Title
Ethnic Discrimination: Evidence from China

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ETHNIC DISCRIMINATION: EVIDENCE FROM CHINA*

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March 2016

Abstract

We study the role of ethnicity in experimental labor markets where "employers" determine wages of "workers" who perform a real effort task. This task requires a true skill which we show is not affected by minority status. In some treatments, we provide subtle priming to employers about minority status of workers as commonly depicted on Chinese "Hukou" identification system. We conduct our experiments at two sites located in provinces that differ by their historical shares of ethnic groups in the population. We find that: (1) Han and minority workers are equally productive in both provinces; (2) in the diverse province, there is no difference in the wages between Han and minority workers; (3) in the non-diverse province, minority workers receive 4%-7% lower wages than Han workers.

Keywords: ethnic discrimination, minority stereotype, diversity, experimental labor market.
JEL Classification: C90, J31, J71.

1 Introduction

We design experimental labor markets to study otherwise hidden job market interactions between employers and employees of different ethnicity. In particular, we

*We thank discussions and suggestions of conference and seminar participants at Iowa State University, the 2012 Asia-Pacific Annual Meeting of the Economic Science Association, the 2012 North-American Annual Meeting of the Economic Science Association, the 2011 China Economics Annual Conference, and Shandong University. Peter Orazem, Wallace Huffman, Joydeep Bhattacharya, Juan Murguia, Xia Li, and Shmuel Zamir provided valuable comments. Financial support from Iowa State Department of Economics is gratefully acknowledged. Special thanks are given to Qiaochun Wang, Jianping Cheng, Long Chen, Zhenfang Yin, Biao Wang, Chaohong Feng, Zhibo Zhang, and Yanli Ma for their incredible support and assistance throughout this work.

explore whether minority status information that is frequently revealed through job application process affects employer perceptions of worker productivity. We design our experiments taking into account particular aspects of the Chinese labor market where such information is typically transmitted through the national identification card and Hukou which are necessary documents for most job applicants.[1] Laboratory experiments provide a unique opportunity to study labor market behavior that is often hidden in the natural data (Charness and Kuhn, 2011; Fehr and Falk, 2003) because we can isolate the effect of specific worker characteristics such as ethnicity or urban/rural status on employer behavior.

We use an experimental labor market with a real effort task which involves solving character puzzles (Niehaus et al., 2015; Yang, 2013). Participants solve a practice puzzle in the beginning of the experiment and subsequently perform in a five-minute work period in which they receive a piece rate from the experimenter in order to encourage them to solve as many puzzles as possible. We specifically choose a real effort task that is new for our participants and for which there are no observed productivity differences based on minority status. Furthermore, we let workers and employers participate in our experiment in both roles, first as workers and then as employers, reducing the possibility that any bias could arise from inexperience with the task. In addition to experimenter provided compensation, employers evaluate workers' mini-resumes which have information about time spent on the practice puzzle (a noisy signal of worker productivity), and depending on a treatment are also subtly primed on various aspects of possible minority status. Instead of relying on minimal groups used in psychology and near-minimal groups in economics (Tajfel and Turner, 1979; Chen and Li, 2009; Chen and Chen, 2011) to induce minority status, we base our priming on participants' natural identities (Benjamin, Choi and Strickland, 2010; Chen, Li, Liu, and Shih, 2014; Chang, Chen and Krupka, 2015) as would be revealed to employers through national identification card and Hukou. Employers are incentivized to estimate worker productivity in the five-minute work period. This estimate is paid to the worker as an additional source of income and we refer to it as worker "wage".

We adopt a two site design in which our participants are recruited from universities in two provinces of China, Guizhou and Shaanxi. Ethnic minorities make up 36% of the local population in the former but only 0.5% in the latter. We find that there is no productivity difference between minority and Han workers in both locations. However, minority workers in Shaanxi receive a 4%-7% lower wage than Han workers when the employer is also Han. On the contrary, there is no such discriminatory wage differential in Guizhou.

