

## INFORMALITY, RETURNS TO EDUCATION, AND LABOUR MARKET INTEGRATION IN CHINA

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*This study analyses data from household surveys in six large Chinese cities in 2010 to describe the nature of informal employment and estimate the returns to education in the formal and informal labour markets. It is estimated that 25.4 per cent of the urban workers are informally employed and 22.2 per cent of them work in the informal sector. Wage equations for informal and formal workers are also estimated by using OLS, Heckman selection correction models, switching regression models, and quantile regressions. The results show that the returns to education are lower for those working informally as compared to formal workers, and that the gap in returns is even larger for those working in the informal and formal sectors (4.2 per cent versus 11.1 per cent per year of schooling according to a switching regression model). The quantile regression results reveal that the returns to education increase at higher quintiles for informal employment but not for formal employment. The results suggest that the formal and informal sectors are characterised by labour market segmentation.*

**Keywords:** *Returns to education, Informality, Labour, China*

### I. INTRODUCTION

The urban economy in most developing countries can be classified into the formal or modern sector and the informal or traditional sector (Kazuhiro, 2007). The informal sector often accounts for most employment opportunities in developing countries (Gunther and Launov, 2012) and is characterised by small firm size, unskilled jobs, low wages, and loose enforcement of laws and regulations, and is concentrated in such sectors as petty trading, domestic services, repair services, and basic manufacturing (ILO, 2002; Kazuhiro, 2007).<sup>1</sup>

A rich theoretical literature discusses the causes and consequences of informality (Maloney, 2004; Fields, 2005; Amaral and Quintin, 2006; Loayza and Rigolini, 2006; Bennett and Estrin, 2007; World Bank, 2007; and Bennett, 2008). A key question in this literature is the extent to which informal employment is involuntary or voluntary. In systems where formal employment is highly regulated and protected, with wages and benefits set at levels that are above market clearing, informal employment may include many individuals who are unable to obtain rationed formal job opportunities, leading to market segmentation (Harris and Todaro, 1970). However, if individuals decline formal job offers to pursue high-return

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self-employment activities or because they feel the benefits of formal employment are inferior to those of informal employment, then labour would flow more freely between the formal and informal sectors, which would lead to closer integration of the two labour markets.

One way to examine whether the markets for different groups of workers are well integrated is to test whether the returns to education are the same across groups of workers. Theoretically, the differences in such returns create arbitrage opportunities for some workers to increase their wages by moving to a different employment group if mobility is unrestricted. Evidence of labour market segmentation implies that the allocation of workers is inefficient, consistent with the proliferation of informal self-employment in developing countries being economically sub-optimal. According to Jamal and Weeks (1988), there are substantial rural–urban income differentials in many sub-Saharan African nations, but the income differentials for unskilled workers are relatively small, and consistent with the returns to education being higher in the more formal urban labour market.

Perhaps because of its socialist legacy, thus far relatively little research has been conducted on labour informality in China. Since China has the world’s largest population, understanding informality in China is important for understanding informal labour markets globally and this can provide lessons for other countries, given China’s successful development record. Beginning in the late 1990s, China’s urban labour market experienced a rapid diversification of ownership types. From 1995 to 2005, the percentage of China’s urban labour force that was undocumented (not officially registered as employees of formal sector work units or as self-employed workers) increased from 9 per cent to 36 per cent (Park and Cai, 2011). This rapid increase in labour market informality in China has been associated with an explosion of rural–urban migration; the layoffs of tens of millions of formal, state-sector workers in the late 1990s and early 2000s; and the rapid growth of private sector employment and the service sector (Park and Cai, 2011). Informality has also been influenced by the passage of a landmark Labour Law in 1994 and a Labour Contract Law in 2008, which helped formalise the system of labour contracting and employment (Cai, *et al.*, 2009; Gallagher, *et al.*, Forthcoming).

In this paper, we provide the first comparison of the distribution of wages and returns to education in China’s formal and informal labour markets. The few existing studies of informal employment in China focus primarily on defining and providing a descriptive picture of the extent of informal employment (Wu and Cai, 2006; Park and Cai, 2011; Park, *et al.*, 2014). The rest of the paper is organised as follows. In Section II, the data has been introduced and define and provide descriptive evidence on the key variables used in the paper has been defined and provided. Section III presents the estimating equations and results, by using OLS, Heckman selection models, switching regression models, and quantile regressions. The final section concludes the paper.

## II. DATA, INFORMALITY DEFINITIONS, AND DESCRIPTION

The data analysed in this study is from the third wave of the China Urban Labour Survey (CULS3), conducted by the Institute of Population and Labour Economics (IPLE) of the

Chinese Academy of Social Sciences (CASS) in six large Chinese cities in 2010. The survey questionnaire included detailed questions about employment and wages of all members of each surveyed household, including questions designed to assess whether the jobs and sectors of employment were informal or formal. The six surveyed cities are located in different regions of the country. Three of them are in coastal China—Guangzhou is in the Pearl River Delta, Shanghai is in the Yangtze River Delta, and Fuzhou is in the coastal area nearest to Taiwan. The other three cities are in the interior—Wuhan is in the Hubei Province of central China, Shenyang is in the Liaoning Province in the North-east; and Xian is in Shaanxi Province in the North-west.

