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Social Identity and Inequality: The Impact of China's *Hukou* System*

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*We thank Albert Park for helpful discussion and Karla Hoff for sharing her insights and experiment materials. We are grateful to conference participants at the UT-Dallas behavioral/experimental reading group, the International ESA meetings (Caltech, 2008), and the Chinese Economist Society annual meeting (Nanning, China, 2009) for helpful comments. Li gratefully acknowledges the financial support from the National Science Foundation through grant no. SES 0720936. Any remaining errors are our own.

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ABSTRACT

We conduct an experimental study to investigate the causal impact of migrant or *hukou* identity on individuals' response to economic incentives in China. We examine the role that this internalized social identity may play in the widening economic disparity in urban areas. Our results indicate that making individuals' *hukou* status salient and public reduces the performance of rural migrant children on assigned tasks by more than 9 percent. *Hukou* status shifts the income ranking of rural migrants towards the low end of the income distribution – the proportion of rural migrants with earnings below the 25th percentile increases significantly from 11.9 percent to 30.3 percent. This suggests that *hukou* identity imposed and shaped by the existing institution may distort individuals' *intrinsic* response to incentives. This distortion may serve as an avenue through which the *hukou* system aggravates rising economic inequality in urban China even in the absence of any discrimination.

Keywords: social identity, *hukou*, inequality, field experiment, China
JEL Classification: C93, D03, O15

1 Introduction

A large body of literature documents significant and increasing income inequities in the fastest growing economies of the world - China and India (Deaton and Dreze, 2002; Datt and Ravallion, 2002). In China, income inequality has risen significantly since economic reforms were initiated in 1978 (Ravallion and Chen, 2007; Yao, Zhang and Hanmer, 2004; Chen, 2002; Kanbur and Zhang, 1999). While the contribution of rural-urban inequality to overall income inequality was about 70 percent over 1983-1995, the contribution of intra-urban inequality has increased by 96 percent over the same period (Kanbur and Zhang, 1999).[1] Behind these inequality statistics lie rapid urbanization (Ravallion and Chen, 2007) and the accompanying migration of people from rural to urban areas – the largest in world history. According to the 5th Population Census conducted in 2000, about 144.39 million rural residents, or 11.6 percent of the total population of China, migrated into cities and towns in that year (National Bureau of Statistics of China, 2002). China's unique *hukou* or household registration system, however, does not grant migrants urban citizenship.[2] This 'floating' population, a majority of who are unskilled rural laborers (Kanbur and Zhang, 1999), is treated as an "outsider" with limited access to economic resources and opportunities (Liu, 2005).

In this paper we study the issue of intra-urban economic inequities in the rapidly developing country of China from a hitherto unexplored perspective. We analyze whether migrant status in urban China, through decades of differential treatment of rural-urban residents based on the institution of the *hukou*, may have been *internalized* by individuals through a

[1] In 1978, the annual per capita disposable income of the urban residents was 2.6 times that of the rural residents. This ratio increased to 2.9 in 2001. Over the same time period, the urban-rural ratio of per capita consumption increased from 2.9 to 3.5 (National Bureau of Statistics of China, 1994-2003).

[2] Established during 1950s, the *hukou* system categorizes the population into rural (agricultural) *hukou* holders and urban (non-agricultural) *hukou* holders. The registration record is issued at the family level and serves as the official certification of legal residency in a specified geographic area (Cheng and Seldon, 1994).

manifestation of their social identity. This *internalized* identity may influence their response to incentives in the market economy and hence affect their economic decisions and outcomes. If so, the *intrinsically* distorted response to incentives could serve as an important, yet unexplored, avenue through which the *hukou* system may contribute to rising socio-economic inequality within urban China. Specifically, we ask whether an individual's *hukou* identity has a *causal* impact on her response to incentives. If yes, how does the response to incentives affect individuals' performance on assigned tasks and thereby the distribution of earnings among these different socio-economic groups?

Currently there exists little evidence on the causal effect of *hukou* status on economic behavior and income distribution in urban China. Research suggests that on average those with a rural *hukou* are socio-economically worse-off than those with an urban *hukou* in China. However, secondary sources of data based either on surveys or direct field observations to test whether the differences in the economic outcomes are due to *hukou* status make it difficult to establish *causality* between *hukou* status and perceptions of self, expectations regarding discrimination and economic behavior. Moreover, existing research does not provide a complete picture of the extent of urban inequality in China, primarily due to paucity of data. The presence of the household registration system implies that only permanent or registered urban households are included in official survey data, thereby underestimating urban income inequality (Ravallion and Chen, 2007). The literature almost entirely focuses on restricted labor mobility and discrimination in the allocation of economic resources in the *hukou* system as an explanation for rural-urban and intra-urban economic inequities (Liu, 2005; Lu and Song, 2006; Whalley and Zhang**,** 2007).[3]

[3] The *hukou* system is considered as one of the contributing factors to the ever-increasing rural-urban income disparity (Chen, 1996; Hare and West, 1999; Jalan and Ravallion, 1998; Kanbur and Zhang, 1999). Liu (2005) uses

The importance of incorporating social identity, defined as a person's sense of self derived from perceived membership in social groups, into economics analyses is being increasingly stressed in economics (Akerlof and Kranton 2000). An expanding theoretical (Smith, 2005; Shayo, 2005; Fang and Loury, 2005; Benabou and Tirole, 2006; Horst, Kirman and Teschl, 2006) and experimental literature suggests that making identity salient has important effects on individual preferences and economic behavior (Ball *et al.*, 2001; Benjamin, Choi and Strickland, 2008). However, the impact of social identity on economic outcomes in developing countries is understudied. An exception is an experimental study in rural India by Hoff and Pandey (2006). They find that social identity – a product of history and culture – shapes one's belief system and has a pronounced impact on behavior in response to economic incentives through its effect on expectations. They show that making caste salient to middle school children lowers the performance of low-caste participants relative to high-castes even when rewards for performance depend solely on individual effort. Thus social identity may have important implications for the distribution of gains from economic growth in developing countries.

In this study we design a framed field experiment (Harrison and List, 2004) to explore the effect of *hukou* identity.[4] To introduce an exogenous variation in identity salience we adopt a methodology from psychology called priming (Bargh 2006).[5] Specifically, our experiment

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a national representative sample from the Chinese Household Income Project 1995 and finds that compared to urban residents those who obtained urban *hukou* later in their lives have significantly lower educational attainment and healthcare benefits. The study argues that the root cause of the adverse effects of the rural *hukou* status is that the system restricts rural residents' access to quality education and urban employment, which lowers the return to their human capital investment. Lu and Song (2006) conduct an individual-level survey to find that local urban workers in Tianjin earn substantially higher hourly wage than those who do not have local urban *hukou*. Whalley and Zhang (2007) use numerical simulation methods and suggest that removing the *hukou* barriers to domestic labor mobility will significantly reduce inequality and increase economic efficiency gains.

[4] It is categorized as a 'framed field experiment' according to Harrison and List (2004) since participants come from a nonstandard subject pool, and their experience with the institution (i.e., *hukou* system) is generated in the field and not the lab.

[5] The priming technique has been widely used in social psychology since Higgins, Rholes, and Jones (1977). Studies show that subtle activation of different social identities, e.g., gender, race, or age, can affect outcomes such as test

randomly assigns primary school students in Beijing, with different *hukou* backgrounds, to a treatment and control condition. In the treatment condition we prime student's *hukou* identity and make it salient through a pre-experiment questionnaire followed by a public verification of students' *hukou* status (Shih, Pittinsky and Ambady, 1999; Hoff and Pandey, 2006). In the control condition individual's *hukou* identity is kept private. We then compare participants' performance in incentivized tasks, solving mazes, between the treatment and the control in order to answer the questions on the effects of *hukou* identity on economic inequality.[6]

Our results suggest that making *hukou* identity salient affects the economic performance of lower rank *hukou* holders, especially the rural migrants to large cities. Making individuals' *hukou* status salient and public reduces the effort of rural migrant children. They solve 0.69 fewer mazes in the treatment group compared to the control group. This implies an average reduction of 9 percent in the effort of a rural migrant. The performance of individuals with a Beijing *hukou* holder or a non-migrant improves, but insignificantly, when *hukou* status is made public.

To explore the impact of *hukou* identity on overall economic efficiency we calculate the difference between the average performance in the treatment and control sessions. We find this difference to be insignificant suggesting that overall productivity is not affected by the *hukou* system. However, this finding combined with the reduced effort of rural migrants in the treatment group, indicates a shift in the earnings distribution in favor of Beijing *hukou* holders.

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performance (Aronson, Quinn and Spencer 1998, Steele 1997), walking speed (Bargh, Chen and Burrows 1996), or perceptions (Bargh and Pietromonaco 1982).

[6] An individuals' *hukou* status is inherited at birth and can thus be treated as mostly exogenous to an individual. However, unlike the caste system in India, there are some channels through which *hukou* conversions are possible (Chan and Zhang, 1999) including by marriage. Nevertheless, *nongzhuanfei* or converting one's hukou status from agricultural to non-agricultural, is a daunting task (Chan and Zhang, 1999). Prospective buyers have to meet stringent health, investment, employment and housing conditions to qualify (Chan and Zhang, 1999) for an urban *hukou*. Between 1990 and 1994, local governments sold about 3 million urban *hukou* at an average price of ¥8,300 (Chan and Zhang 1999). The annual rural per capita income during the same period was between ¥686 to ¥813 in 1990 prices (National Bureau of Statistics, various issues). The *hukou* price increases with the administrative status of a city. For instance, in Shanghai the fee ranged from ¥20,000 to ¥40,000 in 1994.