Our experimental design specifically abstracts away from *statistical discrimina-*

[1]The national identification card displays a person's name, date of birth, ethnicity, gender, and place of origin. Hukou is an official registration record issued to every Chinese citizen on a household basis. It contains a person's basic demographic information such as name, date and place of birth, education, ethnicity, gender, urban/rural status, province of origin, and marriage status.

tion where employers rationally believe certain groups of workers to be less productive in a particular task. Majority and minority workers perform equally well in our task and employers are already familiar with the task before setting wages. Our design also reduces the role of *taste-based discrimination* because employers do not engage in direct interaction with workers.

This leaves *stereotypes* by Han employers as a possible explanation for the discriminatory wage gap. Minority workers are *wrongly* perceived to be less productive by Han employers at the ethnically non-diverse site. When Han employers make judgments based on this wrong perception, they make costly discriminatory decisions against minority workers. A sufficient level of exposure to minorities can help correct this stereotype and weaken discrimination, which is consistent with observed behavior in our experimental labor market in Guizhou.

Our results are consistent with studies in social psychology which suggest that social contact can be a remedy for group stereotypes (Allport, 1954; Pettigrew, 1997; Pettigrew and Tropp, 2006; Pettigrew et al., 2011). Higher exposure to people with diverse backgrounds leads to more accurate perceptions which in turn attenuates discrimination based on stereotypes. In line with our work, other recent studies have emphasized the benefits of diversity in a wide range of domains. Boisjoly et al. (2006) and Van Laar et al. (2004) demonstrate that in university dorms, having a roommate of another ethnic group improves attitudes toward that group. Beaman et al. (2009) report a field experiment in which gender quotas for leadership positions are assigned on Indian village councils. This enhanced exposure to female chief councilors weakens gender stereotypes and improves voter perceptions toward females, leading to higher likelihood of women to win subsequent elections. Moody (2001) finds that in American high schools, friendship segregation declines with school heterogeneity levels. Herring (2009) finds a positive association between racial diversity and business success in workplaces. Gurin et al. (2004) show that curricular and co-curricular experience with racial and ethnic diversity have positive educational values for democratic citizenship. This line of research from economics, psychology and sociology provides a possible explanation for differences in discrimination based on stereotypes against minority workers observed at two different sites in our study.

Covert discrimination is notoriously difficult to measure in natural data. While such approaches as audit studies and field experiments help establish evidence of discrimination in the field, laboratory studies improve our understanding of the mechanisms that lead to discrimination.[2] Our paper utilizes the latter approach: we conduct a novel laboratory experiment to explore how minority status priming affects employer beliefs about worker productivity. One often overlooked advantage of laboratory studies is an opportunity for *replication*. By conducting our experi-

[2]For example, see Bertrand and Mullainathan (2004), Doleac and Stein (2013), Zussman (2013) for notable examples of field studies. See Ferstman and Gneeezy (2001) and Mobius and Rosenblat (2006) for examples of laboratory experiments.

ment at one site only, we would have failed to identify the complexity of discriminatory behavior which appears to depend on site-specific characteristics: our student participants drawn from similar populations of undergraduates facing exactly the same experimental conditions and incentives behave differently when subtly primed on minority status. Since ethnicity wage gap is observed only at the ethnically non-diverse site, our study not only shows that ethnic discrimination is a complex phenomenon that depends on local factors, but is also suggestive of a possible mechanism that can alleviate discrimination. While we focus on the particular aspects of Chinese labor markets in this study, our methodology can be fruitfully adopted to investigate discriminatory pay differentials in other settings.

The rest of this paper is organized as follows. Section 2 gives an introduction to China's ethnic groups. Section 3 discusses the experimental design and the data collection process. Experimental results are analyzed in section 4 and section 5 concludes.

2 Background

The Chinese government officially recognizes 56 ethnic groups. The majority Han population accounts for 92% of China's population. The remaining 8% of the national population belongs to other 55 ethnic groups. The largest ethnic group are the Zhuang people who account for just 1.27% of the national population. All other ethnic groups are each below 1% of China's population and only 18 groups have more than one million members.