In each city, representative samples of local residents and migrants were independently selected by using a two-stage procedure that sampled neighbourhoods with probabilities proportional to population and households living in a random sampling of dwellings in each neighbourhood. One limitation of the sampling approach is that because sampling was done in the fixed dwellings of neighborhoods, migrants living in collective forms of housing (for example, construction sites and factory dormitories) remain under-represented.

Our goal is to compare the characteristics of informal and formal workers, and those working in the informal and formal sectors. In order to do so, best attempts have been made to follow ILO conventions for the definitions of informal jobs and the informal sector (Park, *et al.*, 2014). For wage employees, informal jobs are defined as those which provide no benefits from China's three main social insurance programmes—pension, health, and unemployment. If the entire labour force of the country were to be examined, informal employees would also include the self-employed, unpaid family workers, and casual (daily) labourers.<sup>2</sup> The informal sector includes those working in organisations that are not government or public agencies and have less than eight employees. In China, businesses with 8 or more employees are required to register as firms.

Table 1  
Types of Informal Employment in Urban China (%)

	<i>Local Residents</i>	<i>Migrants</i>	<i>All</i>
Formal employment	83.9	39.5	74.6
Informal employee in the informal sector	5.4	24.1	9.3
Informal employee in the formal sector	5.2	12.1	6.6
Employer in the informal sector	0.2	1.0	0.4
Self-employed	4.6	20.3	7.9
Unpaid family worker	0.8	3.0	1.3
Total	100	100	100

*Source:* Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Table 1 describes different types of informal employment for all urban workers based on the CULS3 data. Overall, 75 per cent of the workers are formally employed, nearly all of whom (74.6 per cent) are wage employees. Among the 25 per cent who are informally employed, 15.9 per cent are wage employees, 7.9 per cent are self-employed in firms of 7 or fewer workers, and 1.3 per cent are unpaid family workers. Thus, in contrast to India, in China, most jobs are formal and most informal work is concentrated in the sphere of

wage employment rather than self-employment. Interestingly, though most informal wage employment is in the informal sector (accounting for 9.3 per cent of all workers), there are also a significant number of informal jobs in the formal sector (accounting for 6.6 per cent of all workers). In view of this, just 22.2 per cent of urban workers work in the informal sector, a percentage that is smaller than the share of workers who are informally employed (Park, *et al.*, 2014).

Tables 2 and 3 provide descriptive statistics for the sample of workers used in the analysis. We restrict attention to women aged 16–55 years and men aged 16–60 years, since 55 and 60 years are the maximum mandatory retirement ages for women and men, respectively. All means have been calculated by using sampling weights, and thereby reflect the population living in the sampled cities.<sup>3</sup> We focus on workers who were wage employees at the time of the survey, excluding those who were self-employed. The self-employed are often excluded from studies of the returns to education, because their earnings reflect the returns to capital in addition to the returns to labour. Non-working individuals have also been used in estimating the selection correction models that model the decision to work.

Since informal work is often identified with migrant workers in China, we first compare the characteristics of migrant and local resident workers. As can be seen in Table 2, as compared to local resident workers, migrants are younger (33.8 years old as compared to 39.5 for local residents) and significantly less educated (53.1 per cent are middle school graduates or below while 19 per cent have a tertiary degree, as compared to the corresponding figures of 28.1 per cent and 31 per cent, respectively, for local resident workers). The average

Table 2  
Sample Means for Local Residents and Migrants

<i>Variable</i>	<i>All</i>	<i>Local</i>	<i>Migrants</i>
Age	38.5	39.5	33.8
Male	51.3%	51.4%	50.8%
Married	76.0%	76.9%	76.1%
Middle school and below	32.4%	28.1%	53.1%
Regular high school	29.5%	31.3%	21.3%
Vocational high school	9.11%	9.64%	6.64%
Vocational higher education	15.9%	17.1%	10.2%
Regular college and above	13.0%	13.9%	8.80%
Years of schooling	11.9	12.2	10.6
Years of work experience	22.0	23.0	17.4
Proportion of family members < age 16	26.4%	25.2%	32.2%
Proportion of family members > age 60	15.0%	13.4%	22.8%
Monthly wage (yuan)	2424.0	2394.1	2453.0
Weekly working hours	47.3	45.0	55.8
Hourly wage (yuan)	11.9	12.8	10.9
Observations	11,041	5432	5640

*Note:* Mean values for all variables use sample weights.

*Source:* Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Table 3  
**Sample Means by Formal vs. Informal Employment and by Formal vs. Informal Sector**

<i>Variable</i>	<i>Employment</i>		<i>Sector</i>	
	<i>Formal</i>	<i>Informal</i>	<i>Formal</i>	<i>Informal</i>
Age	39.4	35.6	38.2	38.6
Male	58.7%	52.2%	57.4	53.8
Married	80.9%	79.6%	78.9%	87.7%
Middle school and below	19.3%	50.8%	22.8%	55.8%
Regular high school	27.9%	25.2%	27.1%	27.1%
Vocational high school	10.3%	8.5%	10.2%	7.5%
Vocational higher education	22.0%	10.1%	21.0%	6.6%
Regular college and above	20.6%	5.5%	18.9%	3.0%
Years of schooling	13.0	10.6	12.7	10.2
Work experience	20.4	18.7	19.4	22.1
Proportion of family members < age 16	27.2%	31.2%	27.6%	31.8%
Proportion of family members > age 60	14.9%	18.4%	15.8%	16.8%
Monthly wage (yuan)	2654.8	2569.6	2622.9	2658.3
Weekly working hours	44.2	60.1	46.4	65.7
Hourly wage (yuan)	14.4	9.5	14.3%	11.1
Observations	5278	5757	7570	3471

*Note:* Mean values of all variables use sampling weights.

