Household registration, urban status attainment, and social stratification in China ☆

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ABSTRACT

Previous studies on the household registration system (*hukou*) have focused either on the selective process of *hukou* conversion to urban status and its impact on social stratification or on the socioeconomic disadvantages and the assimilation of rural migrant workers in cities. Pooling the data from two national probability surveys in China (CGSS 2003 and 2008), we investigate socioeconomic inequality in urban labor markets and the role played by successful and unsuccessful conversion to urban *hukou* status for those of rural origins. Specifically, we compare the earnings of three subgroups: those who acquired urban status through their own efforts, those who gained their urban *hukou* via the incorporation of their villages into cities, and rural migrants who have not obtained an urban *hukou*. Linear regression results show that the commonly observed earnings premium associated with urban *hukou* status is limited only to a subgroup of rural-origin people who obtained their urban *hukou* through a highly selective process. Propensity-score matching analyses further reveal that the effect of urban *hukou* status on earnings is positively associated with the propensity of *hukou* conversion to urban status, and that the urban *hukou* only pays off among people with better education and higher-status occupations within the state sector. These findings shed new light on the relationship between mobility processes and stratification outcomes, and bear important policy implications for the ongoing reform of the *hukou* system in the process of China's urbanization.

1. Introduction

As one of the most important redistributive institutions under Chinese state socialism, the household registration (*hukou*) system has received much attention from both academics and policy-makers (Cheng & Selden, 1994). Since the 1990s, government control on population migration has been relaxed, resulting in a large number of people leaving inland villages to pursue economic opportunities in coastal cities. However, without an urban local *hukou*, most rural migrants are still denied of the rights and benefits of citizenship, and *hukou* registration status plays an important role in affecting not only rural migrants' wellbeing but also their offspring's educational opportunities (Chan & Buckingham, 2008; Cheng & Selden, 1994; Liang & Chen, 2007; Wu & Zhang, 2015; Zhang & Wu, 2017).

Scholars on *hukou* and migration typically attribute the socio-economic disadvantages of rural migrants in the urban labor market directly to their lack of urban *hukou* status (Chan, 1994, 1996; Cheng and Selden, 1994; Solinger, 1999; Wang, 2004, 2005; Wang, Zuo, & Ruan, 2002). This assertion, however, needs support from rigorous analysis of empirical evidence because, other than household registration, migrants and urban local residents may differ in migration experience, childhood environment, and cultural adaptation, which may also affect their socioeconomic attainment in labor markets (Zhang & Wu, 2017). In fact, the literature pertaining to migration in western countries has also shown that rural-to-urban migrants are disadvantaged in occupational attainment, earnings and psychological wellbeing in the destination cities, even without existence of the *hukou* registration system (Bhugra 2004; Evans & Kelley, 1991). Moreover, studies also suggest whether one spent their childhood in rural or urban areas has strong influences on his/her subsequent wellbeing as an adult (Zhang & Treiman, 2013).

Urban residents with *hukou* consist of those who were born to urban-*hukou* parents and those of rural origins who attained urban *hukou* through a process called "the conversion of household registration from rural status to urban status", or "*nong zhuan fei*" in short in Chinese (Wu & Treiman, 2004). The fact that people who moved to urban areas through varying channels suggests the heterogeneity among rural migrants of different background and life experience, further complicating our investigation of the disparities in stratification outcomes between those with and without urban local *hukou* (i.e., urban residents and rural migrants). Previous studies in this field have largely ignored such varying processes and relied on comparisons among rural migrants and urban natives to make causal inferences on the effects of the *hukou* institution on socioeconomic inequality. Without knowing how individuals are sorted/placed into different social groups (*hukou* status), the estimates of group differences in earnings based on aggregate data are likely to be biased, and the interpretation of the group differences as caused by *hukou* status is unwarranted (Gerber, 2000; Wu & Xie, 2003).

Hence, to determine the effects of *hukou* status on rural migrants' socioeconomic outcomes, we adopt a counterfactual approach to conceptualize the causal mechanisms (Holland, 1986). Specifically we ask, how would the rural-to-urban *hukou* converters have fared had they not been able to gain urban *hukou* status? In this setup, the truly comparable group are those of rural origins who presumably have similar migration experiences and grew up in similar environment but failed to attain urban status, known as rural migrants in cities.

Based on data from the Chinese General Social Survey (CGSS) conducted in 2003 and 2008, we examine the possible causal effects of *hukou* conversion on earnings inequality. First, we classify the mechanisms of *hukou* conversion into merit-based selection and policy-based incorporation, to be elaborated below, and compare the earnings of those who obtained their urban *hukou* via these two mechanisms with those who failed to obtain urban status. Second, we employ the propensity score matching method to estimate the causal effects of urban *hukou* (propensity to obtain urban status) on earnings (Guo & Fraser, 2009), as well as how these causal effects vary with work unit sector and the propensity of obtaining urban *hukou* status (Dehejia & Wahba, 1998; Dehejia & Wahba, 2002). In so doing, we reveal how the process through which individuals obtain their urban status affects *hukou*-based stratification outcomes.

2. Registration status, mechanisms of *Hukou* conversion and its social consequences

To enhance administrative control, China established the household registration (*hukou*)system in the 1950s, which has since been playing an important role in distributing resources and determining life chances. Through the work unit (*danwei*) system (Bian, 1994), the state has been providing a series of social welfare benefits to urban *de jure* residents, but not to those with rural *hukou* status, who accounted for two-thirds of the national population in the 1960s and have become the "second-class" citizens of the country (Chan, 1994, 1996; Cheng and Selden, 1994). Given the huge socioeconomic disparities between rural and urban *hukou* holders, it is difficult for those born of rural status to convert to urban *hukou* status (Fan, 2001; Wu & Treiman, 2004).[1] Indeed, the Chinese state has imposed a stringent *hukou* conversion rate of between 0.15 and 0.2% per year, even in the era of economic reform until recently (Lu, 2003, pp 144–146), to control the growth of the urban population. However, students admitted to specialized secondary (*zhong zhuan*) or tertiary schools are allowed to convert to urban *hukou* status, without taking up the quota. In fact, *hukou* conversion is

generally achieved through attaining higher education or entering a state work unit. While Communist Party membership, cadre status and military experience do not automatically grant an urban *hukou*, they could greatly facilitate access to employment and promotion in the urban non-agricultural sector, and thus the conversion of *hukou* status (Wu & Treiman, 2004; Zhang, 2015).

