pupil spending at rural institutions is about one-third of what urban children received in 2013. This gap is considerably larger than the one that existed at the primary level. Rural primary students received about two-thirds of what their urban counterparts did.

A similar gap is observed on the staffing side. In Figure 3, we calculated the average annual staff compensation.<sup>2</sup> Rural ECE teachers and staff are paid much less, almost 40-50 percent less compared to their urban colleagues. Since China has yet to develop a price adjustment system to account for cost of living, it is difficult to pinpoint whether the difference in compensation reflects a difference in teacher quality or in living costs. But

<sup>2</sup>The calculation combines two sources of data: teacher salary and benefits (social security, retirement fund contribution, and other subsidies).

the difference in teacher compensation between urban and rural teachers is larger in ECE than at the primary level. Therefore, it is difficult to imagine that low compensation could attract and retain a high quality ECE workforce.



Note : Prices are adjusted to 2013

Figure 2. Per-pupil spending in ECE and primary by rural and urban

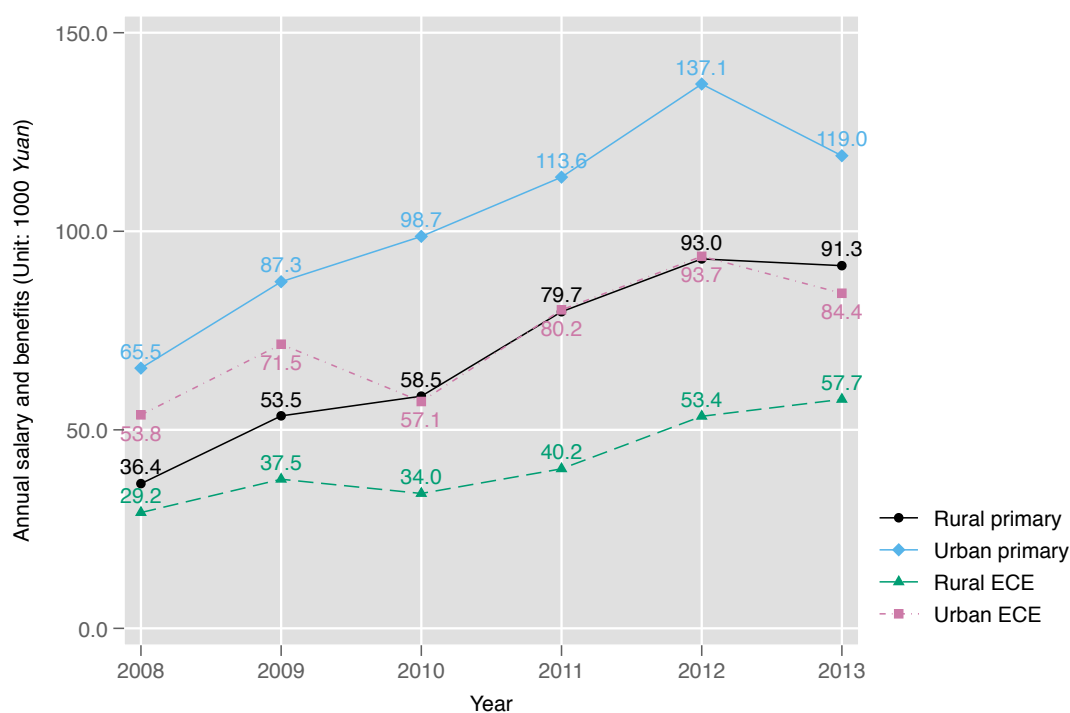


Figure 3. Average teacher compensation at ECE and primary level by rural and urban, 2008-2013

The difference in per-pupil funding and teacher compensation are driven by a much lower level of total expenditure in ECE to begin with. It is also affected by the structure of the financial scheme. Figure 4 shows categorical spending by various types of schools in urban and rural areas. The structure of expenditures underwent substantial change for ECE institutions. Regardless of school location, a sizable chunk of expenditures was on goods and services for ECE (over 60 percent for both urban and rural in 2013). This category includes items ranging from utility bills and transportation, to personnel training and development. Expanded services and goods spending affected teacher compensation the most. On average, 25-26 percent of expenditures in ECE went to teacher compensation, compared to over 70 percent at the elementary level and over 74 percent at the lower secondary level. As a result, the pupil-to-staff ratio is much higher as shown in Table 2.