*Source:* Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

number of years of schooling of migrant workers is 10.6 years, as compared to 12.2 years for local resident workers. The monthly wages of migrant workers are similar to those of local resident workers, but this reflects a significantly greater number of working hours (55.8 hours per week as compared to 45 hours per week for local resident workers) and lower hourly wages (10.9 yuan/hour as compared to 12.8 yuan per hour for local resident workers). The two samples are similar in terms of the shares of workers who are women and who are married.

Table 3 provides descriptive statistics by breaking down the sample in terms of whether workers have formal versus informal jobs or whether they are working in the formal or informal sectors. Note that the sample sizes of the informal and formal workers are similar even though the overall share of workers who are informally employed is relatively small. This is because the survey over-sampled migrant workers by design. Although the age difference between informal and formal workers is less than that between migrant and local resident workers, the gaps in education, working hours, and hourly wages are distinctly larger. Among those who are informally employed, the share of workers with middle school education or less is 50.8 per cent, the share with tertiary education is 15.6 per cent, and the mean years of schooling is 10.6. The corresponding figures for workers who are formally employed are 19.3 per cent, 42.6 per cent and 13 per cent, respectively. The differences between workers in the formal and informal sectors are similar in magnitude to the differences between formal and informal employment.

In addition to describing the nature of informal employment in China, one of the main goals of this article is to examine the returns to education. We start by describing the differences

in wages across groups of workers with different levels of educational attainment. Table 4 summarises the mean and standard deviations of log hourly wages for migrant and local resident workers with different levels of education. It shows that workers with higher education levels attain large wage premiums, especially in the case of those with college education, and that these gaps look similar for local resident workers and migrants. The results also reveal that wage dispersion is greater at lower levels of education, and for migrant workers in comparison to local resident workers. The greater wage dispersion for those with less education may be explained by the fact that older workers tend to have less human capital than younger workers. It is well-known that wage differences not associated with education increase with experience (Lemieux, 2006). Table 5 compares the mean hourly wages of informal and formal workers by education level. Here, we see large wage gaps between formal and informal workers at all education levels, especially at the low and high levels of education. We also find that wage differences across educational groups are roughly similar for the two groups, though the premium to vocational high school as compared to middle school is greater for informal workers while the premium for vocational higher education as compared to high school is greater for formal workers.

Table 4  
Mean Log Hourly Wage by Education Level for Local Residents and Migrants

	<i>Local Residents</i>		<i>Migrants</i>	
	<i>Mean</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Standard Deviation</i>
Middle school and below	1.99	0.640	1.95	0.696
Regular high school	2.18	0.634	2.18	0.751
Vocational high school	2.27	0.549	2.17	0.697
Vocational higher education	2.48	0.589	2.46	0.671
Regular college and above	2.81	0.586	2.90	0.683

*Note:* Mean values of all variables use sampling weights.

*Source:* Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Table 5  
Mean Hourly Wage by Educational Level

	<i>Formal Workers</i>	<i>Informal Workers</i>
Middle school and below	11.61	6.80
Regular high school	12.91	8.02
Vocational high school	12.03	8.82
Vocational higher education	15.86	9.76
Regular college and above	21.72	16.46

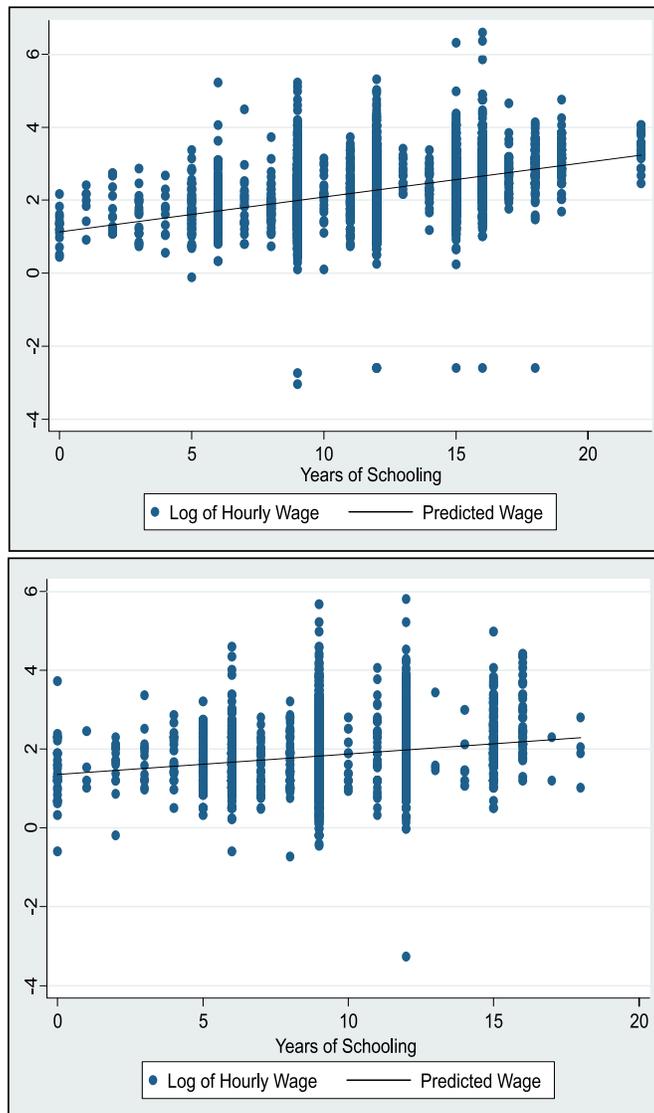
*Note:* Mean values of all variables use sampling weights.