Hence, *hukou* mobility is extremely selective, as it is highly restricted by governmental regulations. Only the most talented and capable people of rural origin are able to acquire an urban *hukou* through their own efforts (Wu & Treiman, 2004). As the opportunities for *hukou* conversion and formal migration from rural to urban areas once were so scarce, those who succeeded in converting their registration status through their own educational or occupational achievements typically experienced extreme upward mobility, and fared even better than urban natives in the labor market (Wu & Treiman, 2007). We thus conceptualize this kind of *hukou* mobility as merit-based selection (Chan & Buckingham, 2008).

The economic reform in China since 1978 has introduced substantial changes to the *hukou* system. Rural migrants from inland villages have been flocking to coastal cities since the 1990s (Liang & Ma, 2004; Liang, Li, & Ma, 2014; Wu & Zhang, 2015). Compared to permanent migration with *hukou* change, government control on population geographic mobility has been relaxed considerably and migration without *hukou* conversion has become much easier than before. The size of the floating population has reached 261 million in 2010, indicating that 19% of China's national population is on the move (National Bureau of Statistics in China 2011). As most of these migrants do not have a local (urban) *hukou*, until recently, they are denied of access to government subsidies, welfare benefits, and better work opportunities (Cai, Zhang, & Du, 2002; Li, 2006; Liang, 2004; Liang & Ma, 2004; Solinger, 1999; Zhang & Wu, 2017).

The surging population migration has fueled rapid urbanization in China over the past decades. The percentage of the population living in urban areas (including both *de jure* and *de facto* residents) increased from 20% in 1980 to 50% in 2010. Against this backdrop, some cities have enacted local regulations allowing the floating population to register as permanent residents under certain circumstances. As a result, a few other channels of *hukou* conversion have emerged (Chan & Zhang, 1999), and a small fraction of rural migrants are able to obtain a local *hukou* and actually settle down in their destination cities. A typical example is Shenzhen in Guangdong province, which has grown from a small fishing town bordered with Hong Kong to a major metropolis of more than 10 million population in China over three decades, with only about 2.5 million local permanent residents with *hukou* (National Bureau of Statistics 2011).

Concomitant with China' rapid urbanization, large areas of agricultural land collectively owned by rural villagers have been requisitioned for urban development, especially since the late 1990s, increasing from $519.38 \, km^2$ in 1997 to $2879.9 \, km^2$ in 2002 (National Bureau of Statistics 1998; National Bureau of Statistics, 2003). To address the employment and livelihood issues of landless peasants, the government instituted policies that collectively grant them urban *hukou* status, in addition to financial compensations, so that they may apply for the same pension, welfare benefits and job opportunities that urban residents are entitled to (State Council, 1982). Unlike merit-based selection where individuals must rely on their own efforts to obtain urban *hukou* status, in this kind of *hukou* conversion, former villagers are simply given an urban *hukou* as part of their compensation for their relinquished land. We term this channel of *hukou* mobility as policy-based incorporation.

Hence, the mechanisms through which people obtain urban *hukou* status have become more diverse after the reform of the household registration system. Merit-based *hukou* conversion suggests a strong mechanism of self-selection at work: those who attained urban *hukou* status through their own efforts may possess characteristics, whether observable or not, which are positively associated with both *hukou*

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[1] According to Wu and Treiman (2004, p367), since the establishment of the household registration system, only 11% of people from rural areas have successfully changed their *hukou* status. Among these 11%, about half obtained urban *hukou* through their own educational achievements.

change and earnings attainment. This is a classic case of an endogenous problem: outstanding human and political capitals help certain people of rural origins overcome institutional hurdles to successfully achieve urban *hukou* status, and to bring generous economic returns in the urban labor market. In contrast, in policy-based incorporation, urban *hukou* status is collectively attained, independent of individuals' own abilities and self-selection, suggesting an exogenous effect of governmental policies. Therefore, investigating the consequence of different kinds of *hukou* conversion on individuals' life chances can help understand the causal relationship of *hukou* status with social stratification outcomes.

In this article, we aim to assess whether or not *hukou* conversion has a causal effect on earnings inequality in urban China, and among *hukou* converters, how those who converted through merit-based selection fare differently from those who converted through policy-based incorporation? As household registration is a part of the socialist redistributive system (Bian, 1994; Wu, 2002), discrimination against rural migrant workers without urban *hukou* is more pronounced in the state sector than in the non-state sector (Wu, 2013; Wu & Song, 2014; Zhang & Wu, 2017). Our study further considers the two-tier labor market in urban China and investigates how the causal effect of *hukou* status conversion differs between the state sector and the non-state sector (also see Li, Gu, & Zhang, 2015).

3. Data, variables and analytical strategies

3.1. Data

The data analyzed here are drawn from the Chinese General Social Survey (CGSS), a series of nationally representative surveys conducted since 2003. Using the multi-stage stratified random sampling method, the surveys gather rich information on Chinese adults' education, job history, migration experience and social relations. We pool two waves of data in 2003 and 2008 to ensure the statistical power of our analyses. We presume that the Chinese urban labor market remained relatively stable in the window of 2003 and 2008, thus our analyses focus on the average effect of *hukou* status rather than temporal trends. We restrict the analysis to the sample of urban residents aged between 18 and 60 at the time of survey (Bian & Li, 2012).

As Table 1 shows, approximately 10.61% of *de facto* urban residents retained their rural *hukou*, and most of them were migrant workers. Of the other nearly 90% of the urban population with urban *hukou* status, 25.8% (23.09/89.39) are of rural origins (hold rural *hukou* at age 14). Since this article mainly focuses on the effects of rural-to-urban *hukou* conversion, we restrict our analysis to the sample of rural origin (33.7% of the entire *de facto* urban population).

3.2. Variables

We compare those of rural origin who have changed their *hukou* and those who have not. Among the *hukou* converters, we further

Table 1
Chinese Urban Population Aged between 18 and 60 by *Hukou* Status and *Hukou* Origins, 2003 and 2008.