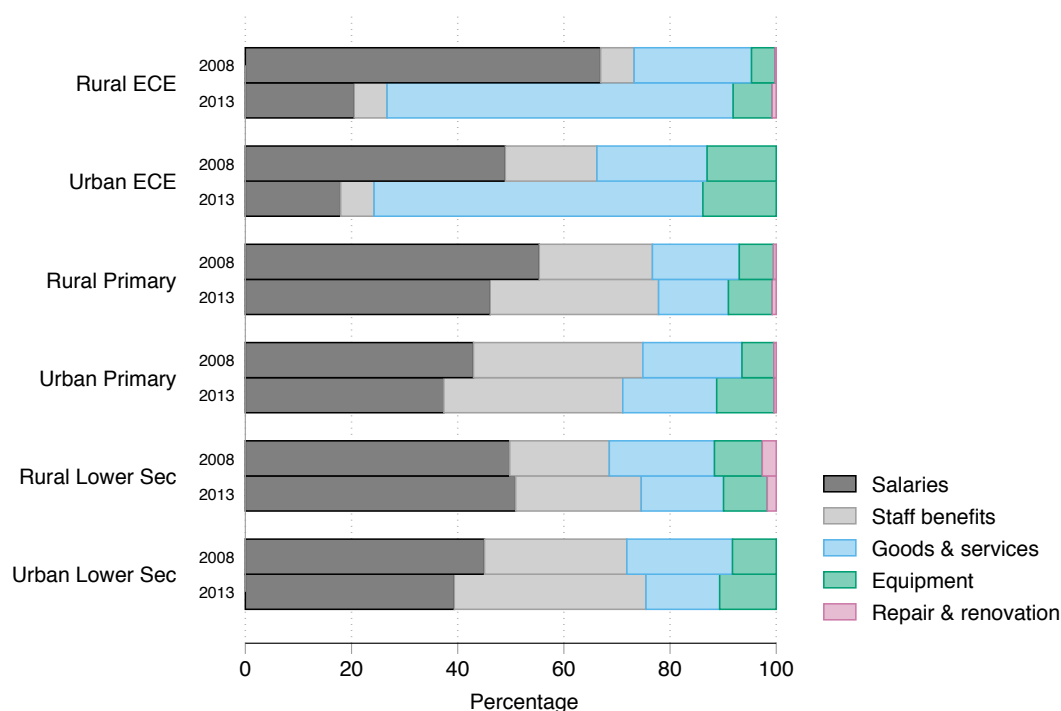


Figure 4. Categorical spending of ECE and primary by rural and urban, 2008 and 2013

A second issue concerns equity. As previous research has consistently shown (Ding and Xiao, 2013), a decentralized financial scheme that relies on school-generated resources creates inequality among schools. In Table 4, we calculated several indicators of horizontal equity commonly used in school finance. The second column shows the federal range ratio, which reflects the relative gap between the highest spending schools and lowest spending schools. In this regard, ECE institutions are much more unequal. Initially, the ratio was over 70, and it seemed that the ECE expansion had brought equity into the horizon of policy makers as the indicator substantially dropped to 17 in 2013. But such an expenditure gap is considerably larger compared to the primary and lower secondary level.

The Theil index and coefficient of variation also revealed a similar pattern: there is more inequity in financial resource distribution at the ECE level compared to the primary and lower secondary levels. The Theil index is 2 to 3 times higher for ECE, and COV is doubled compared to those for primary and lower secondary education spending. Additionally, the Theil index decomposition shows that there is a larger urban-rural gap in spending, though the gap was on a closing trend.

Table 4  
*Measures of Horizontal Equity*

ECE	Federal Range Ratio	Theil			Coefficient of variation
		Index	within	between	
2008	76	0.66	46%	54%	1.38
2009	74	0.63	44%	56%	1.37
2010	18	0.62	69%	31%	1.82
2011	25	0.80	76%	24%	2.22
2012	26	0.76	89%	11%	2.00
2013	17	0.65	90%	10%	2.03
<b>Primary</b>					
2008	5	0.18	84%	16%	0.83
2009	5	0.24	93%	7%	1.16
2010	6	0.20	93%	7%	0.82
2011	5	0.32	92%	8%	1.91
2012	5	0.39	94%	6%	2.41
2013	5	0.35	98%	2%	1.69
<b>Lower Secondary</b>					
2008	5	0.19	80%	20%	0.77
2009	6	0.25	86%	14%	0.91
2010	6	0.20	88%	12%	0.80
2011	6	0.25	95%	5%	1.05
2012	5	0.22	97%	3%	1.00
2013	5	0.22	97%	3%	1.01

Note: Theil index is decompsed between rural and urban schools

These findings lead to serious doubts over the quality of ECE. It's certainly true that paying teachers higher wages and benefits do not necessarily translate into superior teacher quality, but it is difficult to imagine a sustainable developmental path following the current trajectory of paying teachers less compared to other education sectors.