*Source:* Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Next, we visually examine the relationship between wages and education in the formal and informal sectors in Figure 1, by plotting the distribution of wages by years of schooling and fitting a simple regression line to the data. This exercise reveals substantial wage dispersion at all levels of education, especially intermediate levels, and a significant positive relationship between wages and the number of years of education that is steeper in the formal

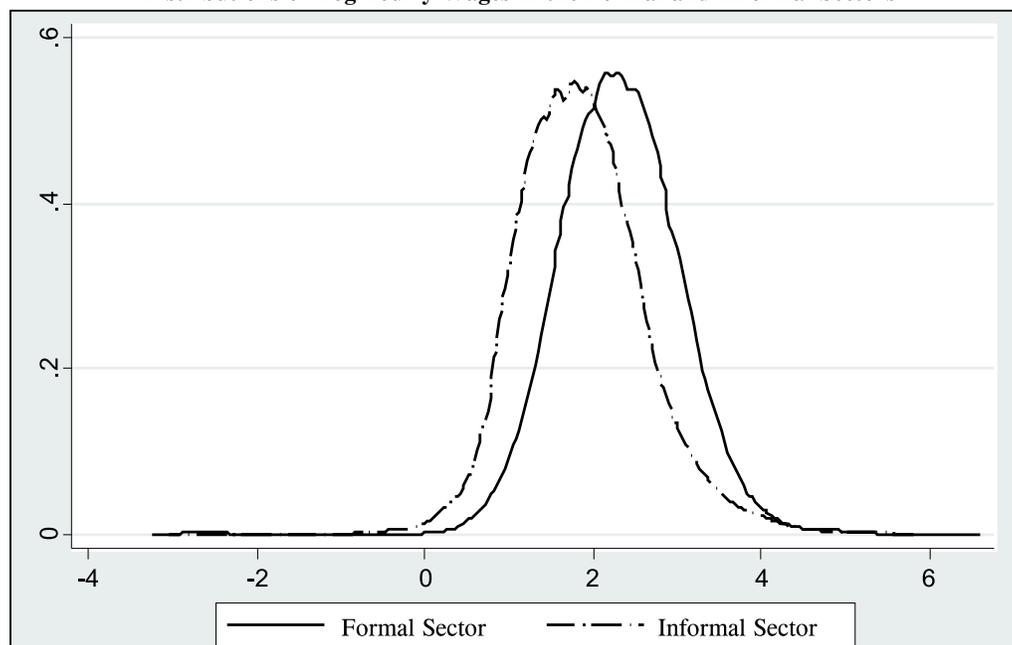
sector than the informal sector. Here, we focus on sector differences because we find that differences in the returns to education in the formal versus informal sectors are sharper than that between formal versus informal employment. In Figure 2, we plot the overall log wage distribution for the two sectors. We find that the distributions have a very similar shape but that the mean formal sector wage is significantly greater than the mean informal sector wage. This persistent gap could reflect education and other unobserved productivity differences between workers in the two sectors. The similar shapes could reflect a degree of market integration between the two sectors.

Figure 1  
**Log Hourly Wage and Years of Schooling in Formal and Informal Sectors**



Source: Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Figure 2  
Distributions of Log-hourly Wages in the Formal and Informal Sectors



Source: Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

### III. RETURNS TO EDUCATION

In this section, we report the results of our analysis of the returns to education. The workhorse model for estimating of the returns to education is that derived by Mincer (1974), in which log wages are specified as a function of the number of years of education, number of years of experience, and number of years of experience squared. We start with Mincer's specification and add controls for whether workers are male, whether they are migrant workers, and the city fixed effects. In Table 6, we report the OLS estimates for the full sample, as well as estimates that control for selection bias associated with being an employed worker by using Heckman's selection correction model. In order to identify the selection equation, we include two variables capturing family structure (the percentage of family members aged 16 and younger and the percentage of family members above the age of 60 years) as identifying variables. The implicit assumption of this approach is that the family structure is likely to affect labour force participation due to the income and care needs of households, but it should not directly influence labour productivity. To the extent that this is not true, the Heckman selection correction model could yield results that remain biased.