	Hukou Status		Total
	Rural	Urban	
Hukou Origin			
Rural	10.61% (550)	23.09% (1196)	33.70% (1746)
Urban	/	66.30% (3434)	66.30% (3434)
Total	10.61% (550)	89.39% (4630)	100% (5180)

Notes: The percentages are weighted. As CGSS surveys did not ask for the *hukou* mobility experiences of rural population, we assume that there is no *hukou* mobility from urban to rural, as it is very rare in reality.

differentiate between those who converted through merit-based selection and those who converted through policy-based incorporation. In both the 2003 and 2008 surveys, respondents were asked about the reasons why they changed their *hukou* status. We consider those who gave the reasons of "attained higher education", "joined the military", "found an urban job" and "promoted to cadres" as having converted through merit-based selection (Wu and Treiman 2004), and those who cited the reasons of "land expropriation" and "migrant settlement" as having converted through policy-based incorporation. In accordance with this classification, the two waves of data provide a total of 206 valid cases of policy-based converters, 846 cases of merit-based converters, and 510 cases of failing to convert to urban *hukou* status (rural temporary migrant workers). Among the sample of the urban population of rural origins, 68.5% (23.09/33.70) eventually achieved *hukou* conversion.

We use work income (earnings) as the major dependent variable. The two surveys collected data on the total annual income that respondents earned in previous years (i.e., 2002 and 2007, respectively). This item includes not only salaries and bonuses but also business income. To make the measure more comparable across the two waves, we standardize the values in 2007 using the consumer price index so that they represent the same purchasing power as that in 2002.[2]

Independent variables include education, party membership, military experience, gender, working experience, and working hours per week. Education, a measure of human capital, is coded into three categories: junior high school or lower, senior high school or equivalent (vocational/technical high school), and tertiary education. Party membership is a dummy variable (1 if yes and 0 otherwise), measuring respondents' political capital. Military experience is an important predictor of upward mobility, especially for those of rural origin (Zhang, 2015). It is also a dummy variable (1 if yes and 0 otherwise). Other dummy variables include gender (1 if male and 0 otherwise) and marital status (1 if married and 0 otherwise), whereas working experience and working hours per week are continuous variables.

We also include respondents' occupation and work unit as independent variables in the model. Occupation is coded into six categories: administrators, professionals, clerks, sales and service workers, manual workers, and the self-employed. Work unit is coded as a dummy (1 if state sector and 0 if non-state sector).

3.3. Analytical strategies

Conversion to urban *hukou* status through merit-based selection and that through policy-based incorporation bear different implications for workers' urban labor market positions. It also affects how we estimate the impacts of *hukou* status on stratification outcomes.

As mentioned above, we differentiate between two types of *hukou* converters and compare each with rural migrant workers who fail to change their *hukou* status in urban areas. We then employ multiple linear regression models to estimate the differences among the three groups. However, such dichotomous classification may oversimplify the heterogeneity of the *hukou* mobility process. For instance, individuals could gain a job and subsequently an urban *hukou* through factors other than their human capital, whereas the cases of policy-based incorporation may include individuals who obtained urban status through their own merits.

To reduce measurement errors due to such dichotomous classification, we employ the propensity score matching method to assess an individual's selectivity in *hukou* conversion. The propensity score is estimated from a series of observable characteristics. This method assumes that individuals who have a lower propensity of converting to an urban *hukou* but have actually done so are more attributable by the

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[2] The standardized indexes are: 2002 = 100, and 2007 = 85.03 (National Bureau of Statistics, 2011).

Table 2
Descriptive Statistics of Chinese Urban Residents with Different *Hukou* Status.

Hukou Status	Rural Migrants	Policy–based Converters	Merit-based Converters	Urban Natives
Education				
Junior high or below	70.67	65.42	32.23	40.89
Senior high or equivalent	24.00	29.24	32.16	36.86
Tertiary or above	5.33	5.34	35.61	22.25
Communist Party member	8.00	14.39	37.89	16.86
Military experience	2.55	4.56	15.08	5.37
Occupation				
Administrator	3.47	5.60	8.71	5.92
Professional	9.64	12.67	30.70	19.77
Clerk	4.28	13.89	14.20	12.55
Sales or service worker	19.16	12.86	12.40	20.11
Manual worker	43.09	41.32	29.95	35.69
Self-employer	20.36	13.65	4.03	5.96
Working Units				
State sector	20.31	33.61	76.22	62.99
Non-state sector	79.69	66.39	23.78	37.01
Male	48.21	48.85	65.13	50.02
Married	82.16	87.46	96.00	90.37
Working hours per week	56.40 (17.71)	49.82 (16.15)	46.98 (13.43)	48.12 (13.36)
Age	34.44	38.89	42.11	41.16
	(10.38)	(11.08)	(10.58)	(10.59)
Working experience	16.95	20.46	22.57	22.37
	(11.43)	(12.04)	(11.18)	(10.99)
N	510	206	846	3617

Notes: 1.The sample comes from CGSS data (2003 and 2008), urban residents aged from 18 to 60. 2. Percentages are presented for categorical variables, and means and standard deviations are presented for continuous variables.

relaxation of the *hukou* policy. In this case, individuals' selectivity in obtaining urban status is treated as a continuous variable rather than a dummy variable.

We combine the two methods above to investigate how the process of rural-to-urban *hukou* conversion affects individuals' socioeconomic attainment in urban labor markets. In the first method, we include dummy variables in conventional linear regression models to show the differences in earnings among rural migrants who converted to urban status through merit-based selection and those who did so through policy-based incorporation. Note here, we do not include urban natives in comparison, as most previous studies did. However, since this approach cannot completely overcome the endogenous issue encountered in estimating the causal effect, we adopt the propensity score matching method to estimate the average treatment effect of *hukou* conversion. We first estimate an individual's propensity score for receiving a treatment, where the score summarizes all of the observable differences between the "treatment group" (*hukou* converters) and the "control group" (rural migrant workers). Under the condition that there are no systematic differences between the two groups, the average earnings difference within a propensity score stratum can thus be interpreted as the average treatment effect of *hukou* conversion for that stratum (Rosenbaum & Rubin, 1984). Second, the results across strata were pooled under the assumption of a homogeneous treatment effect, which was the weighted average of the stratum-specific treatment effects. Finally, via hierarchical linear modeling (Raudenbush & Bryk, 2002), we show how the treatment effects vary by propensity stratum (Xie, Brand, & Jann, 2012).[3] Specifically, we introduce a two-level model to measure the relationship between the treatment effect of *hukou* conversion on earnings and the corresponding propensity-score stratum:

Level 1: $Y_{ij} = \delta_{0j} + \delta_{1j}Treat_{ij} + \mu_{ij}$ (1)

where δ_{1j} denotes the treatment effect of urban *hukou* on earnings, i.e., the average earnings gap between the urban population and the rural population for the *j*th stratum of the propensity score for *hukou* conversion. Moreover, the treatment effect is allowed to vary by stratum as follows:

Level 2: $\delta_{1j} = \gamma_{10} + \gamma_1 Stratum_j + \theta_{1j}$ (2)

where $Stratum_j$ denotes the *j*th stratum of the propensity score, and γ_1 denotes the varying impact of propensity-score strata on the treatment effect, which can explain how the treatment effects vary among people with different levels of propensity for *hukou* conversion, and μ_{ij} and θ_{1j} are the error terms, respectively, at the individual level and the stratum level.