Despite their overall low share, the minority populations are heavily geographically concentrated as Figure 1 shows. About 90% of minorities live in 17 (out of 31) provinces in the west and northeast. In particular, the minority population of the four western provinces Guangxi, Yunnan, Xinjiang, and Guizhou, are home to more than half of the total minority population and each have a minority share above 30% (see Table 1). In contrast, six central and eastern provinces have minority shares below 1%.

Table 1

Our experiment was conducted in a south-western province, Guizhou, and a central province, Shaanxi. As shown by Table 1, Guizhou has the fourth-highest minority share at 36.12% while Shaanxi has the fourth lowest at 0.51%.

Recent research has documented a substantial wage gap between Han Chinese and minorities (Gustafsson and Shi, 2003; Johnson and Chow, 1997; Li, 2003). Maurer-Fazio (2012) study how Chinese firms respond to Han and minority job applicants on an internet job board and find that minorities are less likely to receive callbacks from private firms. In a recent study, Hasmath et al. (2011) interview Han employers who express their concerns about hiring minority workers.

Discrimination could either be statistical and reflect actual ability differences between minority and Han workers, or could be either based on a taste-based preference for Han workers or reflect wrongly held beliefs about minority groups. Anecdotal evidence suggests that group stereotypes are an important contributor to discrimination. In the media and popular culture, the typical Han is often described as a modern economic agent who is diligent, thrifty, and self-interested. In contrast, minorities are often associated with terms such as nomads, braveness and combativeness, or described as good dancers and singers (Cai, 2009; Cai, 2011; Zhu and He, 2011; Ding and Yang, 2011). Although rapid industrialization and urbanization has influenced the entire country since the late 1970's, anachronistic stereotypes still shape perceptions about ethnic minorities (Peng and Peng, 2010, p. 391-394). Studies on national mainstream newspapers find that fewer than 1% of the total reports are about minorities (Qiu, 2011) and the majority of these reports are not related to economic development (Gu, 2009; Han, 2006).

3 The Experiment

3.1 Experimental design

We simulate a Chinese labor market where the "employer" determines the wage of the "worker." Compared to experimental labor markets in other studies where workers choose abstract effort levels (Charness, 2000; Charness, 2004; Charness and Kuhn, 2007; Fehr et al., 1998; Hannan et al., 2002), workers in our experiment are employed in completing a real-effort task: solving character puzzles (see Figure 2 for an example of the puzzle).[3] Each puzzle shows two quadratic arrays of 7 times 6 characters of Latin alphabets. The two arrays are identical except for two random positions where the characters differ. To solve the puzzle, one has to find these two locations.

Figure 2

All participants begin the experiment in the role of worker. In the first step, each worker is given two warm-up non payoff-relevant character puzzles to solve in order to become familiar with the task. Afterwards, the worker is asked to solve one practice character puzzle. The experimenter records the time it takes the worker to complete the practice character puzzle as the "practice time." The worker's practice time, ethnicity, gender, urban/rural status, and province are used by the experimenter to construct the worker's "resume." In the last step, the worker is asked to solve puzzles for a five minute work period under a piece rate of 40 credits per puzzle. This compensation is provided by the experimenter to encourage

[3]English is a mandatory class from middle school up to university in China. In particular, it is also a subject of the university entrance exam. As the participants in our experiment are all university students, they are supposed to have the ability of identifying basic Latin letters.

workers to solve as many puzzles as possible. To guarantee that the measured ability is comparable, workers solve the same puzzles in the same sequence. We interpret the actual performance in the five-minute work period as the worker's "productivity" and the projected performance (5×60/practice time) as a noisy "signal" of future productivity.