We find that the returns to an additional year of schooling are 10.7 per cent and 11.1 per cent, according to the OLS and Heckman selection correction models. In addition, men make 21.5 per cent (27.5 per cent) more than women, migrants make 3.5 per cent (7.2 per cent) less than local resident workers, and wages peak at 26.2 (21.1) years of experience based on the OLS (Heckman) estimates. The selection equation turns out to be not strongly

identified, as neither of the family structure variables is statistically significant at the conventional levels. The selection correction term ( $\lambda$ ) is still statistically significant in the wage equation, but the inclusion of the correction term does not strongly influence the estimated return to the number of years of schooling.

Next we turn to the results of main interest—the returns to education estimated separately for formal and informal workers, and in the formal and informal sectors. In order to economise on the number of results reported, we report only the results for the Heckman selection correction models, though we note that these never deviate very far from the OLS estimates. The independent variables are the same as in Table 6, except that we drop the control variable for being a migrant, since this is a key determinant of being informally employed or in the informal sector. For each specification, we also estimate separate models in which the number of years of schooling is replaced by a set of indicator variables for the highest level of education attained. These attainment levels include regular high school, vocational high school, vocational higher education, and college and above, with middle school and below serving as the reference category.

Table 6  
Wage Equation Estimates for Pooled Sample

	OLS		Heckman	
	Coef.	$P >  z $	Coef.	$P >  z $
<i>Wage Function</i>				
Schooling	0.1067	0.000	0.1114	0.000
Experience	0.0262	0.000	0.0348	0.000
Experience squared	-0.0005	0.000	-0.0008	0.000
Male	0.2145	0.000	0.2746	0.000
Migrants	-0.0353	0.032	-0.0724	0.001
City dummies		Yes		Yes
<i>Selection Function</i>				
Schooling			0.0572	0.000
Experience			0.0935	0.000
Experience squared			-0.0028	0.000
Male			0.7528	0.000
Migrants			0.5224	0.000
Family member share < 16			-0.0444	0.125
Family member share > 60			-0.0251	0.494
City dummies				Yes
Lambda			0.2156***	0.0600(Std.)
Observations		10844		10844

Note: P value is significant probability. “\*\*\*, \*\*, \*” significant at 1%, 5%, with Shanghai taken as the reference city. The sample comprises women aged 16– 55 years and men aged 16– 60 years.

Source: Authors’ calculations using data from Wave 3 of the China Urban Labour Survey (2010).

The results are presented in Tables 7–10. We find large gaps between the returns to education for formal and informal employment, and between the returns to education in the formal and informal sectors. As shown in Table 7, the return to a year of schooling is 9.5 per cent for formal employment and 6.7 per cent for informal employment. Wages rise

faster with experience and peak earlier for informal employment than formal employment. Table 8 reports estimates of the returns to different levels of educational attainment. The most obvious difference lies in the returns to regular high school education as compared to middle school and below, which is 19.4 per cent for formal employment but only 7.8 per cent for informal employment. Except for vocational higher education, the returns to other levels of education as compared to middle school and below are also higher for formal employment as compared to informal employment.<sup>4</sup>

Tables 9 and 10 present results for the formal and informal sectors, respectively. Interestingly, the formal–informal differences are found to be even larger when comparing sectors than when comparing formal versus informal employment. The return to a year of schooling is 10.6 per cent in the formal sector and 6.7 per cent in the informal sector (Table 9). The larger gap for sectors as compared to employment type suggests that there is greater integration between formal and informal employment within the same sector than between the formal and informal sectors. This makes sense given that employers in different sectors are completely different, whereas the same firms can hire both formal and informal workers. It has also been found that the male premium is significantly higher in the informal sector (at 26.1 per cent) as compared to the formal sector (20.5 per cent). For these samples, the family structure variables are significant predictors of labour force participation for both formal and informal sector employment.

Table 7  
Returns to Schooling Years in Formal and Informal Employment

	<i>Formal jobs</i>		<i>Informal jobs</i>	
	<i>Coef.</i>	<i>P &gt;  z </i>	<i>Coef.</i>	<i>P &gt;  z </i>
<i>Wage Function</i>				
Schooling	0.0949	0.000	0.0666	0.000
Experience	0.0194	0.000	0.0324	0.000
Experience squared	-0.0004	0.000	-0.0008	0.000
Male	0.2031	0.000	0.1833	0.000
City dummies		Yes		Yes
<i>Selection Function</i>				
Schooling	0.0027	0.879	0.0011	0.139
Experience	-0.0001	0.883	0.0420	0.811
Experience squared	0.0159	0.879	-0.0218	0.896
Male	0.0569	0.473	0.1234	0.458
Family member share < 16	-0.2783	0.009	-0.0223	0.609
Family member share > 60	0.0391	0.017	-0.0379	0.176
City dummies		Yes		Yes
Lambda	0.0970*	0.0673(Std.)	0.1351*	0.0931(Std.)
Observations		5956		2528

*Note:* P value is significant probability. “\*\*\*, \*\*, \*” significant at 1%, 5%, and 10%. Shanghai has been taken as reference city. The sample comprises women aged 16–55 years, and men aged 16–60 years.