To check the consistency between the two approaches to operationalize the different mechanisms of *hukou* mobility, we replicate the propensity score analysis separately for merit-based converters and for policy-based converters.

4. Empirical results

4.1. Descriptive statistics

Table 2 presents the descriptive statistics on the sample and comparisons among urban residents with different *hukou* statuses (urban *hukou* obtained via merit-based selection, urban *hukou* obtained via policy-based incorporation, and rural *hukou* [temporary migrants]). We also include the group of urban natives as a reference only. In terms of education, the policy-based converters and rural migrants show striking similarities: only a handful of those in either group have attained college education or higher (5.33% and 5.34%, respectively). In contrast, 35.6% merit-based converters have attained college education or higher. This percentage is even higher than that for urban natives, suggesting that merit-based converters are highly selected among those of rural origins.

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[3] To ensure the inference is unbiased, we must assume that the observable characteristics are exhaustive; in other words, no other covariates exist that may affect the propensity or probability of receiving treatment. This is the so-called strong ignorability assumption (SIA), which is an important foundation for executing the propensity score matching method (Imbens, 2004; Rosenbaum & Rubin, 1984). According to SIA, a comprehensive array of observable covariates must be identified to differentiate between the rural migrants (without *hukou*) and the urban population of rural origin.

Table 3
Average Annual Earnings of Chinese Urban Residents by Working Unit Sector.

Hukou Status	Rural Migrants	Policy-based Converters	Merit-based Converters	Urban Natives
State Sector	8740	10,337	14,367	13,302
	(7362)	(8756)	(14,428)	(16,264)
	94	*82*	*636*	*2289*
Non-state Sector	15,171	10,379	22,213	15,854
	(26,961)	(11,224)	(36,848)	(36,678)
	416	*124*	*210*	*1328*
Full Sample	13,986	10,363	16,315	14,239
	(24,674)	(10,290)	(22,445)	(25,740)
	510	*206*	*846*	*3617*

Notes: Yearly earnings are standardized according to the consumer price index. The unit is RMB *yuan*. Standard deviations are in parentheses. The number of observations for each group is in italics.

The merit-based converters also have the highest percentages of Communist Party members and people with military experience: 37.9% are party members and 15.1% have military experience (Zhang, 2015). These percentages are even much higher than those for urban natives. This reflects that merit-based converters enjoy significant advantages in not only human capital but also political capital. Among policy-based converters, 14.4% are party members and 4.56% have military experience. These percentages are also higher than those for rural migrants.

In terms of occupation and work unit, very few merit-based converters are engaged in manual work or self-employment. More than half of them are administrators, professionals or clerks (8.71 + 30.70 + 14.20 = 53.6%), and 76.2% of them work in the state sector. In contrast, despite the fact that the percentage of policy-based converters who enter the state sector is much higher than the percentage of rural migrants who do so (33.61 vs. 20.31), the two groups are engaged in similar kinds of occupation, namely manual and service jobs, and also self-employed. Even compared to urban natives, merit-based converters are more likely to be administrators and professionals, suggesting a pattern of extreme upward mobility among this group (Wu and Treiman 2004, 2007).

In terms of gender composition, 64.1% of the merit-based converters are male, whereas male and female are more evenly distributed within the other groups. Rural migrants have more working hours per week than all the other groups, and they are the youngest, with the least experience among urban residents. No significant differences in terms of age and experience are observed among the urban *hukou* groups (including two kinds of *hukou* converters and urban natives).

Table 3 presents the adjusted yearly earnings of the urban population by *hukou* status and work unit. Overall, merit-based converters earn the highest (16,315 *yuan*, which is approximately 2000 *yuan* more than urban natives). An interesting finding is that policy-based converters have the lowest annual income of 10,363 *yuan*, which is 3623 *yuan* less than rural migrants. This disparity is statistically significant ($p = 0.042$). In the state sector, rural migrant workers earn less than policy-based converters, although the difference is not statistically significant ($p = 0.190$). However, policy-based converters are even more disadvantaged in the not-state sector: they earn 4792 *yuan* less than rural migrant workers and 11,834 *yuan* less than merit-based converters on average. Notably, merit-based converters even earn 6359 *yuan* more than urban natives in the non-state sector. These results show that rural-origin people who are highly selective can achieve even higher economic returns in the non-state sector than in the state sector (also see findings by Zhang and Wu (2017) based on the mini-census data). Results in Table 3 also suggest that rural-to-urban *hukou* conversion itself (e.g., policy-based incorporation) does not seem to guarantee any earnings advantages.

Table 4
OLS Regression Models on Determinants of Logged Annual Earnings among Urban *De Facto* Residents of Rural Origins.

Dependent Variable: log (annual earnings)	Model 1	Model 2	Model 3	Model 4
Hukou status (rural migrants [omitted])				
Policy-based converters	−0.096	−0.159	−0.100	−0.309
	(0.196)	(0.193)	(0.195)	(0.238)
Merit-based converters	0.634***	0.136	0.219	−0.064
	(0.137)	(0.153)	(0.165)	(0.206)
Male	0.942***	0.868***	0.916***	0.919***
	(0.122)	(0.125)	(0.127)	(0.127)
Married	−0.823***	−0.779***	−0.663***	−0.645***
	(0.230)	(0.228)	(0.229)	(0.229)
Working experience	0.023	0.037*	0.035	0.032
	(0.023)	(0.022)	(0.022)	(0.022)
Working experience$^2 \times 100$	−0.001	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Education:(junior high or below[omitted])				
Senior high or equivalent		0.324**	0.227	0.253*
		(0.147)	(0.152)	(0.152)
Tertiary or above		1.214***	0.975***	0.993***
		(0.184)	(0.209)	(0.208)
Communist Party member		0.129	0.112	0.097
		(0.168)	(0.174)	(0.174)
Military Experience		−0.110	−0.055	−0.057
		(0.245)	(0.245)	(0.245)
Occupation: (manual worker [omitted])				
Administrator			0.605**	0.615**
			(0.268)	(0.267)
Professional			0.508***	0.510***
			(0.188)	(0.188)
Clerk			−0.084	−0.093
			(0.226)	(0.226)
Sales or service worker			0.168	0.176
			(0.177)	(0.177)
Self-employed			−0.576**	−0.590**
			(0.156)	(0.156)
State sector			−0.173**	−1.037***
			(0.149)	(0.270)
State sector × Policy-based C				0.864**
				(0.270)
State sector × Merit-based C				0.841**
				(0.420)
Working hours per week			0.004	0.003
			(0.004)	(0.004)
Constant	8.289***	7.856***	7.671***	7.775***
	(0.211)	(0.226)	(0.328)	(0.329)
N	1562	1562	1562	1562
R^2	0.070	0.102	0.115	0.120