Participants then switch to the role of the employers who are incentivized to estimate worker productivity. The design choice of having participants perform in both roles provides the employers with hands-on experience with the task and complete information about the nature and difficulty of the task. We refer to the estimate of worker productivity elicited from the employer as the "employer belief" or the "wage." There are four resume treatments which always contain the practice time and gender. Treatment TG showing these basic characteristics serves as the baseline treatment. Another treatment TGPU shows the practice time, gender, home province, and urban/rural status. In order to examine the effect of ethnicity, we design treatment TGE where we provide ethnicity on the resume. Because the majority of ethnic minorities live in regions that are also less urbanized, ethnicity might be associated with urban/rural status. To tease them apart, we create treatment TGEU where the urban/rural status is provided in addition to ethnicity. Examples of each resume treatment are provided in Figure 3.

Figure 3

Employers are randomly assigned to treatments TG, TGPU, TGE, and TGEU with probability of 1/6, 1/6, 1/6, and 3/6, respectively. Each employer evaluates 10 other randomly selected workers and earns 150 credits for each evaluation. However, for every puzzle the estimated performance differs from the actual performance, the earnings are reduced by 10 credits.[4] For example, if a worker solves 20 puzzles in the five-minute work period and the employer's estimate is 18, the employer receives 130 credits.

The worker receives a wage of 40 credits times the average of all employer evaluations. For example, if a worker is evaluated by eight employers and the average estimated performance is 20 puzzles, the worker receives a wage of 800 credits. In total, the worker has two sources of income: the actual productivity compensated by the experimenter using a piece rate of 40 credits per puzzle and the employer set wage derived from the average of all evaluations. This gives the worker incentives to try hard both in the practice task and the five-minute work period.

[4]This linear scoring rule elicits the employers' median belief. To see this assume that subject's perceived performance is a random variable X with median M and assume that the subject reports $m < M$. With probability $\frac{1}{2}$ we have $X > M$ and the subject loses exactly $M - m$ from reporting m instead of M. She gains at most $M - m$ if $X < M$ and strictly less than this if the distribution is continuous at M. Hence, she cannot improve her expected earnings by under-reporting her belief (an analogous argument holds for reporting $m > M$). We did not use a quadratic scoring rule because we wanted to keep the game as simple as possible.

3.2 Data

We conducted the same experimental labor market in Shaanxi in December, 2010 and Guizhou in March, 2011. From now on we will refer to Shaanxi as the "Non-diverse" site and Guizhou as the "Diverse" site.

The experiment was web-based and programmed on a server of the department of economics at Iowa State University. Each participant received an unique user identification number and a password for login. All instructions were in Chinese.

In total, 299 university students majoring in agronomy, forestry and horticulture at the Non-diverse site and 280 students majoring in agricultural products, agronomy, Chinese medicinal herbs, environment and resources, horticulture and plant protection at the Diverse site participated in the experiment.[5] Participants were of similar ages as they were all freshmen. Due to different lab sizes, participants at the Non-diverse site were divided into two sessions while those at the Diverse site were divided into three sessions. Each session lasted about one hour. Sessions were conducted back to back to prevent communication between participants about the nature of the experiment.

We over-sampled minority participants at the Non-diverse site to obtain a reasonable mix of minorities and Hans in the experiment. At the Diverse site, the share of ethnic minorities in the experiment reflects their actual shares in the provincial population.

At the end of the experiment, every 100 credits were converted to cash at the rate of one Chinese Yuan.[6] The combined earnings from playing the worker and the employer were put inside a sealed envelope and returned to each participant in private according to the user identification number. Average earnings in Chinese Yuan were 21.5 for the Non-diverse participants and 22.1 for the Diverse participants. The average earnings are comparable to the opportunity cost of one working hour for university students.

4 Results

4.1 Empirical strategy

We use a simple empirical model to measure the impact of ethnic identity on productivity and employer beliefs. We start with the *productivity equation*:

$$\text{LnProductivity}_j = \alpha + \beta \cdot \text{LnSignal}_j + \gamma \cdot \text{Minority}_j + \delta \cdot X_j + \epsilon_j \qquad (1)$$

The performance of worker j during the five minute work period is predicted by the signal on her ability (measured by projected performance from the practice

[5] Because the experiment was internet-based and some data points were not recoreded properly, the number of available workers (employers) was reduced to 291 (281) at the Non-diverse site and 276 (277) at the Diverse site.