*Source:* Authors’ calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Table 8  
Returns to Schooling Levels in Formal and Informal Employment

	<i>Formal Jobs</i>		<i>Informal Jobs</i>	
	<i>Coef.</i>	<i>P&gt;  z </i>	<i>Coef.</i>	<i>P&gt;  z </i>
<i>Wage Function</i>				
Regular high school	0.1939	0.000	0.0780	0.014
Vocational high school	0.2370	0.000	0.2684	0.000
Vocational higher education	0.5067	0.000	0.4357	0.000
College and above	0.7824	0.000	0.7480	0.000
Experience	0.0234	0.000	0.0383	0.000
Experience squared	-0.0005	0.000	-0.0009	0.000
Male	0.2035	0.000	0.1951	0.000
City dummies		Yes		Yes
<i>Selection Function</i>				
Regular high school	-0.0177	0.907	-0.0478	0.815
Vocational high school	0.2846	0.156	0.1493	0.650
Vocational higher education	0.1664	0.319	-0.0503	0.890
College and above	0.3828	0.022	-0.0190	0.964
Experience	0.0077	0.655	-0.0354	0.164
Experience squared	-0.0001	0.718	0.0011	0.114
Male	0.0147	0.887	0.0352	0.838
Family member share < 16	0.0558	0.479	-0.0165	0.921
Family member share > 60	-0.2766	0.009	0.1348	0.420
City dummies		Yes		Yes
Lambda	-0.1037*	0.0664 (Std.)	0.1393*	0.0941(Std.)
Observations		5956		2565

Note: P value is significant probability. “\*\*\*, \*\*, \*” significant at 1%, 5%, and 10%. Shanghai has been taken as the reference city. The sample comprises women aged 16–55 years and men aged 16–60 years.

Source: Authors’ calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Table 9  
Returns to Schooling Years in Formal and Informal Sectors

	<i>Formal Sector</i>		<i>Informal Sector</i>	
	<i>Coef.</i>	<i>P&gt;  z </i>	<i>Coef.</i>	<i>P&gt;  z </i>
<i>Wage Function</i>				
Schooling	0.1060	0.000	0.0669	0.000
Experience	0.0272	0.000	0.0231	0.001
Experience squared	-0.0005	0.000	-0.0006	0.000
Male	0.2052	0.000	0.2607	0.000
City dummies		Yes		Yes
<i>Selection Function</i>				
Schooling	0.0398	0.015	-0.0073	0.803
Experience	-0.0056	0.716	0.0146	0.700
Experience squared	0.0003	0.384	-0.0005	0.508
Male	0.0099	0.917	0.2535	0.123
Family member share < 16	0.0129	0.864	-0.0421	0.671
Family member share > 60	-0.1245	0.277	-0.1244	0.332
City dummies		Yes		Yes
Lambda	0.2144*	0.1357(Std.)	0.4728***	0.1093(Std.)
Observations		7541		3409

Note: P value is significant probability. “\*\*\*, \*\*, \*” significant at 1%, 5%, and 10%. Shanghai has been taken as the reference city. The sample comprises women aged 16–55 years and men aged 16–60.

Source: Authors’ calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Table 10  
Returns to Schooling Levels in Formal vs. Informal Sectors

	<i>Formal Sectors</i>		<i>Informal Sectors</i>	
	<i>Coef.</i>	<i>P &gt;  z </i>	<i>Coef.</i>	<i>P &gt;  z </i>
<i>Wage Equation</i>				
Regular high school	0.2213	0.000	0.2040	0.000
Vocational high school	0.3106	0.000	0.1924	0.001
Vocational higher education	0.5957	0.000	0.4284	0.000
College and above	0.9014	0.000	0.8021	0.000
Experience	0.0319	0.000	0.0271	0.000
Experience squared	-0.0006	0.000	-0.0007	0.000
Male	0.2070	0.000	0.2752	0.000
City dummies		Yes		Yes
<i>Selection Equation</i>				
Regular high school	-0.0236	0.858	0.0628	0.711
Vocational high school	0.2700	0.126	-0.4853	0.061
Vocational higher education	0.2089	0.177	-0.2855	0.358
College and above	0.3832	0.012	0.0557	0.894
Experience	-0.0005	0.972	-0.0008	0.980
Experience squared	0.0002	0.517	-0.0003	0.689
Male	0.0076	0.935	0.2328	0.129
Family member share < 16	0.0119	0.875	-0.0427	0.662
Family member share > 60	-0.1205	0.293	-0.1207	0.320
City dummies		Yes		Yes
Lambda	0.1120*	0.0536(Std.)	0.4829***	0.0971(Std.)
Observations		7541		3409

Note: value is significant probability. “\*\*\*, \*\*, \*” significant at 1%, 5%, and 10%. Shanghai has been taken as the reference city. The sample comprises women aged 16–55 years and men aged 16–60 years.

Source: Authors’ calculations using data from Wave 3 of the China Urban Labour Survey (2010).

An examination of the differences in the returns to different levels of schooling in the formal and informal sectors again reveals much more striking differences than the comparison between formal and informal employment. The returns to all levels of schooling are higher in the formal sector (Table 10). Specifically, in the formal sector, (informal sector) as compared to middle school and below, the returns to regular high school are 22.1 per cent, the returns to vocational high school, 31.1 per cent, the returns to vocational higher education 59.6 per cent, and the returns to college and above levels of education, 90.1 per cent. The corresponding figures for the informal sector are 20.4 per cent, 19.2 per cent, 42.8 per cent, and 80.2 per cent, respectively. These large gaps in the returns to education suggest significant lost arbitrage opportunities and a lack of market integration between the formal and informal sectors. Since segmentation across sectors seems more salient than segmentation across jobs, hereafter we focus on understanding differences between the formal versus informal sectors, rather than between formal and informal jobs.