Notes: Standard errors are in parentheses; ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

4.2. Multiple linear regression models

Table 4 presents the results from linear regression models of income determination among China's urban residents of rural origins. The dependent variable is the logarithm of respondent's total annual income. Model 1 shows that, unlike what other studies have suggested, after controlling for gender effect, marital status and working experience, *hukou* status does not have a notable effect on earnings: policy-based converters do not differ significantly from rural migrant workers in earnings attainment. Merit-based converters, on the other hand, earn almost twice as much as rural migrant workers ($e^{0.634} = 1.885$), net of other factors, and the difference is statistically significant ($p < 0.001$).

In Model 2, we further control for the effects of respondents' education, party membership and military experience. The effect of *hukou* status on earnings becomes insignificant among the urban population of rural origins. In Model 3, after occupation, work unit sector and working hours per week are further included, the results remain largely the same, suggesting that the observed earnings advantages associated

with urban *hukou* status are limited to only the merit-based selection converters. Such advantages, to a large extent, are derived from their human capital, political capital, as well as the occupation and work units in which they are placed.

In Model 4, we introduce an interaction term between *hukou* status and work unit sector to assess whether *hukou*-based stratification in the urban labor market differs between the state and non-state sectors. Similar to the results presented in Table 3, the earnings disparities between rural *hukou* holders and urban *hukou* holders (including two types of converters) are much larger in the state sector than in the non-state sector. In the state sector, policy-based converters and merit-based converters earn 1.7 times ($e^{0.864-0.309} = 1.742$) and 2.2 times ($e^{0.841-0.064} = 2.175$) as much as rural migrant workers (p < 0.001). In the non-state sector, the premium associated with urban *hukou* status is no longer evident. These two groups earn even less than rural migrant workers, though the differences are not statistically significant (Zhang & Wu, 2017).

These results from the multiple linear regression models reveal that urban *hukou* status *per se* does not necessarily lead to any earnings advantages. Differences in earnings between those working in the state sector and those in the non-state sector are probably due to the different mechanisms of *hukou* conversion. To more accurately determine the causal effects of the urban *hukou* on earnings, as well as the impacts of different mechanisms of *hukou* conversion, we now turn to the propensity score matching analysis.

4.3. Propensity score matching analysis

Under the framework of propensity score matching analysis, we divide the urban population of rural origin into two subgroups. Those who have obtained urban *hukou* status are defined as the treatment group (regardless of how they obtained it), and those who continue to hold a rural *hukou* status are defined as the control group (i.e. rural migrant workers). More specifically, we first use the binary logistic regression model to summarize all observable differences between the treatment group and the control group in the form of propensity scores. We then stratify the propensity scores along with all observational covariates to match the two groups (Xie, Brand, & Jann, 2012). Finally, we compute the actual effect of urban *hukou* status on individual earnings based on the assumption that the two groups are comparable in all respects except for holding different *hukou* statuses. The benefit of using the propensity score matching method is that we can utilize the observational covariates to deal with selection bias problem in estimating the causal relationship (Guo & Fraser, 2009). This method has also been widely adopted in the recent social science research (e.g., Brand & Xie, 2010; Harding, 2003; Wu, 2010; Xie & Wu, 2005).

We employ the following independent variables to estimate the propensity for *hukou* conversion of each individual: years of schooling, party membership, military experience, marital status, working experience, age, gender, father's work unit sector when the respondent was aged 18, and occupation. In a recent study, Zhang and Wu (2017) revealed that the earnings disadvantages of rural migrant workers are mainly attributed to occupational segregation, rather than unequal pay within an occupation. Hence, we include occupation to predict the propensity score so as to balance the occupational distribution between the treatment and control groups. Meanwhile, father's work unit is also added to capture the effect of family background. We do this on the grounds that if one's father worked in the state sector, one may be more likely to gain access to an urban job, either by utilizing the father's urban *hukou* and social networks to achieve *hukou* conversion, or by directly inheriting urban job after the father's retirement (Bian, 1994).

Because our analytical strategy of this article is guided by the conceptually differentiation between merit-based selection and policy-based incorporation, we also estimate the propensity score separately for the two subgroups of *hukou* converters. Results in Table 5 empirically confirm our differentiation of two mechanisms of *hukou*

Table 5
Binary Logit Models Predicting *Hukou* Conversion (Propensity Score Estimation).

	All *Hukou* Converters	Policy-based Converters	Merit-based Converters
Year of schooling	0.134[***]	−0.002	0.462[***]
	(0.019)	(0.026)	(0.074)
Communist Party member	0.358[*]	0.192	0.408[*]
	(0.152)	(0.229)	(0.158)
Military experience	0.527[*]	0.058	0.708[**]
	(0.257)	(0.396)	(0.257)
Male	−0.058	−0.094	−0.007
	(0.094)	(0.131)	(0.104)
Age	0.059[***]	0.041	0.109[***]
	(0.011)	(0.012)	(0.025)
Working experience	−0.015	−0.014	−0.008
	(0.011)	(0.011)	(0.012)
Married	0.16	−0.220	0.559[**]
	(0.157)	(0.211)	(0.209)
Father working in state sector	0.652[***]	0.586[***]	0.814[***]
	(0.112)	(0.160)	(0.128)
Occupation	Yes	Yes	Yes
Constant	−3.211[***]	−1.585[***]	−7.024[***]
	(0.373)	(0.439)	(1.083)
Observations	1562	716	1356
Wald χ^2	189.36	35.35	318.93
Pseudo R^2	0.211	0.058	0.338

Notes: Standard errors are in parentheses; ***p < 0.001, **p < 0.01, *p < 0.05.

conversion. Of 1562 analytical samples pooled from the two waves of CGSS, 846 can be classified as merit-based converters and 206 can be classified as policy-based converters, in contrast to 510 rural migrants in cities who have not obtained urban *hukou* (also see Table 2). Consistent with what have been reported by Wu and Treiman (2004), years of schooling, party membership, and military experience, as well as father's work unit, are all significant predictors of the likelihood of obtaining an urban *hukou*. However, this pattern applies to merit-based converters only, who account for 80% of all *hukou* converters. Except for father's work unit,[4] other individual characteristics do not have significant effect in predicting the likelihood of *hukou* change through policy-based incorporation.