[6] One Chinese Yuan is approximately \$0.16.

round) and demographic variables such as minority status, gender and province. We measure productivity and beliefs in logs so we can interpret the estimated coefficients as elasticities. Summary statistics are shown in Table 2.

We can think of this equation as the the prediction of a well-calibrated employer who does not follow stereotypes and does not engage in taste-based discrimination. The only reason why such an employer would put a negative weight on ethnicity is because minority workers either perform worse than Han workers or because minority status proxies for omitted variables that predict productivity. Both of these are instances of (rational) statistical discrimination. However, we find no evidence that ethnicity predicts performance in any of the specifications that we estimate below.

The second part of our model is the *wage equation* which closely mirrors the productivity equation:

$$\text{LnBelief}_{ij} \quad = \quad \alpha^* + \beta^* \cdot \text{LnSignal}_j + \gamma^* \cdot \text{Minority}_j + \delta^* \cdot X_j + \epsilon^*_{ij}. \qquad (2)$$

Here, the belief of employer i about worker j depends on the signal and the demographic variables that are observable by the employer.

Treatment TG and TGPU serve as our control treatments where the worker's ethnicity is not revealed to the employer - we therefore expect $\gamma^* = 0$. Moreover, we expect the same to hold for *Han employers* in the TGE and TGEU treatments if there is *no* discrimination based on taste or stereotypes. This follows if minority status is uncorrelated with productivity (as is the case in our experiment). We interpret a negative estimate of γ^* in the TGE and TGEU treatments as evidence for non-statistical discrimination.

Finally, we compare the TGE and TGEU treatments to check whether discrimination by Han employers is triggered by ethnicity rather than rural status which might be a proxy for ethnicity.

4.2 What determines worker productivity?

We estimate the productivity equation and include an ethnicity dummy *Minority* (0 for Han and 1 for minority), a gender dummy *Female* (0 for male and 1 for female), an urban/rural dummy *Rural* (0 for urban and 1 for rural), as well as province dummies. Columns 1 and 4 in Table 3 report the OLS estimates for the two sites.

The most important predictor of worker productivity is projected productivity from the practice game: a 1% change in this signal predicts a 0.34% increase in worker productivity at the Non-diverse site and 0.32% at the Diverse site. At the Diverse site, female workers are more productive than males by 8%. At the same site, rural workers are less productive than urban workers by 7%. Importantly, the ethnic minority status has no significant effect on worker productivity during the five-minute work period in either locations.

Table 3

We also estimate the productivity equation by only assuming the information set of employers in treatment TGE (columns 2 and 5) as well as TGEU (columns 3 and 6). Ethnicity is not significantly different from 0 in any specifications – hence we find no basis for employers to engage in statistical discrimination.

4.3 What determines employer belief?

We start our analysis on employers' beliefs by comparing mean beliefs across sites, treatments and workers in Table 4. We use the Wilcoxon signed rank test to check whether the two types of employers (Han/minority) have different beliefs about Han/minority worker productivity. We can reject the hypothesis that there is no such difference for three groups of employers: the Non-diverse Han employers in treatments TG (19.21 and 17.80), TGE (19.72 and 18.65), and TGEU (18.62 and 17.13). These employers predict significantly higher performance for Han workers. This pattern is consistent with the discrimination hypothesis except for the TG treatment.[7] We therefore turn to wage regressions to control for worker-specific characteristics that are observable to each employer.[8]

We estimate the wage regressions in two ways: (a) we use OLS with standard errors clustered at the employer level and (b) a fixed effect model with employer fixed effect. The former assumes that the error terms σ^*_{ij} have non-constant variance at the employer level and the latter allows employers to have unobservable individual characteristics (as in Mobius and Rosenblat, 2006). Results are reported in Tables 5 to 8 for treatments TG, TGPU, TGE, and TGEU, respectively.