We find that when *hukou* identity is primed the proportion of Beijing *hukou* holders with earnings below the 25th percentile drops from 22.2 percent to 17.2 percent, and those with earnings above the 75th percentile increases by almost 8 percentage points. The effect of *hukou* is opposite for rural migrants. It shifts their rankings towards the low end of the income distribution – the proportion of rural migrants below the 25th percentile increases significantly from 11.9 percent to 30.3 percent. We conclude that the *hukou* system distorts individuals' response to incentives and may have a causal impact on widening the income gap between migrants and non-migrants in urban China even in the absence of any discrimination against the former group.

Theoretical literature suggests that high levels of inequality may have adverse implications for economic growth (Persson, 1994; Alessina and Rodrik, 1994). Further, empirical research shows that higher inequality lowers poverty reduction at any given positive rate of growth (Ravallion, 1997). Thus our results here underline the importance of designing redistributive policies to ensure that economic growth is inclusive and sustainable in developing countries. This may hold particular significance for economies in which deep socio-economic divides exist, such as China and India.

The remaining sections of the paper are organized as follows. Section 2 provides a brief background on the *hukou* system in China. Section 3 describes the experimental design and the data. The results of the analysis are presented in Section 4. Section 5 concludes.

2 The *Hukou* System and Social Identity in China

A 1950s to 1970s

The household registration or the *hukou* system was established in China in 1951 following the success of the communist revolution in 1949 (see Cheng and Selden, 1994 for a review). But it

was not until 1960 that the *hukou* institution came to be understood as it is to this day. The classification of *hukou* registration was dual in nature (Chan and Zhang, 1999). Citizens were classified according to a specific place of regular residence (*hukou suozaidi*) which was either urban or rural and the type of *hukou* (*hukou leibie*) which was either agricultural or non-agricultural *hukou*. This institution played an indispensable role in implementing the government's post-civil war economic strategies that prioritized industrialization by regulating citizens' geographic mobility (Chan and Zhang, 1999). First, urban employment was primarily determined by the prospective employees' *hukou* status which favored urban residents (Chan and Zhang, 1999). Second, state-subsidized food and other necessities were distributed preferentially to urban residents through a national rationing system from 1955 to 1993. Urban *hukou* holders were eligible for the ration stamps that guaranteed low price products but not rural *hukou* holders (Liu, 2005). Third, urban residents (particularly employees of the state-owned enterprises) were granted various fringe benefits including subsidized housing, health services and education. In contrast, such benefits to rural residents were provided by their communes or villages, which were usually of inferior quality and whose availability and reliability varied widely (Lin, Cai and Li 1995; Cheng and Selden, 1994). By controlling *nongzhuanfei* or rural-urban migration, involving both a geographic change in place of residence and a conversion in entitlements or *hukou leibie*, rural-urban migration was restricted. This ensured that the population in urban areas was mostly homogeneous in terms of its *hukou*.

Since *hukou* passed down to the next generation, *hukou* status and thereby educational attainment and eventually employment opportunities of the next generation of rural populace was restricted by birth.[7] Thus the institution divided the population into two social groups: a non-

[7] Before 1998, the children of rural-urban couples had to follow the mothers' *hukou* status (Chan and Zhang, 1999). They are now allowed to inherit either the father's or the mother's. The policy change alleviated one important

agricultural population which was socio-economically superior to the agricultural population (Chan and Zhang, 1999).

B 1980s to 1990s

Following China's transition from a centralized to a market economy during the late 1970s, the *hukou* system gradually lost its control over spatial migration and rationing of necessities (Chan and Zhang, 1999). The number of people migrating in search of jobs surged following market reforms (and abolition of communes) and an easing of government regulations on spatial migration. As a result, the past two decades have witnessed a drastic increase in the number of 'temporary' non-*hukou* residents (either registered or non-registered) in urban centers. These migrants or temporary residents are not entitled to urban benefits unless they convert to a full urban *hukou* status.[8] However, the *nongzhuanfei* process, with some changes, continues to be the core of any permanent alteration in *hukou* status. Thus *hukou* status is permanent for most of the population because rural-to-urban conversions are granted through very limited channels including direct purchase of an urban *hukou* as local governments seek additional revenue sources following China's fiscal decentralization in the 1980s (Lin and Liu, 2000).[9]

C Recent Reforms

In 1997, the State Council approved a pilot social experiment in small cities and townships of limited geographic areas where urban *hukou* was granted to local agricultural residents subject to

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barrier in *hukou* conversion for younger generations since traditional rural-urban marriages generally happen between urban men and rural women.

[8] Temporary Residence Certificates (TRC) are usually valid for one year and are renewable (Chan and Zhang, 1999)

[9] Chan and Zhang (1999) list the channels for converting one's hukou: recruitment by state-owned enterprises, promotion to a senior administrative position, enrollment in higher education institutions, demobilization from military services and land requisition by the state. All are controlled by the state's labor laws and have fixed quotas. Besides the fact that quotas can be very small, it is also possible that only one family member recruited by the state is permitted to move to the urban locale and thereby separated from her (his) family for long periods. Beginning 1992 urban *hukou* are now sold for high fees and in sought-after cities (such as Shanghai and Beijing) eligibility is limited to investors, property buyers and professionals.

job and residence requirements. The pilot reform was implemented in 450 towns and small cities before the State Council approved an expansion to more townships and small cities in 2001 (Yu 2002). In contrast, the reforms in large and middle cities varied dramatically. In cities including Nanjing, Xi'an, and Zhuhai, the requirements for granting city *hukou* to local agricultural *hukou* holders have been relaxed (Cai 2002). In February 2009, the government of Shanghai issued guidelines for granting local city *hukou* to migrants who met strict job, residential and legal requirements.[10] Little has been changed, however, in other main metropolitan areas such as Beijing and Guangzhou where local *hukou* remains to be the main hurdle for employment opportunities.

Despite the recent reforms the distinction of *hukou* location continues to exist. There continue to be substantive differences in benefits of public services (education, health, employment and social welfare) and opportunities of urban life between people with and without a local *hukou*. The social hierarchy, shaped by the institution of *hukou* and made conspicuous by vast migrant populations in fast-growing cities, has affected people's daily life so ubiquitously that social disparities resulting from the *hukou* system have been exported to urban areas and constitutes an important aspect of one's social identity in urban China.

The Hukou System and Schooling in Urban China

For the purpose of this study it is essential to understand the impact of the *hukou* institution on educational opportunities since our experimental study utilizes public school students with different *hukou* backgrounds. Children are entitled to subsidized public education only in the area of their legal permanent residency. Even after the reforms in many cities non-local *hukou* holders cannot enroll their children in local schools unless the schools have quotas for "guest"

[10] http://www.gov.cn/gzdt/2009-06/17/content_1342934.htm.

students who pay a higher tuition which can be a significant proportion of migrants' incomes (Xinhua News Agency, July, 2002).[11] Private schools for migrant children are usually opposed by local authorities, or stringent physical and financial requirements are imposed on them to obtain a legal status. In several urban areas private migrant schools are, therefore, considered illegal.

There are four categories of students to be found in public schools admitting non-local *hukou* students. Due to the *hukou* classification system urban areas contain both non-agricultural and agricultural *hukou* population (Chan and Zhang, 1999). Thus the population in large cities such as Beijing and Shanghai (also called municipalities and equivalent to a province) usually consist of four different *hukou* categories: local urban, non-local urban, local rural, and non-local rural *hukou* holders. Although the latter three are usually socio-economically disadvantaged relative to the local urban *hukou* holders, all three categories fare differently amongst themselves. Non-local rural *hukou* holders are migrants from rural areas of other provinces outside the municipality. Since they are likely to be less educated, take on less decent jobs, and live in poorer conditions compared to their urban counterparts, they are generally considered as the bottom of the social hierarchy within the municipality. Local rural *hukou* holders are residents of the rural areas of the municipality. Non-local urban migrants, i.e., permanent urban residents from economically less-developed cities, are on average relatively more educated than their rural

[11] "Migrant workers have to pay extra fees if they want to have their children educated in public schools. If they cannot afford them, their children either have to go to schools run by other migrants, or simply get no schooling at all. According to statistics from Beijing educational authorities, there are now 123 schools set up by migrants accommodating over 17, 000 children in the capital city. These schools teach between 20 and 3,000 students each and charge about ¥300 (US$36.1) each term. When migrant children go to public schools, their parents have to pay ¥500 (60.2 US dollars) in *tuition fees* each term, plus ¥1,000 (120.5 US dollars) for *selection of the school* and ¥1,000 to ¥30,000 (3614.5 US dollars) as *sponsorship*…….*Migrant schools are cheap and affordable for migrant workers. And children here don't suffer from the discrimination they face in public schools, because they have similar family backgrounds*….. Beijing's educational authorities (have) decided to cut charges for teaching migrant children in public schools in the upcoming school year. Fees for primary school will be reduced to ¥200 (24.1 U.S. dollars) from the previous ¥500, and for secondary school to ¥500, a 50 percent drop from the previous charge." (http://www.10thnpc.org.cn/english/China/36594.htm) Migrant laborers in Chinese cities earn an average of ¥966 per month in 2006 according to a National Bureau of Statistics Survey Report (http://english.peopledaily.com.cn/200610/22/eng20061022_314208.html)

counterparts, more likely to have white-collar jobs and be better paid. But the comparison of socio-economic status between local rural and non-local urban is not clear. Due to this ambiguity and the constraints we faced in subject recruiting, we exclude the local rural *hukou* holders from this study, and focus on the other three groups. Since our experiment was conducted in Beijing, we consider specifically Beijing urban (hereafter **H**igh), non-Beijing urban (hereafter **M**iddle) and non-Beijing rural (hereafter **L**ow) *hukou* holders.