Based on the binary logit models, we predict the propensity scores and conduct the matching analysis. Since the models in Table 4 have shown the different effects of *hukou* status on earnings in the state sector and the non-state sector, we separate matching analysis for two types of *hukou* converters by employment sectors, i.e., four subgroups. More specifically, the subsample is classified into a few strata according to individuals' propensity scores for *hukou* conversion. Fig. 1 vividly demonstrates the sample distribution for all four subgroups after the matching. The X axis indicates the average propensity scores in each stratum. The treatment group tends to be centered on the higher propensity-score strata, whereas the control group is centered on the lower propensity-score strata, although this is less obvious for the groups of policy-based converters and for *hukou* converters in the non-state sector. These patterns suggest that significant differences exist between urban *hukou* converters and non-converters (rural migrants), particular for those who obtained *hukou* through merit-based selection. In this sense, previous regression models that compare these two "incomparable" groups may yield biased results.

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[4] As pointed out earlier, the role played by father's work units in *hukou* conversion play to a large extent is attributable to policy rather than individual merits. If one's father worked in the state sector, one may be more likely to gain access to an urban job, either by utilizing the father's urban *hukou* and social networks (typically known as "internal recruitment", or *neizhao* in Chinese), or by directly inheriting urban job after the father's retirement ("replacement", or *dingti* in Chinese) (Bian, 1994, p.58). One the other hand, "land expropriation" and "migrant settlement", with which we defined policy-based incorporation, may affect both father's and children's work unit sector in the same way.
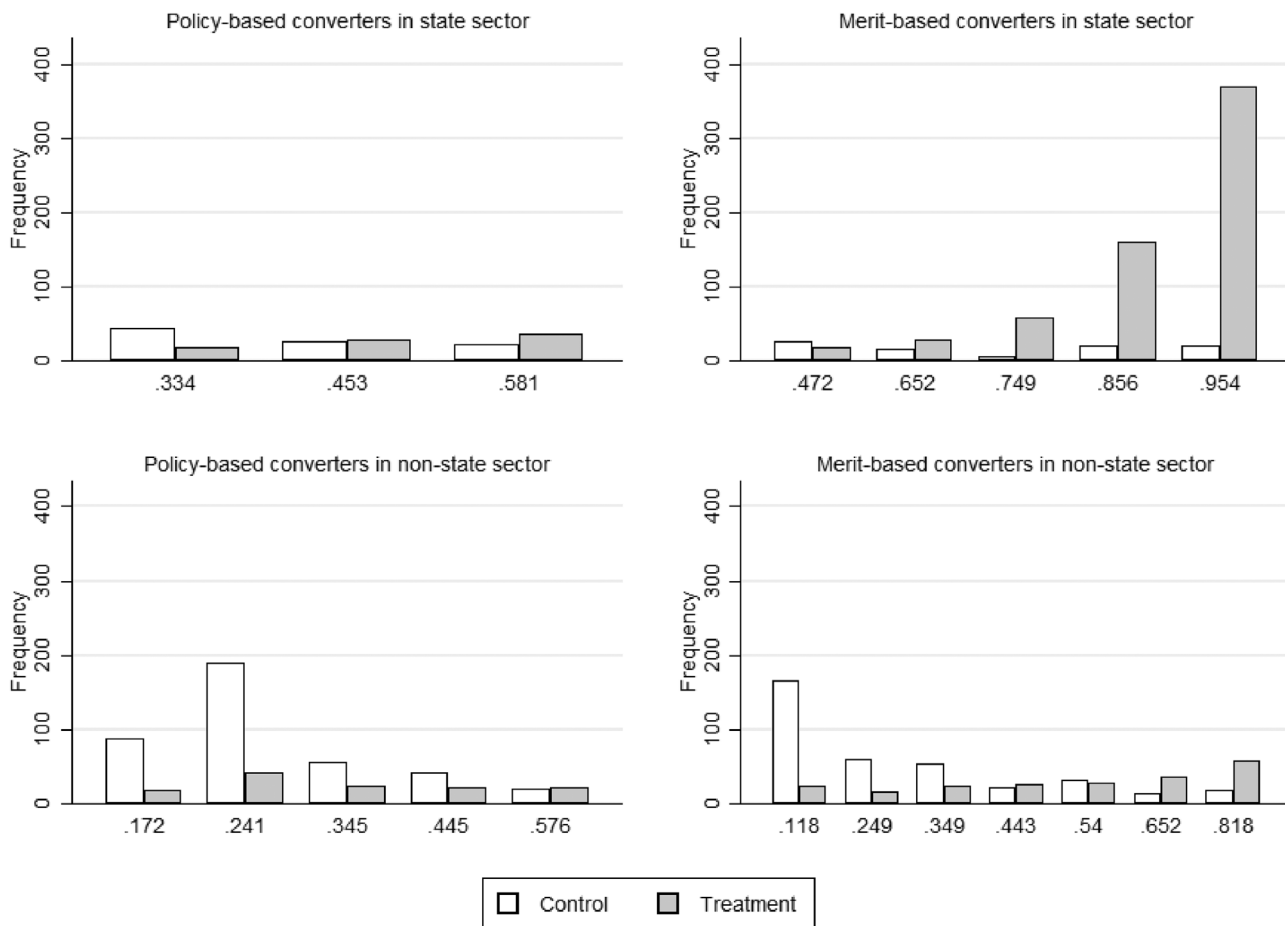
Fig. 1. Histogram of Estimated Propensity Scores in the State and Non-state Sectors.

We take annual earnings and weekly working hours to compute hourly wages as the dependent variable in the propensity score matching analysis to obtain the semiparametric and nonparametric estimators for causal effects of urban *hukou* on earnings. With this method, one can first summarize all the observable differences between the treatment and control groups along a single dimension, the

Table 6
Average Treatment Effect (on the Treated) of Urban Hukou Status on Earnings.