The earlier regressions deal with selectivity associated with labour force participation, but do not address selectivity associated with working in the formal versus informal sectors. In

order to address this form of endogeneity bias, we estimate a switching regression model by using maximum likelihood methods. Restricting the sample to those who work, we explicitly estimate an equation for whether an individual works in the formal or informal sector, and account for the correlation between the errors in this equation and separate wage equations estimated for the formal and informal sectors.<sup>5</sup> Our identifying variable for the sector selection equation is an indicator variable for whether one has a spouse who has a formal job. Having a spouse with a formal job is likely to provide connections that help in finding a formal sector job oneself, though under assortative mating, one's spouse's employment characteristics could also be correlated with one's own ability or motivation. Nonetheless, one's spouse's job characteristics should be less correlated with one's ability than one's own job characteristics, and thus this strategy should improve identification as compared to OLS.

The results for the returns to schooling years are presented in Table 10. For comparison, we present the OLS results that do not account for the endogeneity of job choices. We find that the gap in returns to a year of schooling between the formal and informal sectors is even wider when we estimate the switching regression model. Accounting for the endogeneity of sectoral choice, we estimate that the return to a year of schooling is 11.1 per cent in the formal sector and just 4.2 per cent in the informal sector, as compared to corresponding figures of 10.5 per cent and 6.7 per cent by using OLS (Table 11). The differences between the switching regression model results and the OLS results suggest that a higher number of years of schooling are more strongly correlated with unobserved ability, school quality, or unobserved skills in the informal sector compared to the formal sector. This seems plausible given the fact that the informal sector mixes less educated migrant workers, who

Table 11  
Returns to Years of Education in the Formal and Informal Sector  
(OLS and Switching Regression Model)

	OLS	ML (switching regression)
<i>Formal Sector</i>		
Years of schooling	0.105***	0.111***
experience	0.027***	0.030***
Exp. squared	-0.001***	-0.001***
occupation dummy		
<i>Informal Sector</i>		
Years of schooling	0.067***	0.042***
experience	0.022***	0.031***
Exp. squared	-0.001***	-0.001***
occupation dummy		
<i>Selection Equation</i>		
Years of schooling		0.187***
experience		0.042***
Exp. squared		-0.001***
Spouse is formally employed		0.542***
Observations		10843

Note: All regressions include male dummy variable and city dummies; \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Same as Table 10.

are disadvantaged in many respects, with local resident workers to a much greater extent than the formal sector. While estimating the selection equation, we also find, not surprisingly, that education is strongly associated with being employed in the formal sector and that one's spouse's formal employment is a strong positive predictor of working in the formal sector.

Table 12 presents the results for the switching regression model wherein the number of years of schooling has been replaced with indicator variables for attaining different levels of education. Similar to the results for the number of years of schooling, we find much sharper gaps in the returns to all levels of schooling between the formal and informal sectors. In particular, the returns to college or vocational higher education as compared to middle school and below are greater by more than 20 per cent in the formal sector than in the informal sector.

Table 12  
Returns to Levels of Education in the Formal and Informal Sectors  
(Switching Regression Model)

	<i>Formal Sector</i>	<i>Informal Sector</i>
<i>Wage Function</i>		
Reference category: Middle school and below		
Regular high school	0.203***	0.127***
Vocational high school	0.295***	0.108***
Vocational higher education	0.556***	0.326***
College and above	0.851***	0.618***
Experience	0.036***	0.031***
Experience squared	-0.0007***	-0.0008***
<i>Selection Function</i>		
Reference category: Middle school and below		
Regular high school		0.598***
Vocational high school		0.928***
Vocational higher education		1.363***
College and above		1.794***
Experience		0.031***
Experience squared		-0.0009***
Spouse is formally employed		0.506***
Observations		10843

*Note:* All regressions include male dummy variable and city dummies; \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

*Source:* Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

Finally, we report the results of the quantile regressions that explore whether the returns to education vary across different parts of the wage distribution in the formal and informal sectors. In Table 13, results are reported for the 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, and 90<sup>th</sup> percentiles of the distribution of the wage error terms. Coefficients of control variables are suppressed for ease of exposition. These regressions do not control for selection bias. There are a couple of interesting patterns. In the formal sector, there is no systematic relationship between the returns to a year of schooling and the quantile being estimated (the highest return is at the median). However, in the informal sector, the return to a year of schooling systematically

increases with higher quantiles. However, when we examine the returns to different levels of educational attainment, we find that in the formal sector, the returns to all levels of education decline at higher quantiles. In the informal sector, the return to regular high school is a bit smaller at higher quantiles, but the returns to higher education are greater at higher quantiles. In particular, the returns to college at the 90<sup>th</sup> percentile are much larger than for the other quantiles investigated.