3 Experimental Design and Data

A Experimental Design

Our experiment adopts the design of Hoff and Pandey (2006). On one dimension we manipulate *hukou* salience. Subjects' *hukou* status is made salient and public in the treatment, and is kept private in the control. On the other dimension, we change the payment regime, and use piece rate and mixed tournament in different treatments. We elaborate on the experimental design in detail below, starting with discussion on subject selection which is one crucial part of the design.

Selection of subjects Participants in our experiment were 8-12 year old students recruited from three to six graders at four elementary public schools in Beijing. These schools suited the requirements of our experiment on several aspects. First, the schools admitted non-Beijing *hukou* students. Second, the proportion of students belonging to migrant families was comparable to the migrant population of the Beijing metropolitan area.[12] Third, these schools were situated in districts of Beijing whose per capita GDP was comparable to that of the average for the Beijing municipal area.

Our study involves three *hukou* types: Beijing urban (H), non-Beijing urban (M) and non-

[12] Migrants who resided in Beijing for more than 6 months constituted 23 percent of Beijing's total population in 2005 (Beijing Municipal Bureau of Statistics, 2005).

Beijing rural (L).[13] Records on individual students' *hukou* status were kept by the registrar's office of the schools through two independent filing systems – student registration cards filled in manually by parents, and the schools' official roster in their computing system. Student registration records, generally self-reported by parents, are subject to the problem of missing information. In comparison the schools' official rosters contain complete information on students' *hukou* and are more accurate since this system is used to track students' payments of tuition and the miscellaneous fees which are charged based on the student's *hukou* status.[14] When students are enrolled the evidence of *hukou* status needs to be presented by parents to justify the payment amount of the miscellaneous fees.

The study focuses on primary school students rather than adults for several reasons. First, the validity of the assumption of *exogenous hukou* declines with age since the possibility of changing from rural to urban *hukou* increases with one's level of education. Thus, focusing on young individuals allows us to avoid using selective samples of people whose decision to migrate to urban areas may be systematically linked with their abilities and intrinsic preferences. Second, an ideal subject pool for our experiment is those whose *hukou* status cannot be differentiated *a prior* from observable characteristics. Using adult subjects can potentially confound our results because observable characteristics –accent and clothing –usually provide cue to where the subjects originate from and give away their *hukou* status even in the absence of the *hukou* identity prime. [15] Compared to adults, young children generally pick up local accent

[13] We decided to exclude the category rural Beijing students since the schools had a limited number of such students.
[14] Specifically, the miscellaneous fee in the Spring 2007 semester was ¥80 for the local urban students, compared to ¥40 for non-local rural students and ¥200 for non-local urban students. The schools may have been charging other fees, although they may not be legal.
[15] Although China is an ethnically homogeneous country (Han Chinese comprise 95 percent of the population) people from different geographic areas have their own local dialects and speak mandarin with dramatically different accents. One can usually tell whether an individual is originally from the northern or southern part of the country from her/his accent.

relatively easily making it difficult to infer from their speech their *hukou* type.[16] Third, using students rather than adult subjects ensured that the monetary compensation provided sufficient incentive for subjects. On average subject payments are ten times the weekly allowance that they receive from their parents. Finally, a growing number of experimental economics studies show that any difference between the behavior of children and adults is insignificant when it comes to rational choice behavior, altruism, and strategic behavior (Harbaugh et al., 2001; Harbaugh and Krause, 2000). Although our sample was young, almost all participants in the experiment understood what their *hukou* status was.

We recruited subjects from among 3-6 graders at three schools and among 3-5 graders in one.[17] Each session of our experiment consisted of six subjects of the same gender with three from each of two different *hukou* groups. To ensure that the effect of identity comes purely from the identity prime in the laboratory we took pains in subject selection to minimize the probability that they knew each other *a priori*. We obtained the student roster from the schools and stratified the sample by gender, grades, class sections, and *hukou* types. Then the three students of the same *hukou* type were randomly selected, each from a different grade.[18] The two students from the same grade (with different *hukou* types) were randomly selected, each from a different class

[16] Adult rural migrants usually dress differently than urban migrants and Beijing locals probably because they are on average poorer. In our experiment students are required to wear school uniforms at some schools while at others, where uniforms are not required, migrant students are indistinguishable from their local counterparts by what they wear.

[17] We were unable to obtain school permission to recruit from the 6th graders at the fourth school since these students were preparing for the middle school entrance exams that were coming up in a few weeks.

[18] At the school where only 3-5 graders were recruited, each of the three H students came from a different grade, and so did the three L students. In other words, one H student and one L student were coming from the same grade. We followed a similar method at the other three schools where 3-6 graders were recruited. To further reduce the probability of prior acquaintance, we made sure that an H student and an L student came from two different grades. For example, if H students were recruited from grades 3, 5, and 6, L students were then selected from grades 3, 4, and 6. For all cases, if two students were recruited from the same grade (hence by design had different *hukou* types) they came from different class sections. The average number of class sections at these grades is 3.3. The class size varies from 24 to 68 students per class, with median 36 and mean 35.8.

section.[19] The treatment and control sessions were formed in the same way. This substantially alleviated the concerns over any pre-existing confounds since schools' social events generally take place within a class section and less often within a grade. Overall, 29 percent of 3-6 graders of these schools participated in our experiment. According to the post-experiment survey the average number of others in a session that a subject knew by name prior to the experiment was 1.7.[20]

The 'migrant' students in our experiment have lived in Beijing for an average of six years, more than 60 percent of their current lifetime. They speak with perfect local accent, and behave and dress in ways that are indistinguishable from their local counterparts. Eighteen percent of them were actually born in Beijing. A nontrivial fraction of these students consider themselves as Beijing locals, or believe to be considered as locals by their teachers/fellow students. It is reasonable to believe, therefore, that these students in our sample should be relatively *less* sensitive to the *hukou* status compared to their counterparts who recently migrated to Beijing and who have not yet had enough time to adapt, may be more frequently exposed to estrangement and discrimination by the local community, and are constantly reminded of their lower status as an outsider in the municipality.

Identity manipulation The treatment and control conditions differ only in the use of identity manipulation. In the identity treatment we made *hukou* identity salient by using a survey *and* publicly verifying subjects' *hukou* status in public at the beginning of the experiment, while in the control subjects' *hukou* identity was kept private. In the pre-experiment survey used in the treatment, subjects were asked where they were born, whether they spoke Beijing dialect at home, whether they (or their classmates or teachers) considered them as a Beijing local, and

[19] We also conducted a few sessions with the uniform *hukou* type in each of the schools. In this case, the six participants were selected from 6 different class sections, 2 from each of the three different grades.
[20] The average number of others a student knew in her session is 1.4 in Hoff and Pandey (2006).

whether they paid the miscellaneous fees that were charged to non-local guest students at the beginning of the semester. They were also asked to compare Beijing local students with guest students on academic performance, class participation, extracurricular activities and achievement, and daily spending. After the survey was conducted the experimenter verified in public with every student their names and their month and date of birth as well as their *hukou* background.[21] In the control condition, the sessions started with neither the survey nor the public verification of individual *hukou* status and proceeded directly to the experimenter illustration of the mazes.

Incentivized task The experiment was conducted in a standard classroom setting with six subjects seated at separate desks with a fairly large distance from one another. Before the experiment started participants were greeted by a female experimenter and each paid ¥3 participation fee upon arrival.[22] The experimenter then explained the tasks and rules. We followed Niederle *et al* (2007) and Hoff and Pandey (2006) by adopting the maze from Yahoo! games.[23] A sample maze with the solution is included in Appendix A. The task was to find a path through the field from one side to the other without crossing the walls (solid lines in the figure). The experimenter explained the rules using a simple maze, and showed how to solve another one of similar difficulty level as those that subjects were about to play in the games. Both mazes were posted in front of the classroom during the illustration. Then subjects were given five

[21] Experimenter said in public, "According to the information from the school's registrar office, your *hukou* belongs to [province/city] and it is a(n) [agricultural/non-agricultural] *hukou.*" When verifying the information on date of birth, we did not reveal their year of birth to the public to avoid distorting their self-confidence due to the mixture of kids of different age.

[22] An ID number was randomly assigned to each subject before they entered the classroom. The numbers determined where they sat. The ¥3 participation fee was enclosed in an envelope on each desk. Subjects were told that the money was theirs to keep upon arrival before the experiment started. Receiving compensation by participating in research projects was new in the Chinese culture, and was something these students had never experienced before. We paid them an up-front participation fee to gain their trust in the incentivized scheme.