	Stratification Matching	Nearest Neighbor Matching	Interval Matching	Kernel Matching
Panel A: All *hukou* converters				
Full Sample	0.543	0.387	0.435	0.338
	(1.143)	(1.789)	(1.016)	(1.017)
State Sector	3.012***	2.878***	2.850***	2.992***
	(0.530)	(0.634)	(0.396)	(0.525)
Non-state Sector	0.315	0.882	−0.087	0.341
	(1.761)	(2.412)	(1.905)	(1.569)
Panel B: Merit-based *hukou* converters				
Full Sample	−0.680	0.640	0.379	−0.040
	(2.877)	(1.724)	(1.230)	(1.473)
State Sector	2.916***	2.645***	2.874***	2.844***
	(0.427)	(0.689)	(0.569)	(0.677)
Non-state Sector	0.708	2.839	0.613	1.625
	(3.650)	(2.436)	(3.919)	(2.612)
Panel C: Policy-based *hukou* converters				
Full Sample	−2.058	−1.803	−1.446	−2.091
	(1.067)	(1.585)	(0.946)	(1.199)
State Sector	1.470*	1.184*	1.541*	1.470*
	(0.675)	(0.604)	(0.645)	(0.612)
Non-state Sector	−3.177*	−3.252*	−3.383	−3.062
	(1.422)	(1.410)	(1.792)	(1.574)

Notes: dependent variable is standardized hourly wages; ***p < 0.001, **p < 0.01, *p < 0.05.

All converters:

$Y = -4.368 + 1.592*Stratum$

Merit_based converters:

$Y = -1.949 + 0.973*Stratum$

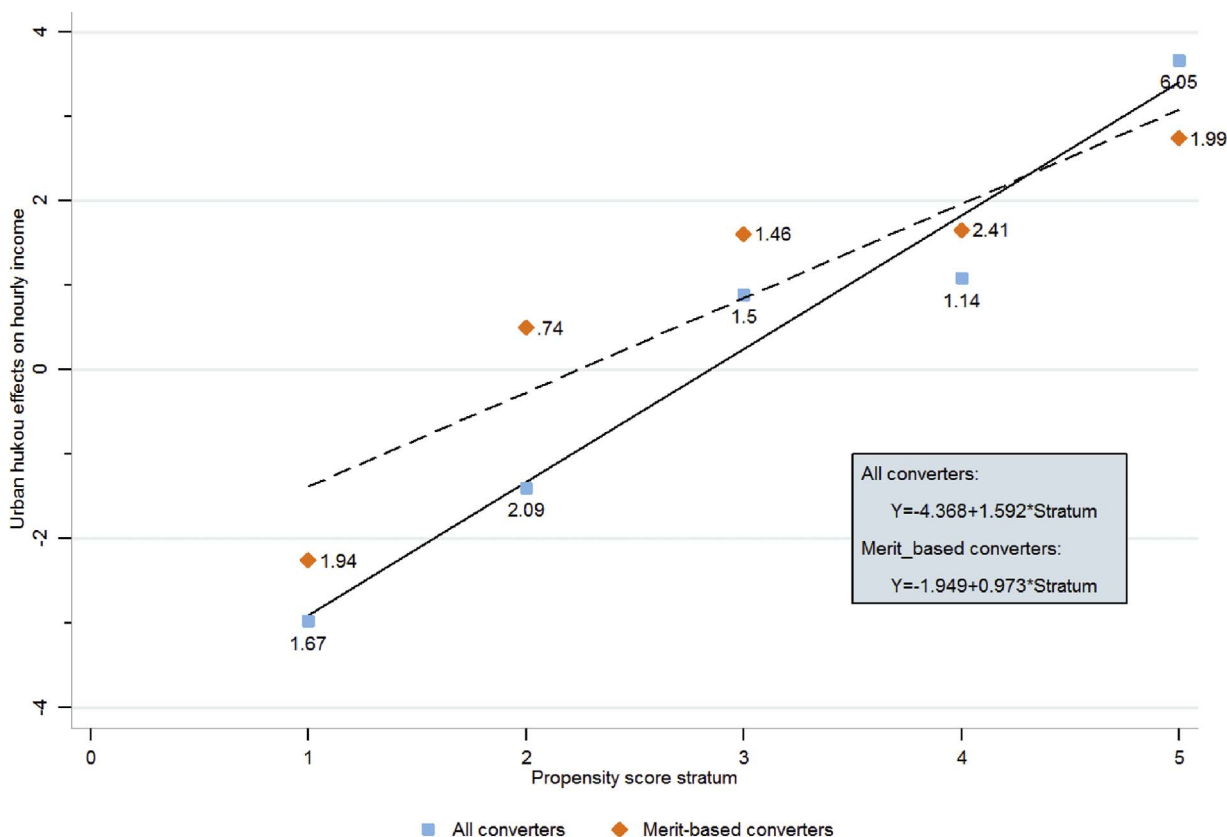■ All converters ◆ Merit-based converters

Fig. 2. Heterogeneous Treatment Effects of Urban Hukou Status on Earnings in the State Sector: All Converters and Merit-based Converters.

propensity of receiving a particular treatment, and then match the two groups with similar propensity score stratum (DiPrete & Gangl, 2004; Xie, Brand, & Jann, 2012). With the balance achieved between the treatment and control groups in both propensity scores and covariates, the mean difference between the two groups can be seen as the causal effect of conversion to urban *hukou* status within each stratum, and either the average treatment effect on the treated (ATT) or the average treatment effect (ATE) can be obtained through weighted means.[5] Table 6 reports the ATT effects estimated based on stratified propensity scores, for all converters as a whole, and for merit-based and policy-based converters separately. To check the robustness of our matching analysis, we also report results based on other methods, including nearest neighbor matching, interval matching, and kernel matching (see details in Morgan & Winship, 2007).

We perform the matching exercise for all *hukou* converters, and then separately by those in the state sector and those in the non-state sectors. Results in Panel A from different matching methods show high consistency. We find that the causal effect of urban *hukou* on earnings is only limited to those who work in the state sector: urban *hukou* converters earn between 2.850 *yuan* to 3.012 *yuan* more per hour than those who remain rural *hukou* status, but *hukou* status has no effect on the hourly wages in the non-state sector. Again, we replicate the analyses for merit-based converters and policy-based converters we have classified, and results remain the same.[6]

However, one may not simply assume homogeneous causal effects of *hukou* status across the propensity-score strata. Given the fact that the causal effect of urban *hukou* is found only in the state sector, we estimate the effect of urban *hukou* status in each propensity-score stratum within the state sector, and adopt a hierarchical linear model to show how the effect varies across different strata. In Fig. 2, squares and diamonds denote the point estimates of causal effect in each stratum for all converters and for the subsamples of merit-based converters, respectively, and the numbers denote the corresponding *t* values of the test to see if the treatment effect differs significantly from zero. The results of heterogeneous treatment effect for the subsample of policy-based converters in the state sector are not displayed here because of the limited size of the subsample size and strata we could divide.[7]