Table 13  
Quantile Regression Estimates of Returns to Schooling  
Years and Levels in Formal and Informal Sectors

<i>Variables</i>	(1)	(2)	(3)	(4)	(5)
	<i>q10</i>	<i>q25</i>	<i>q50</i>	<i>q75</i>	<i>q90</i>
<i>Formal Sector</i>					
Years of schooling	0.105***	0.107***	0.115***	0.106***	0.096***
Regular high school	0.197***	0.170***	0.182***	0.176***	0.104
Vocational high school	0.296***	0.269***	0.246***	0.209***	0.111**
Vocational higher education	0.545***	0.516***	0.538***	0.497***	0.351***
College and above	0.826***	0.812***	0.812***	0.703***	0.583***
Observations	5930	5930	5930	5930	5930
<i>Informal Sector</i>					
Years of schooling	0.039***	0.041***	0.042***	0.047***	0.048***
Regular high school	0.150***	0.156***	0.152***	0.126***	0.138***
Vocational high school	0.199***	0.241***	0.249***	0.194***	0.259***
Vocational higher education	0.434***	0.442***	0.412***	0.450***	0.489***
College and above	0.716***	0.737***	0.774***	0.790***	0.973***
Observations	4913	4913	4913	4913	4913

*Note:* All regressions include male dummy variable and city dummies; \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

*Source:* Authors' calculations using data from Wave 3 of the China Urban Labour Survey (2010).

A common finding for developed countries is a slightly positive relationship between wage quantile and returns to education (Martins and Pereira, 2004). A positive association (as in China's informal sector) may be due to the over-qualification of workers in low-paying jobs, complementarity between ability and education, and greater unobserved variation in the quality of education at higher schooling levels. The negative association between wage quantile and returns to education in the formal sector suggests that in higher-paying jobs, education may matter relatively less and skills or social capital unrelated to education may matter relatively more than in lower paying jobs. For example, if higher paying jobs are in the state sector, it could be that family or political connections matter relatively more for success than is the case for relatively lower paying jobs in the non-state sector. The fact that the formal and informal sectors exhibit such opposite patterns across the wage distribution reinforces the idea that the labour markets in the two sectors operate very differently in terms of how different characteristics are rewarded, a finding that is consistent with lack of market integration.

#### IV. CONCLUSION

In this paper, we examine data from household surveys conducted in 2010 in six large Chinese cities to provide new insights into the functioning of formal and informal labour markets in China. We first document the extent of informal employment in China, showing that 25.4 per cent of the urban workers have informal jobs and 22.2 per cent work in the informal sector. Non-parametric plots of hourly wage distributions show that informal workers receive lower pay than formal workers, on an average, but that the wage distributions have a similar shape, perhaps suggesting a degree of market integration.

In order to gain greater insight into the functioning of the formal and informal labour markets, and the extent to which the two are integrated, we analyse the returns to education for formal and informal workers by using several different empirical specifications that control for different sources of bias and provide different insights into the performance of the labour market. Our main robust finding is that across the different specifications, we find a significant gap in the returns to education for formal workers as compared to informal workers (defined mainly by access to social insurance programmes), and especially between those working in the formal and informal sectors (defined mainly by the number of workers employed by one's employer). According to a switching regression model, the return to a year of schooling is 11.1 per cent in the formal sector and just 4.2 per cent in the informal sector. This large difference in the returns to education suggests unexploited arbitrage opportunities and definite labour market segmentation between the two sectors, which contrasts with evidence of convergence in the returns to education across regions and ownership types (Zhang, *et al.*, 2005). Quantile regressions reveal greater nuance in how the returns to education vary at different parts of the wage distribution and again reveal very different outcomes in the formal and informal sectors, consistent with labour market segmentation.

These findings are of interest because they reveal that despite continuous development and deepening of China's labour market, which has increased the spatial integration of labor markets, there are still workers in the informal sector who do not appear to have the same employment opportunities as those working in the formal sector. China's implementation of new labour regulations may affect the extent and nature of informal employment (Gallagher, *et al.*, Forthcoming) going forward. Thus, continued monitoring and analysis of the situation of informal sector workers is important to ensure that Chinese workers enjoy equal opportunity and high mobility in the labour market, which serves the interests of both efficiency and equity.

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### *Notes*

1. Ranis and Stewart (1999) find that about 70 per cent of the labour force in the informal sector in Manila is engaged in trading and about 13 per cent in manufacturing. Similar numbers have also been found for many Latin American economies (Marcouiller, *et al.*, 1997).
2. Following standard practice, employees are considered to be formally employed if the employer engages 8 or more employees within the organisation concerned.
3. The weights for the urban local resident sample are defined simply as the city local resident population (from the *China Urban Statistical Yearbook*) divided by the city sample size (the number of households). The migrant weights correct for the probability that a neighbourhood is selected (on the basis of the number of local resident households, from sampling data or from the neighbourhood form if sampling data is missing), the probability that a migrant is chosen in a given neighbourhood (on the basis of the size of the migrant population in the neighbourhood according to the neighbourhood questionnaire), and the ratio of the city migrant population to the city migrant household sample size.
4. In the selection equations for these regressions, family structure variables are significant predictors of formal employment but not informal employment.
5. In these models, we ignore self-selection associated with labour force participation. In the Heckman selection correction models estimated earlier, we account for endogeneity of labour force participation but do not address selection bias associated with working in the formal versus informal sectors.

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