[23] The mazes can be found at http://games.yahoo.com/games/maze.html. The difficulty level varies from 1 (easy) to 5 (hard). The mazes we used were level 2.

minutes to practice with an additional maze while the experimenter assisted based on individual needs. After the practice round subjects participated in two 15-minute blocks of experiment. In each block, they were given a booklet of 15 mazes, and had up to 15 minutes to solve as many as possible. All the thirty mazes were of identical difficulty level. The two-block structure of the design allows us to analyze efficiency in learning, i.e., how their performance improves over time. It also allows us to compare the effects on performance of the homogeneous versus heterogeneous reward regimes.

The homogeneous reward system (hereafter the Piece Rate regime) used piece rate compensation in both blocks – subjects were rewarded with ¥1 for each maze solved correctly. The heterogeneous reward system (hereafter the Mixed Tournament regime) consists of piece rate in the first block (¥1 per maze), and tournament in the second block in which only the winner was rewarded with ¥6 per maze and other subjects received zero.[24] The winner was the one who solved the most number of mazes in the session. In the case of a tie, each of those subjects who solved the highest number of mazes was rewarded with ¥6 per maze.

Subjects were told that the task consisted of two blocks. But the detailed instructions for the second block, including the payment scheme, were not given until they completed block one. Therefore, the payment structure is identical in block one of the Piece Rate regime and block two of the Mixed Tournament regime. After the maze solving tasks, a survey was conducted to collect demographic information. Subjects were then informed about their performance (and results of the tournament if applicable), paid individually in private, and dismissed.

[24] We use the Mixed Tournament regime, rather than tournament in both blocks, to alleviate the problem of earning inequality in the experiment.

B Data

The experiment was conducted in four public schools located in suburban Beijing in May and December 2007, and December 2008. At each school the experiment included four conditions including the Piece Rate regime with or without identity manipulation (i.e., publicly verifying *hukou*), and the Mixed Tournament regime with or without identity manipulation. Table 1 summarizes the features of experimental sessions. We conducted sessions separately for boys and girls to control for any potential gender differences (Niederle et. al., 2007). Most sessions contained a mixture of two *hukou* groups (H vs. L, or H vs. M) with half of the subjects from each of the groups. Some sessions consisted of a homogeneous *hukou* type (H, M, or L) with all the six subjects being the same *hukou* type. In total we conducted 93 sessions, including 60 male sessions and 24 female sessions with mixed *hukou* types, and 7 male sessions and 2 female sessions with a pure *hukou* type. The total number of subjects was 541 that accounts for 29 percent of the eligible population in the schools. Each treatment session lasted approximately one hour whereas each control session lasted about forty five minutes.[25]

We first report summary statistics and then investigate the effects of the *hukou* identity prime on subjects' performance in the maze solving task in the next section. Since both blocks in the Piece Rate regime and the first block in the Mixed Tournament regime use piece rate payment method we refer them as the *piece rate blocks*. Since the second block in the Mixed Tournament regime uses tournament payment method we refer it as the *tournament block*. We focus on the mixed *hukou* sessions since subjects' performance in these sessions is similar to that in the pure *hukou* sessions. We use a 10-percent statistical significance level as the threshold

[25] Average earnings per subject were ¥17.5 for the Piece Rate regime and ¥22.1 for the Mixed Tournament regime. The average exchange rate between U.S. dollar and Chinese RMB while the sessions were conducted was about $1 = ¥7. The instructions are adopted from Hoff and Pandey (2006) and slightly revised. The English translation of the experimental instruction and surveys are included in Appendix B – D.

(unless stated otherwise) to establish the significance of an effect.

The summary statistics presented in Table 2 show no statistical difference in the demographics and other related variables between the treatment and control conditions, indicating randomization of our sample across these experimental conditions. Two thirds of subjects were male. Subjects' average age was 10 at the time of the experiment. About 50 percent of subjects were Beijing urban (H) *hukou* holders, 43 percent non-Beijing rural (L) *hukou* holders, and about 7 percent non-Beijing urban (M) *hukou* holders. On average these students received ¥2.45 weekly allowance from their parents, about one tenth of the average experiment earnings. This shows that the incentives offered in the experiment were substantial. On average subjects born elsewhere had lived in Beijing for six years, 62 percent of their current life time. Despite the long time they had lived there, their perception of self-image is highly correlated with their *hukou* status. In the pre-survey for the treatment, subjects were asked whether they perceived themselves as Beijing local, and whether they expected their teachers/fellow students would consider them as Beijing local. Only 11 percent of L subjects (compared to 86 percent of H subjects, $p < 0.01$) considered themselves as Beijing locals, and 20.7 percent of M subjects (compared to 84.6 percent of their H counterparts, $p < 0.01$) expected that their teachers/fellow students would consider them as Beijing locals.

Table 3 shows the average number of mazes solved by payment regime, gender, and block for the control sessions (including pure *hukou* sessions). The H-L or H-M difference is not statistically significant ($p > 0.10$) in either Piece Rate or Mixed Tournament regime. This suggests no substantial difference across different *hukou* groups in their intrinsic ability of maze solving. For all the subjects the average number of mazes increased by 2.37 from block one to block two, suggesting substantial amount of learning. Conditional on the *hukou* status and

payment regime, boys' performance exceeded girls' by 1.3 mazes.

4 Results

We begin the data analysis by presenting summary statistics on task performance with a focus on the comparison between the treatment and control groups in Table 4. The tournament block (i.e., block 2 of the Mixed Tournament regime) is shaded to be differentiated from the piece rate blocks (i.e., both blocks of the Piece Rate regime and the first block of the Mixed Tournament regime). The treatment-control differences reveal that in all the piece rate blocks, making *hukou* salient reduces the average number of mazes solved by L (regardless of gender) and M *hukou* holders. The average number of mazes solved is lower in the treatment than in the control by 1.02 ($p < 0.05$, one-side t test of mean comparison), 0.92 ($p < 0.10$, one-side t test of mean comparison), and 0.07 for L boys in blocks one and two of the Piece Rate regime, and block one of the Mixed Tournament regime, respectively. The corresponding performance reduction is 0.49, 1.53 ($p < 0.05$, one-side Wilcoxon rank sum test), and 0.52 for L girls; 1.23, 0.56 and 1.21 ($p < 0.10$, one-side Wilcoxon rank sum test) for M boys.[26] It suggests that when the *hukou* background is made salient, the inferior *hukou* holders, when mixed with the superior group, exert lower effort in response to economic incentives. In contrast the impact of *hukou* on the H group's effort level is more complex and less robust across the experiment conditions. For the H boys in the Piece Rate regime, the effect depends on whom they are mixed with in the same session – the *hukou* prime increases their performance when mixed with L, but decreases their performance when mixed with M. These effects are reversed in the piece rate block of the Mixed Tournament regime. Similarly, the effect of *hukou* for H girls is positive in both blocks of the

[26] The student t test of mean comparison is used for H or L boys in the HL mixed sessions whereas Wilcoxon rank sum test is used for female sessions, and HM male sessions due to the small number of observations. See the number of observations by experiment conditions in Table 1.

Piece Rate regime but negative in block one of the Mixed Tournament regime.

Subjects' performance in the tournament block is summarized in the shaded area in Table 4. We find that both H girls and L girls solve more mazes in the treatment than in the control, 0.51 for the former and 1.2 ($p < 0.10$, one-side Wilcoxon rank sum test) for the latter. This suggests that making *hukou* salient increases female's competitiveness regardless of the *hukou* status. In contrast the *hukou* prime lowers the number of mazes by 0.16 and 0.57 for L and M boys, respectively. For H boys the effect of *hukou* again depends on whom they are mixed with – they solved 1.88 *more* mazes ($p < 0.10$, one-side Wilcoxon rank sum test) when mixed with M and 0.6 *less* mazes when mixed with L. This may be because the H *hukou* status boys are more likely to be pressured by the competition threat from another group of closer 'rank', and are less likely to feel the threats in the presence of the L group. Thus they become more competitive when competing with M (their counterparts from other urban areas), and less competitive when competing with L (boys from non-Beijing rural areas).

We next use a linear regression model to investigate the impact to *hukou* on subjects' effort level under the piece rate payment method. We pool data from piece rate blocks. Results are reported in Table 5. The dependent variable is the number of mazes solved. The independent variable of interest is '*salient hukou*' which equals to one in the treatment and zero in the control. We control for grade, gender, and school fixed effects.[27] Since observations are pooled from both blocks in the Piece Rate regime, the variable '*block2*' is included to control for learning. To take account of the interdependence of these observations, standard errors are clustered on the level of individual subjects. Column 1 includes H group in HL mixture, column 2 L group, and column 3

[27] The correlation between grade and subjects' age is 0.7 ($p < 0.01$). Results are consistent using age or grade. However, using grade yields a higher (adjusted) R^2.

M group.[28] Column 4 pools L and M groups since Table 4 shows a similar behavior change in the treatment compared to the control for these two groups.