As Fig. 2 shows, the treatment effect of urban *hukou* status is only statistically significant ($t > 1.96$) within two strata of propensity scores for all converters in the state sector, as denoted by the squares. The fitted lines of the point estimates in Fig. 2 clearly indicate that the homogeneous treatment effect in the state sector does not hold (slope: 1.592; standard error: 0.267; $p < 0.001$). For the point estimation to the merit-based subsample (also divided into five strata), as denoted by the diamonds, the results are consistent and clear: the magnitude of the effect is positively correlated with the propensity score (slope: 0.973; standard error: 0.331; $p < 0.001$). These results suggest that, in the state sector, the earnings advantages associated with urban *hukou* are enjoyed only by those with higher education and political capital (referring to results in Table 5). Therefore, the causal effect of *hukou* status on earnings and the propensity for *hukou* conversion are positively

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[5] We report ATT results for both substantive and technical reasons. Substantively, the essential interest of this article is to assess the causal effect of urban *hukou* status among those who converted from rural *hukou* status; technically, only ATT estimates are available for some matching methods (e.g., kernel matching).

[6] For policy-based converters, although the urban *hukou* even has significantly negative effect in the non-state sector, the estimated effect is not consistent across different matching methods. We suspect that this is likely due to the small sample size after the matching.

[7] Only three strata can be obtained through this exercise, though results are consistent with those for all converters and for merit-based converters, the positive causal effect of urban *hukou* among people of rural origins increases with the propensity of obtaining urban *hukou* (slope:1.592; standard error: 0.267; $p < 0.001$)

correlated. In other words, people with higher propensity for *hukou* conversion tend to attain higher earnings after successfully converting their *hukou* status.

5. Conclusion and discussion

The massive rural-to-urban migration, rapid urbanization, as well as constant adjustment of the household registration system have had profound effects on social stratification in China since the 1990s. The different mechanisms underlying *hukou* conversion have led to substantial heterogeneities among *de facto* residents in Chinese cities. In our study, we conceptualize two mechanisms governing *hukou* mobility. The first one is merit-based selection, which has been practiced since the establishment of the *hukou* system. Merit-based selection allows people of rural origin to gain urban *hukou* status through limited and institutionalized channels such as attaining higher education. The other mechanism is policy-based incorporation, which collectively grants villagers urban *hukou* status as compensation for expropriating their land to cater to rapid urbanization. This mechanism is less tied to individuals' attributes and abilities.

Our findings show that the effects of the urban *hukou* on earnings differ between the two groups of *hukou* converters. Merit-based selection yields the pattern of extreme upward mobility (Wu & Treiman, 2007), and this group of *hukou* converters earn even more than urban natives. In contrast, policy-based incorporation rarely brings earnings advantages to the *hukou* converters. Hence, only *hukou* mobility achieved through merit-based selection has positive impacts on earnings. The propensity score matching analysis further confirms that the causal effect of urban *hukou* status applies only to those with very high propensity for *hukou* mobility within the state sector. The higher the propensity, the higher the rewards of *hukou* conversion.

Hence, the effects of urban *hukou* status are clearly contingent upon the selectivity in *hukou* mobility. The importance of the selectivity effect has largely been neglected in previous studies, in which scholars have simply compared the mean earnings difference among groups holding different *hukou* statuses, and interpreted the earnings gap simply as the result of their rural *hukou* status. To investigate the causal effect of (urban) *hukou* status on earnings, we believe that it is important to ask a different set of questions: given the same rural origin, why are some people able to overcome institutional barriers and achieve *hukou* conversion, whereas others are not? how do people differ in the mechanisms of *hukou* mobility and what are the consequences associated with the different mechanisms? Hence, the effects of *hukou* status on stratification reflect a typical endogenous issue. Without attending to the process of how individuals are sorted into different social groups/positions, it would be misleading to attribute the observed group difference simply to group membership.

In this regard, researchers should delimit their theories to what he/she refers to as allocation processes, through which individuals are assigned or sorted into positions by a series of micro-level decisions. "Without benefit of more micro analyses, such macro theories are likely to require so many untested assumptions, and to ignore such huge data gaps, our intellectual and ideological biases are likely to predominate, resulting in unanswerable theoretical disputes that merely hamper the process of arriving at a cumulative body of knowledge" (Blalock, 1991, p27). The relaxation of the household registration system has made the attainment of an urban *hukou* much easier and reduced the selectivity in *hukou* mobility. As a result, the urban *hukou* status has lost some of its face value. In fact, the theoretical relationship between the selective process and stratification outcomes applies not only to the Chinese household registration system, but also other aspects of social inequality. For instance, the declining returns to college education since the late 1990s may be associated with less selectivity in access to tertiary education in China (e.g. Ye, 2012).

Another finding of this study is that the effect of urban *hukou* status on earnings is limited only to those working in the state sector, but not those working in the non-state sector where skills and productivity are

more valued, revealing how the *hukou* system has evolved under rapid urbanization and marketization in China. *Hukou*, as an institution closely tied to the socialist redistributive system, to a large extent, has gradually lost its premium as the market reform proceeds and the selection mechanism changes over time (Zhang & Wu, 2017).

Previous literature has typically compared rural migrant workers with urban natives and largely attributed the earnings disadvantages of the former to their lack of urban *hukou* status and the associated discrimination against them. The policy implications is that, if the *hukou* system were to be scrapped and all migrants were to be granted urban status and access to welfare benefits, the disparities would be eliminated. Our research contributes to the sociological literature by focusing on those of rural origins living in cities, including those who have gained urban status through different channels, and those who have not, and adopting a counterfactual framework to understand the role of *hukou* in social stratification in contemporary urban China. We show that the payoff of the urban *hukou* varies with selectivity, diminishing as the propensity of getting urban *hukou* status declines. In this regard, the State Council of China issued a policy notice calling for proactive and stable reform of China's *hukou* system (Hu, 2012), stating that all new employment, education and skills training policies must not be linked to the *hukou*, and migrants in county-level cities could apply for local *hukou*. While such initiatives may remove structural barriers and help rural residents/migrants gain equal access to a variety of opportunities and benefit entitlements in cities, granting them urban *hukou* status would not solve all of the problems overnight and the gap between rural-to-urban *hukou* converters and people of urban origin would likely be lingering for a quite long period of time.

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