## Discussion

This study provides a financial perspective on what changes are necessary in order to achieve Chinese national government's goal of building an equitable high-quality ECE. Our Analysis shows a microcosm of post-2010 development in ECE from one of the most diverse and populated provinces in China. In summary, our findings echoed a previous study that the 2010 reform did not seem to fundamentally change China's current ECE landscape where the majority of providers were privately run and of varying quality, and that the system of ECE is unequitable (Hu et al., 2014). Specifically, our findings deliver two important messages: first, the increasing governmental investment on ECE is far from adequate, at the per-pupil spending level, to solve structural issues related to financial scheme, such as lower

teacher compensation; Second, a glaring gap in financial resource distribution (1) between the highest spending and the lowest spending schools and (2) among the three levels of education: ECE, the primary level education, and the lower secondary level education. Financial data presented in the study provides one unique perspective of ECD, reflecting important lessons learned to guide next steps of development in China, and providing some possible scenarios for other developing nations aiming to expand its ECE sector.

At first glance, the data seems to indicate a rapid period of growth for ECE in the past six years, as demonstrated by visible increase in enrollment rate of children and public investment toward ECE, in particular rural ECE, which were in a much greater need for government support than urban ECE. As a result, we conclude that China is en route to achieving the three development missions (i.e., the gross enrollment rate of 70% for those taking 3-years of ECE; clear government responsibilities in ECE funding and management system; and strengthening rural ECE). Specifically, GER in province J stands at 75 percent in 2013, with universal coverage in sight. The goal of public and private sectors jointly financing ECE services is also in place. Moreover, the total amount of public investment devoted to ECE has grown more than 500 percent during the past 6-year period. Rural areas have clearly benefited from the developmental strategy as we witnessed a steady increase in public funding although lower than public ECE.

Nevertheless, the post-2010 reform did not change the necessary structural differences in order to achieve so-called equitable high-quality ECE. The first insight revealed in our data concerns the current ECE financial scheme. Despite the robust growth in funding for ECE, it only makes up less than 5 percent of the total educational expenditures. Keeping in mind that a decentralized, rather than a centralized strategy is employed during the last six-year period of reform. Unlike primary and secondary education, ECE in province J relies more on private sectors, guided by the user-pay principles, with some public subsidies. In terms of building an equitable ECE system, results from calculation of indicators of horizontal equity and Theil index and coefficient of variation revealed a similar pattern that larger inequity exists in ECE. Overall, there is a diminishing urban-rural gap in spending but a big gap between the highest and the lowest spending schools.

There are only a few provinces such as Shanghai where governmental direct investment in ECE has reached 7.93% of its annual educational budget. As a result, Shanghai has the highest GED in ECE (98%), and most significantly, 72% of Shanghai's kindergartens are public ones. On the other hand, in Guangdong province, about 70% of the kindergartens are privately funded (China Democratic League of Guangdong Province, 2015). The case we presented here is somewhere in-between, as the majority of provinces in China. It implies more room for growth in public investment for ECE, especially at the per-pupil spending level, to reach the similar level as primary and lower secondary education.

The second insight is that the increased enrollment rate and the robust growth in funding for ECE, although favorable, do not necessarily transform the current ECE system into one of quality (Hu, Roberts, Jeong, & Guo, 2016). In fact, the funding structure lead to serious doubt over the quality of ECE. For evaluation of the ECE quality, we would ideally need data on the program quality ratings of these kindergartens using empirically-validated tools, which we lack of in the current study. However, we do have a number of structure

variables that are indicative of ECE program quality including teachers' compensation and pupil-to-staff ratio. Recent studies in Chinese kindergartens have reported both teachers' annual compensation and pupil-to-staff ratio to be sensitive and strong predictors of ECE program quality (Hu, Zhou, Fan, & Chen, under review). According to our findings, the pupil-to-staff ratio in rural areas is so high (exceeding 40 :1) that it has even exceeded the ratio in primary and lower secondary schools. Many researchers have pointed that the large class size and high pupil-to-staff ratio contribute to the low quality in rural kindergartens (Hu et al., 2016, 2014). Also, it is extremely challenging to recruit highly qualified teachers to teach in rural kindergartens because of the low compensation. Our data suggests that rural kindergarten teachers earn significantly lower than urban kindergarten teachers or teachers in rural primary schools. Moreover, ECE, regardless of location, spend more on maintaining daily operations rather than paying decent wages and providing professional development opportunities to teachers. As we know, only when schools invest on the most crucial aspect of program quality, i.e., teachers, will such investment make the real and difference on student outcomes.

All of these findings suggest that much room for improvement to, in addition to increase in public investment for ECE, structure change in the percentage of public ECE service providers.

### Limitations of the Study and Conclusive Remarks

In this current study, we do not have any program quality data and student data to evaluate the effectiveness of the new reform of ECE system. A second limitation is that we only include school-level data in our analysis and do not have any district entities. As a result, our study could not account for resources deployed at the district-level, therefore understanding the total spending. In future studies, researchers are encouraged to consider the aforementioned two issues, in particular to investigate whether has the recent expansion of ECE in rural areas has linked to improved program quality and children's outcomes.

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