Table 5 shows that making *hukou* salient slightly increases H's effort in the HL-mixing piece rate games, but the effect is not statistically significant. Making *hukou* salient and public significantly reduces L group's effort – L subjects solved 0.688 ($p < 0.05$) less mazes in the treatment than in the control, other factors held constant. This effect is not only statistically significant but economically substantial. Since L group solved 7.6 mazes on average in the two blocks of the Piece Rate regime in the control, this effect of *hukou* identity is equivalent to a 9.1 percent drop in effort (and earnings) by the L group. Column 3 shows that when facing their superior counterpart M group reacts in a similar way as L does. Their effort is lowered by 0.888 mazes in the treatment than in the control. It is not statistically significant probably due to the small number of observations. Pooling L and M in column 4 yields an average effect of *hukou* identity of -0.749 ($p < 0.01$). The effects of other covariates on the dependent variable are consistent with our expectations. The higher the grade, the better is the performance in maze solving. Boys solved more mazes than girls, consistent with the summary statistics in Table 4. The covariate 'block 2' enters with a significantly positive sign, suggesting an improvement in performance in the second block due to learning. This leads to the first result.

Result 1 (Effort): The impact of *hukou* identity on individuals' effort depends on the social group they belong to. In the piece rate blocks making *hukou* salient and public substantially reduces L's performance. The impact on H and M groups is insignificant.

We next examine the impact of *hukou* identity on learning. On average subjects solved 2.37 more mazes in the second block compared to the first block. The extent of learning,

[28] HM sessions were conducted in two schools and included only boys due to the constraint in the recruiting. Hence the gender variables and two schools' fixed effects are missing in column 3.

computed as the difference of the number of mazes between these two blocks, is presented in Table 6. The difference in the amount of learning between the control and treatment can be attributed to the effect of *hukou* identity. Two-side p-values from the t test of means for the HL mixed sessions or the Wilcoxon rank sum test for the HM mixed sessions and HL girls' sessions are reported in the parentheses of Table 6. Results show that the only group for which learning is affected by the *hukou* identity is L girls, and the effect is contingent upon the payment regime. Under the Piece Rate regime learning is more effective in the control (2.7 in the control versus 1.66 in the treatment, $p = 0.09$), whereas under the Mixed Tournament regime more effective learning takes place in the treatment (1.93 in the control versus 3.65 in the treatment, $p = 0.04$).[29]

We further investigate the impact of *hukou* on L girls' learning using OLS and present the results in Table 7. The dependent variable is the increase in the number of mazes solved in the second block compared to in the first block, i.e., learning. The explanatory variable of interest is 'salient *hukou*'. Other covariates include grade and school fixed effects.[30] Column (1)-(2) are corresponding to the Piece Rate and the Mixed Tournament regimes, respectively. Under the Piece Rate regime (column 1), 'salient *hukou*' reduces the effectiveness of learning by 0.922 mazes ($p = 0.105$). Under the Mixed Tournament regime (column 2), making *hukou* salient and public in the treatment increases the level of learning by 1.608 mazes ($p < 0.05$) compared to the control. This increase in learning effectiveness is economically sizable. It represents an increase of 83 percent compared to the amount of learning in the control (1.93). These results are generally consistent with those in Table 6 and lead to result 2.

Result 2 (Learning): Introducing competition may improve learning but this effect varies by

[29] The difference in learning between the control and treatment is not statistically different for any *hukou* or gender groups in the HM mixed sessions ($p > 0.10$, Wilcoxon rank sum test), probably due to the limited number of observations.

[30] Fixed effects are missing for school 2 in column (1) and for school 3 in column (2) since we did not conduct the corresponding payment regime for HL girls mixed sessions in these schools due to the constraint of the subject pool.

social group and gender. The *hukou* identity improves L girls' learning under the Mixed Tournament regime and has an insignificant effect on all other groups.

While results 1 and 2 focus on the impact of *hukou* identity on *individual*'s behavior we next ask whether the *hukou* system affects the *overall* efficiency and income distribution of society. We evaluate the overall efficiency or productivity on the basis of sessions. It is defined as the total number of mazes solved by all the subjects (regardless of *hukou* types) in that session. However, some sessions had fewer than six subjects due to school absence of some pre-selected subjects. To circumvent this problem, we use the *average* number of mazes solved per capita to evaluate the productivity of the sessions. We then compare it between the control and the treatment, controlling for gender, learning, and payment scheme. The control condition simulates the 'state' without *hukou* whereas the treatment condition simulates the 'state' with *hukou*. The comparison of the overall productivity across these two states helps answer the question whether the existence of *hukou* system helps improve or causes damage to economic efficiency. Table 8 summarizes the session-level efficiency along with the test of means. We pool data in the first block of the Piece Rate and the Mixed Tournament regimes since their designs are identical. We find that the overall efficiency is very similar between the control and treatment. For example, in the HL boys' sessions, the average number of mazes solved per capita is 6.6 in the control and 6.41 in the treatment, but the difference is statistically insignificant ($p > 0.10$). This is true for all other cases. This leads to result 3.

Result 3 (Economic Efficiency): *Hukou* has no significant impact on the overall efficiency level. The average number of mazes solved per capita is not significantly different between the control and the treatment regardless of session composition, gender, and payment regime.

Recall that result 1 shows that the *hukou* identity helps improve H's performance and

significantly reduces L's under the piece rate payment method. This, combined with result 3, suggests that the *hukou* system may have caused income redistribution across different *hukou* groups. Our conjecture then is that the *hukou* system improves H's ranking but lowers L's in the income distribution. Consequently, *hukou* identity may be a contributing factor to increasing income inequality in urban China. We next investigate this hypothesis. We will focus on subjects' earnings in the HL sessions under the Piece Rate regime in which the significant impact of *hukou* on individual's performance is found in result 1.

Table 9 summarizes average earnings under the Piece Rate regime by H and L, respectively, conditional on gender. Since ¥1 is paid for each maze, the earnings equal the total number of mazes solved in blocks one and two. We find that when *hukou* background is kept private in the control condition both L boys and girls earn slightly but insignificantly more than their H counterparts. This further confirms that H and L students do not differ in terms of their intrinsic ability of maze solving. The direction of comparison is reversed in the treatment, however. We find that when *hukou* identity is made salient and public both L boys and girls earn significantly *less* compared to their H counterparts. H boys earn an average of ¥16.5, compared to ¥14.1 by L boys (p=0.02 for two-side t test; p=0.01for one-side t test of means). H girls earn an average of ¥13.9, compared to ¥11.9 by L girls ($p > 0.10$ for Wilcoxon rank sum test; $p < 0.10$, one-side t test of means). This comparison of average earnings suggests that the *hukou* system contributes to the H-L earning gap to the disadvantage of the low status *hukou* holders.

To examine more closely the impact of *hukou* on income inequality, we compare the earnings distribution between the control and treatment groups. Any shift in the distributions in the treatment, compared to the control, can be attributed to the impact of the *hukou* system. For both the control and the treatment groups we categorize subjects into four categories – those with

earnings below the 25th percentile, between the 25th and 50th percentile, between the 50th and 75th percentile, and above the 75th percentile of the distribution. We report the earning distributions for H in figure 1.A and for L in figure 1.B.[31] The white bars represent the control and the black bars the treatment groups.[32] We find that for H students in the control 22.2 percent have earnings below the 25th percentile, 31.1 percent between the 25th and 50th percentile, 15.6 percent between the 50th and 75th percentile, and 31.1 percent above the 75 percentile. The distribution is 17.2 percent, 23.4 percent, 20.3 percent, and 39.1 percent corresponding to these earning categories in treatment.[33] Therefore, the existence of *hukou* shifts up the rankings of H students. The effect of *hukou* is opposite for L students. It shifts the rankings of L students towards the low end of the distribution. The proportion of L students with earnings below the 25th percentile increases from 11.9 percent to 30.3 percent ($p = 0.03$, two-side t test of proportions).

In Table 10 we use an ordered probit model to analyze the effect of *hukou* on earning distribution while controlling for other factors. The dependent variable is a categorical variable that takes values of 1, 2, 3 and 4 if earnings are below the 25th percentile, between the 25th and 50th percentile, between the 50th and 75th percentile, and above the 75th percentile of the distribution. Other covariates include grade, gender, and school fixed effects. We find that females' earning ranking is on average lower than males', and students from higher grade generally have higher ranking in the income distribution than those from lower grade. We also find that 'salient *hukou*' enters with an effect of -0.533 ($p < 0.05$), suggesting that *hukou* significantly decreases L students' ranking in the earning distribution. It slightly increases H students' ranking, but the effect is not statistically significant ($p > 0.10$). This finding leads to

[31] Each range is closed at the lower bound but open at the upper bound.
[32] Note we pool data of the females' and males' for each *hukou* type. The pattern is similar if the distributions are separated by gender.
[33] The earning histograms for H and L are presented in Appendix E. They show that H's earning histogram in the treatment shifts to the right compared to the control, while L's histogram shifts to the left, consistent with Figure1.

result 4.

Result 4 (Earning Distribution): The *hukou* system significantly lowers L boys' and girls' ranking and slightly, but insignificantly, improves H boys' and girls' ranking in the earnings distribution.

Result 4 implies that the *hukou* system may have worsened the income gap between the local city residents and rural migrants even in the absence of any discrimination between the two social groups. The existing literature attributes income inequality to different economic endowments due to the *hukou* system's discriminatory treatment, i.e., the adverse impact of *hukou* on inequality stems from the fact that people of different *hukou* are entitled to different economic opportunities and have different access to economic resources. However, these studies have not established a causal impact of *hukou* status. In contrast, the underlying mechanism identified in this study is fundamentally different. Our results suggest that the *hukou* identity, superimposed by the institution and tied to differential treatment in economic resource allocation, may have internalized by individuals over time and become an important part of their self-image. This perceived self-image *per se* is sufficient to distort their intrinsic response to economic incentives. It substantially discourages the efforts exerted by low status *hukou* holders, and consequently exacerbates the widening income gap in urban China.

5 Conclusion

We conduct an experimental study to investigate the causal impact of *hukou* identity on individuals' response to economic incentives in urban China. We examine the role that this internalized social identity plays in the widening economic disparity in urban China.

Our results indicate that making *hukou* identity salient adversely affects the economic performance of lower rank *hukou* holders including rural migrants and urban migrants who come

from smaller cities. This adverse impact is significant and substantial for rural migrants. Making individuals' *hukou* status salient and public reduces the performance of rural migrant children on assigned tasks by more than 9 percent. The performance of individuals with a Beijing *hukou* improves, but insignificantly, when *hukou* status is made public. But the impact of *hukou* identity on overall economic efficiency, in terms of the difference between the average performance in the treatment and control sessions, is insignificant. The latter finding combined with the reduced effort of rural migrants in the treatment group suggests a shift in the income distribution in favor of Beijing *hukou* holders. We find that priming *hukou* identity causes the proportion of Beijing *hukou* holders with earnings below the 25^{th} percentile to decrease from 22.2 percent to 17.2 percent, and causes the proportion with earnings above the 75^{th} percentile to increase by almost 8 percentage points. The effect of *hukou* is opposite for rural migrants. It shifts their rankings towards the low end of the income distribution – the proportion of rural migrants with earnings below the 25^{th} percentile increases significantly from 11.9 percent to 30.3 percent. This evidence suggests that the *hukou* identity imposed and shaped by the institution may distort individuals' *intrinsic* response to incentives. This distortion can serve as an additional avenue through which the *hukou* system aggravates the rising socio-economic inequality in urban China. The findings of this paper underline the relevance of social identity in the distribution of gains from economic growth in developing countries. The results indicate the importance of redistributive policies in order to ensure sustainable economic growth in developing countries.

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Table 1. Experimental Design

Game	Is *hukou* publicly verified?	Reward in block 1 (per maze)	Reward in block 2 (per maze)	*Hukou* Composition	Gender	Number of Sessions	Number of Subjects*
1. Piece rate	No	¥1	¥1	3L, 3H	Male	9	52
				3L, 3H	Female	6	35
				3M, 3H	Male	3	18
2. Mixed tournament	No	¥1	¥6 per maze for winner	3L, 3H	Male	9	51
				3L, 3H	Female	5	30
				3M, 3H	Male	3	16
3. Piece rate with *hukou* publicly verified	Yes	¥1	¥1	3L, 3H	Male	15	89
				3L, 3H	Female	7	41
				3M, 3H	Male	3	18
4. Mixed tournament with *hukou* publicly verified	Yes	¥1	¥6 per maze for winner	3L, 3H	Male	15	86
				3L, 3H	Female	6	34
				3M, 3H	Male	3	17
5. Pure *hukou* group	Yes	¥1	¥6 per maze for winner	6H	Male	3	18
				6M	Male	1	6
				6L	Male	3	18
				6H	Female	1	6
				6L	Female	1	6
					Total	**93**	**541**

* 17 prospective participants missing due to absence from school. The experimenter was not informed in a timely manner in order to find replacements.

Table 2. Summary Statistics

Variables	Control			Treatment			Two-side P value
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	t test of means or proportions
Grade	4.27	1.03	202	4.36	1.08	339	0.31
Age (years)	9.85	1.29	202	9.82	1.23	339	0.78
Male	0.68	0.47	202	0.74	0.44	339	0.11
H (Beijing urban)	0.50	0.50	202	0.49	0.50	339	0.82
L (Non-Beijing rural)	0.42	0.49	202	0.44	0.50	339	0.59
Number of games solved in block 1	6.31	2.43	202	6.23	2.27	339	0.70
Number of games solved in block 2	8.54	2.83	202	8.68	2.79	339	0.58
Total earnings (yuan, including showup fee)	19.89	21.06	202	20.14	22.77	339	0.90
Years lived in Beijing	6.18	3.33	82	5.98	2.92	149	0.63
Father's education	3.11	1.11	188	2.98	1.18	330	0.25
Mother's education	2.94	1.17	187	2.81	1.24	329	0.26
Allowance per week (yuan)	2.55	1.66	196	2.35	1.53	335	0.15
Previous experience with maze game	1.89	0.63	197	1.81	0.61	337	0.15
Number of other students known in session	2.19	2.02	198	1.91	1.78	337	0.10

Notes: Father/mother's education – elementary school (1), middle school (2), high school (3), 3-year college (4), 4-year college/university (5), or graduate degree (6). Previous experience with maze game ('Have you ever played any maze games before?') – no (1), played similar games (2), played the same games (3).

Table 3. Number of Mazes Solved by Game, Round and Gender

	Piece Rate								**Mixed Tournament**							
	Boys					**Girls**			**Boys**					**Girls**		
	Hukou Group			**Diff.**		**Hukou Group**		**Diff.**	**Hukou Group**			**Diff.**		**Hukou Group**		**Diff.**
	H	*M*	*L*	*H vs. M*	*H vs. L*	*H*	*L*	*H vs. L*	*H*	*M*	*L*	*H vs. M*	*H vs. L*	*H*	*L*	*H vs. L*
Block 1	6.31	7.56	6.80	-1.25	-0.49	5.56	5.59	-0.03	6.84	7.88	6.19	-1.03	0.66	5.60	5.40	0.20
	(0.421)	(1.002)	(0.507)	(0.978)	(0.659)	(0.573)	(0.529)	(0.782)	(0.467)	(0.693)	(0.437)	(0.999)	(0.648)	(0.505)	(0.423)	(0.659)
Block 2	8.61	9.00	9.28	-0.39	-0.67	7.00	8.29	-1.29	9.53	10.13	8.59	-0.59	0.94	7.20	7.33	-0.13
	(0.441)	(1.067)	(0.549)	(1.027)	(0.699)	(0.775)	(0.427)	(0.900)	(0.533)	(0.611)	(0.563)	(1.116)	(0.777)	(0.712)	(0.591)	(0.925)

Notes: Standard errors in parentheses.

Table 4. Effects of Making *Hukou* Salient on Maze-Solving Performance

			Number of mazes solved in piece rate			Number of mazes solved in mixed tournament		
Composition	*Hukou* and gender groups	Block	Control (1)	Treatment (2)	Effect of identity (2) – (1)	Control (3)	Treatment (4)	Effect of Identity (4) – (3)
H vs. L	H Boys	1	6.3	7.11	0.81	7.21	6.63	-0.58
	H Boys	2	8.44	9.39	0.95	10.21	9.61	-0.6
	H Girls	1	5.56	6.05	0.49	5.6	5.47	-0.13
	H Girls	2	7	7.8	0.8	7.2	7.71	0.51
H vs. L	L Boys	1	6.8	5.78	-1.02	6.19	6.12	-0.07
	L Boys	2	9.28	8.36	-0.92	8.59	8.43	-0.16
	L Girls	1	5.59	5.1	-0.49	5.4	4.88	-0.52
	L Girls	2	8.29	6.76	-1.53	7.33	8.53	1.2
H vs. M	H Boys	1	6.33	6.22	-0.11	5.75	6.38	0.63
	H Boys	2	9.11	7.89	-1.22	7.5	9.38	1.88
	M Boys	1	7.56	6.33	-1.23	7.88	6.67	-1.21
	M Boys	2	9	8.44	-0.56	10.13	9.56	-0.57

Notes: Shaded areas are where tournament is used (i.e., block 2 of the mixed tournament sessions). Piece rate is used in both blocks of piece rate sessions and block 1 of mixed tournament sessions.

Table 5: Impact of *hukou* on effort in piece rate mixed *hukou* sessions

	(1)	(2)	(3)	(4)
Hukou group	H	L	M	L, M
Session composition	HL	HL	HM	HL, HM
salient *hukou*	0.224	-0.688**	-0.888	-0.749***
	(0.361)	(0.289)	(0.654)	(0.269)
grade	0.738***	0.866***	1.830***	0.984***
	(0.169)	(0.118)	(0.338)	(0.117)
female	-0.774*	-1.354***		-1.329***
	(0.396)	(0.302)		(0.286)
block 2	2.078***	2.492***	1.695***	2.380***
	(0.229)	(0.203)	(0.393)	(0.183)
school 1	-1.233**	1.055*	0.403	0.775*
	(0.559)	(0.590)	(0.767)	(0.433)
school 2	-1.261**	0.634		0.464
	(0.525)	(0.470)		(0.450)
school 3	-0.527	0.239		0.102
	(0.468)	(0.388)		(0.364)
Constant	3.945***	2.692***	-0.526	2.410***
	(0.826)	(0.653)	(1.531)	(0.595)
Observations	318	317	53	370
R^2	0.264	0.387	0.535	0.398

Notes: Standard errors in parentheses are clustered at the level of individual subjects.
* - significant at 10 percent level; ** - significant at 5 percent level; *** - significant at 1 percent level.

Table 6: Impact of *Hukou* on Learning

Session composition	*Hukou* and gender groups	Learning in Piece Rate regime			Learning in Mixed Tournament regime		
		Control (1)	Treatment (2)	Effect of *hukou* on learning (2) - (1)	Control (3)	Treatment (4)	Effect of *hukou* on learning (4) - (3)
H vs. L	H Boys	2.14	2.28	0.14 (0.80)	3	2.98	-0.02 (0.96)
	H Girls	1.44	1.75	0.31 (0.51)	1.6	2.24	0.64 (0.48)
H vs. L	L Boys	2.48	2.58	0.10 (0.85)	2.4	2.31	-0.09 (0.84)
	L Girls	2.7	1.66	-1.04 (0.09)	1.93	3.65	1.72 (0.04)
H vs. M	H Boys	2.78	1.67	-1.11 (0.11)	1.75	3	1.25 (0.45)
	M Boys	1.44	2.11	0.67 (0.26)	2.25	2.89	0.64 (0.54)

Notes: Two-side p-values from the t test of means (for HL mixed sessions for boys) or Wilcoxon rank sum test (for HM mixed sessions for boys and HL girls' sessions) are included in the parentheses in smaller font.

Table 7: Impact of *hukou* on learning for L girls

	(1)	(2)
Hukou-gender group	L girls	L girls
Session composition	HL	HL
Payment regime	Piece rate	Mixed tournament
salient *hukou*	-0.922	1.608**
	(0.553)	(0.762)
grade	0.659**	0.475
	(0.269)	(0.359)
school 1	0.220	1.025
	(0.848)	(1.063)
school 2		1.236
		(0.862)
school 3	-0.487	
	(0.620)	
Constant	0.103	-0.729
	(1.305)	(1.768)
Observations	38	32
Adjusted R^2	0.15	0.12

Notes: Fixed effects are missing for school 2 in column (1) and for school 3 in column (2) since we did not conduct the corresponding payment regime for HL girls mixed sessions in these schools due to the constraint of the subject pool. Standard errors are in parentheses. * - significant at 10 percent level; ** - significant at 5 percent level; *** - significant at 1 percent level.

Table 8: Impact of *hukou* on efficiency

Session composition	**Block 1 (all piece rate)**				**Block 2 piece rate**			**Block 2 tournament**		
	Gender	**control**	**treatment**	**p value**	**control**	**treatment**	**p value**	**control**	**treatment**	**p value**
H vs. L	Boys	6.6	6.41	0.53	8.85	8.87	0.97	9.35	9.03	0.53
H vs. L	Girls	5.54	5.39	0.69	7.63	7.27	0.50	7.27	8.12	0.22
H vs. M	Boys	6.88	6.4	0.63	9.06	8.17	0.31	8.81	9.47	0.73

Notes: Two-side p-values from the t test of means (for HL mixed sessions for boys) or Wilcoxon rank sum test (for HM mixed sessions for boys and HL girls' sessions) are reported.

Table 9: H-L earning gap under Piece Rate regime

Session composition		Control			Treatment		
	Gender	H	L	p value	H	L	p value
H vs. L	Boys	14.7	16.1	0.33	16.5	14.1	0.02
H vs. L	Girls	12.6	13.9	0.23	13.9	11.9	0.16

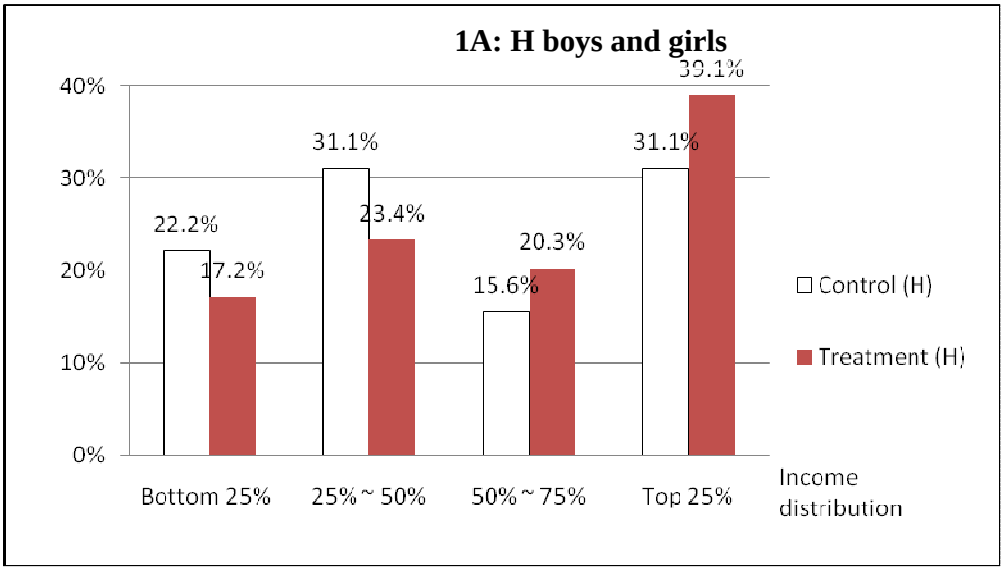
Notes: Two-side p values from the t test of means (for HL mixed sessions for boys) or Wilcoxon rank sum test (for HL girls' sessions) are reported.

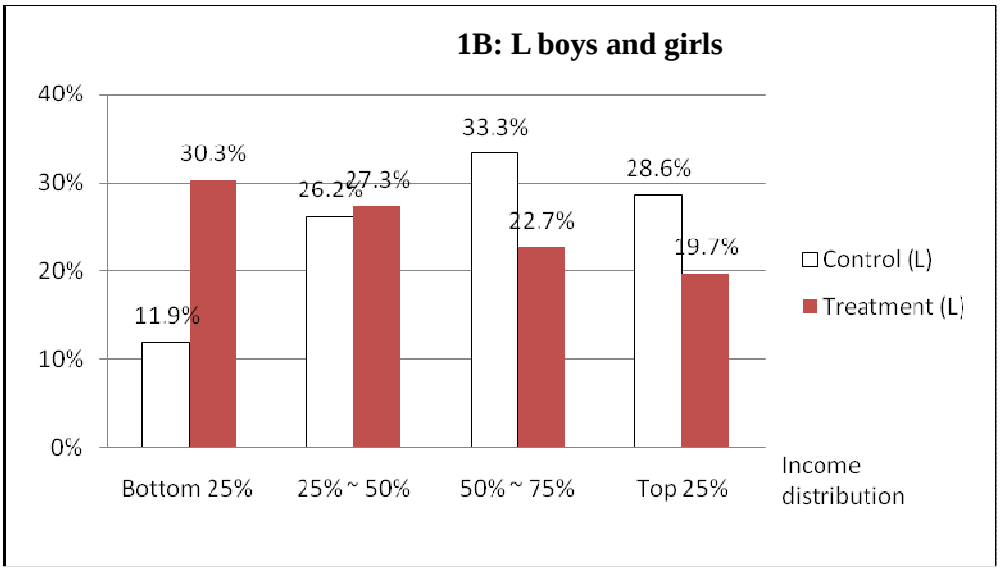
Table 10: Impact of *hukou* on earning distribution in Piece Rate regime – ordered probit

Hukou group	H	L
Session composition	HL	HL
salient *hukou*	0.141	-0.533**
	(0.218)	(0.221)
grade	0.289***	0.435***
	(0.104)	(0.106)
female	-0.364	-0.684***
	(0.240)	(0.244)
school 1	-0.318	0.559
	(0.407)	(0.427)
school 2	-0.348	0.325
	(0.335)	(0.335)
school 3	-0.0872	0.232
	(0.307)	(0.299)
Observations	109	108
Pseudo R2	0.05	0.10
Log Likelihood Function	-139.6	-135.2

Notes: The dependent variable is a categorical variable that takes values of 1, 2, 3 and 4 if earning is below the 25th percentile, between the 25th and 50th, between the 50th and 75th, and above the 75th percentile of the earning distribution. Standard errors are in parentheses. * - significant at 10 percent level; ** - significant at 5 percent level; *** - significant at 1 percent level.

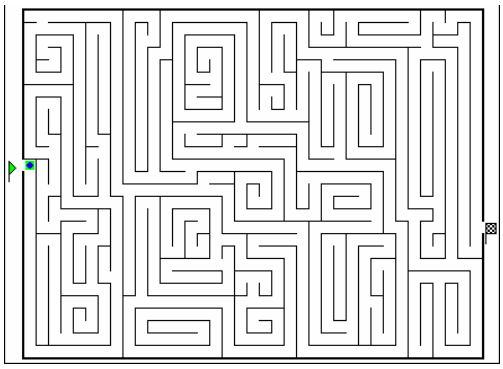
Figure 1: Impact of *hukou* on earning distribution under the Piece Rate regime



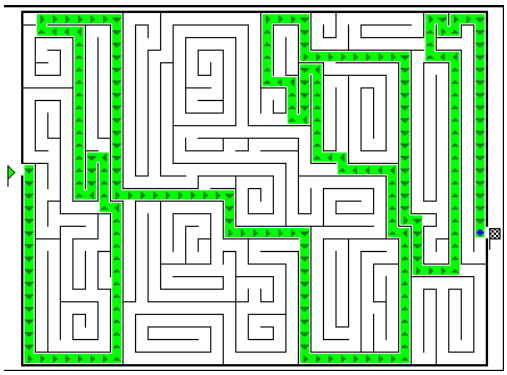


Appendix A. A Sample Maze Game

Maze



Solution



Appendix B. Experimental Instruction

The instruction was given in Chinese. The English translation is presented below with the instructions for experimenters included in the parentheses in italics.

I. Piece rate without *hukou* primed

1. Welcome! Each of you will be compensated with 3 yuan for your participation. Please find 3 yuan in the envelop on your desk. It is yours to keep.

2. In addition, you may earn more money in the games. The average earnings will be about 12 to 18 yuan. You will be paid in cash in private at the end of the games. You are under no obligation to let others know how much you earn. You will participate in two rounds of maze solving games. The entire games will last about half an hour. Please do not talk to each other during the experiment. Please raise your hand if you had any questions.

3. First, we will show you what the game looks like and how to solve it. (*Experimenter reveals the first sample maze and explains while drawing on the poster.)* On the left hand side of the maze, it is the entrance indicated by a triangle flag. On the right hand side, it is the exit indicated by a square flag. The black lines are walls. Your task is to find a path from the entrance to the exit without crossing the walls. You may erase or cross out if you make any mistakes.

4. Let's look at the second example. It is similar to what you will need to solve in the games. *(Experimenter reveals the second example and illustrates how to solve it).*

5. Now you will be given another maze for practice. Everyone will have 5 minutes to do so. If you have any questions, please raise your hand and we will come to you. *(Experimenter offers individual assistance to those who need help.)*

6. Next, we will start the first round of the games. Please find the booklet that says 'Round 1' on the cover. Please don't open the booklet until you are told to do so. There is one maze on each page, and in total 15 games. Everyone will be given 15 minutes to solve as many games as you can. You don't need to solve those games in order. You may skip any game as you like.

7. Now we will explain the rewards. For this round, you will get 1 yuan for each maze you solve correctly. So if

you solve one, you will get one yuan. If you solve two, you will get two yuan …

(Experimenter reveals the following table on the blackboard and goes through this hypothetical example to make sure every subject follows the calculation of rewards. Experimenter asks subject no. 1, 'suppose Qiang solve 4 mazes, how much he will earn?' Then experimenter asks subject no. 2 how much Gang will earn… Hypothetical female names are used in the table if it is female session.)

Name	Number of mazes solved	Rewards
Qiang	4	
Gang	7	
Peng	9	
Wei	12	
Hao	14	
Dong	5	

8. Recall you will have 15 minutes to solve as many mazes as you can. When 5 minutes remain we will let you know. When time is up, please put down the pencil immediately and close the booklet. Please open the booklet now. You may start. *(Experimenter collects the booklet when round 1 is over.)*

9. Next we will explain the games in round 2. Please find the booklet that says 'Round 2' on the cover. Please don't open it until you are told to do so. The booklet contains another 15 games with the same difficulty level.

10-PieceRate. The rules and rewards in round 2 are exactly the same as that in round 1. Let's review the reward calculation again. (*Experimenter reviews the reward table above without checking with individual subjects.)*

11. Again you will have 15 minutes to solve as many mazes as you can. We will let you know when 5 minutes are left. Please open the booklet now. You may start. *(Experimenter collects the booklet when round 2 is over.)*

12. Please find the booklet that says 'Survey' on the cover. While we are grading your games and computing your payoffs please complete the survey. Please try to answer as many questions as you can. We are not going to share individual answers with anyone else including your teachers.

13. You will now be paid in private. Remember you don't have to tell others how much you earned. Thank you for your participation in our study!

II. Tournament without *hukou* primed

*(Replace step **10-PieceRate** above with step **10-Tournament** below. Keep other steps the same as in Piece Rate.)*

10-Tournament. Please note that the rules now are different from round 1. In this round, you will compete with each other. Only the winner(s) will get rewards. The winner(s) is/are the person(s) who solve(s) the greatest number of mazes. The reward for the winner(s) is 6 yuan each game. So if he solves one maze, he will get 6 yuan. If he solves two mazes, he will get 12 yuan. If he solves three mazes, he will get 18 yuan… If it's a tie, all the winners will be compensated. Each of them will get 6 yuan per game. Let's go over one example.

Name	Number of mazes solved	Winner	Rewards
Qiang	4		
Gang	7		
Peng	9		
Wei	12		

Hao	14
Dong	5

(Experimenter adds one more column 'winner' in the reward calculation table. Experimenter checks with each subject, e.g., 'Is Qiang the winner? How much does he earn in this case?')

III. Piece rate with *hukou* primed

(Same as I. except that Step 0 is added.)

0. Welcome! Each of you will be compensated with 3 yuan for your participation. Please find 3 yuan in the envelop on your desk. It is yours to keep. Now please find the booklet that says 'Survey 1' on the cover. Please try to answer as many questions as you can. We will keep your answers confidential and will not share them with anyone else including your teachers. *(After everyone completes the survey, experimenter goes to each student, and verifies in public their names, month and date of birth, and hukou information. Students nod and say yes if information is correct.)*

IV. Mixed Tournament with Hukou Announced
The same as Mixed Tournament except that Step 0 is added.

V.A. Mixed Tournament with Hukou Announced, and H Only
The same as Mixed Tournament except that Step 0 is added. Note there are 6 Beijing urban students (H) in this session.

V.B. Mixed Tournament with Hukou Announced, and M Only
The same as Mixed Tournament except that Step 0 is added. Note there are 6 Non-Beijing urban students (M) in this session.

V.C. Mixed Tournament with Hukou Announced, and L Only
The same as Mixed Tournament except that Step 0 is added. Note there are 6 Non-Beijing rural students (L) in this session.

Appendix C. Pre-experimental Survey (used in the HL treatment)

1. Place of birth: _____province ____city ____street/village
2. If you were not born in Beijing, when did you move to Beijing? _____ year
3. The location of your *hukou*: _____province _____city _____street/village
   ☐ Check here if you don't know the answer.
5. Which dialect do you speak with your parents at home?
   a) Beijing dialect, b) Other, please specify _____
6. Do you consider yourself as Beijing local?
   a) Yes, b) Somewhat, c) No, d) Don't know
7. Do your classmates consider you as Beijing local?
   a) Yes, b) Somewhat, c) No, d) Don't know
8. Do your teachers consider you as Beijing local?
   a) Yes, b) Maybe, c) No, d) Don't know
9. Were you charged 40 *yuan* rural guest student fee or 80 *yuan* local student fee at the beginning of this semester?
   a) 40 *yuan* (rural guest student fee), b) 80 *yuan* (local student fee), c) other _____
10. Where do the students come from in your class?
    a) All from Beijing, b) Most from Beijing, and some from elsewhere,
    c) Some from Beijing, and most from elsewhere, d) Don't know
11. Compare Beijing local students and those from non-Beijing rural areas, what are your opinions regarding the following questions?
    i) Who generally study harder?
        a) Beijing local students, b) Students from non-Beijing rural areas,
        c) They study equally hard.
    ii) Who are more active participating in classes, e.g., ask and answer questions?
        a) Beijing local students, b) Students from non-Beijing rural areas,
        c) They are equally active in class participation.
    iii) Who are more active participating in extracurricular activities?
        a) Beijing local students, b) Students from non-Beijing rural areas,
        c) They are equally active in those activities.
    iv) Who are thriftier with money?
        a) Beijing local students, b) Students from non-Beijing rural areas,
        c) They are equally so.

Appendix D. Post-experimental Survey[34]

1. Place of birth: _____province _____city _____street/village
2. If you were not born in Beijing, when did you move to Beijing? _____ year
3. The location of your *hukou*: _____province _____city _____street/village
   ☐ Check here if you don't know the answer.
4. Your father's employer:
   a) Government, including military, b) State owned company, c) Privately owned company,
   d) Foreign invested enterprises, e) Self-employed, f) Others, please specify: _____
5. Your father's highest level of education achieved:
   a) Elementary school, b) Middle school, c) High school, d) College, e) University, f) Graduate school
6. Your mother's employer:
   a) Government, including military, b) State owned company, c) Privately owned company,
   d) Foreign invested enterprises, e) Self-employed, f) Others, please specify: _____
7. Your mother's highest level of education achieved:
   a) Elementary school, b) Middle school, c) High school, d) College, e) University, f) Graduate school
8. Your average ranking in your class is:
   a) Top 25%, b) 25%-50%, c) 50%-75%, d) 75%-100 %, e) don't know for sure
9. Do you like living in the current residential area?
   a) Like it very much, b) Like, c) neutral, d) Dislike, e) Dislike it very much
10. Where will you want to live when growing up?
    a) Beijing, b) Your hometown, please specify _____,
    c) Other cities in China, please specify _____, d) Foreign country, please specify _____
11. What is your ideal job when growing up?
12. How much pocket money do your parents give to you per week? (Please exclude the expense on meals and transportation)
    a) Less than 3.5 *yuan*, b) 3.5-7 *yuan*, c) 7-10.5 *yuan*, d) 10.5-14 *yuan*, e) more than 14 *yuan*
13. Have you ever played this kind of maze game before?
    a) No, b) Played similar games before, c) Played exactly the same games before
14. How hard did you think these maze games were?
    a) Very hard, b) Hard, c) Neutral, d) Easy, e) Very easy
15. How many other students in this session do you know by name?
    a) 0, b)1, c) 2, d) 3, e) 4, f) 5

[34] For the treatment sessions, the first three questions were included in the pre-experiment survey.

Appendix E. Earning histograms under Piece Rate regime