In both specifications, the signal is the most informative factor for all groups of employers. Moreover, it has comparable effects on employer belief and worker productivity. This indicates that the nature of the task is well understood by the employers.

In treatments TG and TGPU (Tables 5 and 6), ethnicity has no significant effect on the beliefs of either the Han or the minority employers in 15 of the 16 regressions with exception of a borderline significant OLS estimate for minority employers at the Diverse site. These results are consistent with our experimental design since employers could not view the ethnicity of the workers in the TG and TGPU treatments.

However, in treatment TGE we can reject the null hypothesis that $\beta^* = 0$ at the 10% level for Han employers at the Non-diverse site: these employers believe that minority workers are $5\% - 7\%$ less productive than Han workers. We find no such negative effect for minority employers at the Non-diverse site nor for any employer type at the Diverse site.

[7] For the Non-diverse Han employers in treatment TG, ethnicity is no longer significant once we control for practice time and gender.

[8] When we compare means across treatments we also find that minority employers at the Non-diverse site give higher wages to minority workers in treatment TGE (20.59) compared to TG (16.08), TGEU (18.97), and TGPU (16.39).

One concern is that Han employers do not discriminate against minorities but against students from rural areas and that they use ethnicity as a proxy for urban/rural status. In this case, we would expect the Han employers to no longer discriminate against minority workers once they see the rural/urban status of workers in treatment TGEU. Columns 1 and 2 of Table 8 show that this is not the case: Rural workers are not believed to be different from urban workers, but minority workers are still believed to be less productive than Han workers by $4\% - 6\%$. This effect is even more statistically significant compared to the TGE treatment and we can reject the null hypothesis that $\beta^* = 0$ at the 1% level for the fixed effects estimate.

To summarize, we find discrimination against minority workers only for the Non-diverse Han employers. We do not observe such discrimination for the Non-diverse minority employers and the Diverse Han/minority employers. The fact that we observe discrimination in both the TGE and TGEU treatments suggests that employers do not discriminate against students who come from rural areas (and who might be more likely to come from ethnic minorities).

Table 5

Table 6

Table 7

Table 8

4.4 Comparing discrimination between the two sites

We find that discrimination exists at the Non-diverse site but not at the Diverse site. To further check how much the two sites differ in the extent of discrimination, we pool the Non-diverse and the Diverse Han employers in treatments TGE and TGEU in the following pooled wage regression:

$$\begin{aligned} \text{LnBelief}_{ij} = \quad & \zeta_0 \quad + \zeta_1 \cdot \text{LnSignal}_j + \zeta_2 \cdot \text{Female}_j \\ & + \quad \zeta_3 \cdot \text{Minority}_j + \zeta_4 \cdot \text{Diverse}_i + \zeta_5 \cdot \text{Minority}_j \cdot \text{Diverse}_i \\ & + \quad \zeta_6 \cdot \text{Urban}_j \cdot \text{TGEU}_i + \zeta_7 \cdot \text{Rural}_j \cdot \text{TGEU}_i + \nu_{ij}. \end{aligned} \tag{3}$$

The dummy variable *Diverse* (0 for Non-diverse employers and 1 for Diverse employers) measures the location effect and the interaction term *Minority·Diverse* measures the wage difference between the Non-diverse minority workers and the Diverse minority workers. The interaction terms *Urban·TGEU* (1 for TGEU employers estimating urban workers and 0 otherwise) and *Rural·TGEU* measure the behavioral difference between TGEU employers who evaluate urban/rural workers and other employers.

We examine whether the Non-diverse and the Diverse sites differ in the extent of discrimination by testing the null hypothesis

$$H_0 : \zeta_5 = 0,$$

which implies that the two sites are identical in the extent of discrimination. When ζ_5 is positive (negative), discrimination at the Diverse site is less (more) severe than at the Non-diverse site. as before, We estimate ζ_5 through OLS model with standard errors clustered at the employer level and a random effects specification.[9]

Table 9 reports the results. The negative estimates of ζ_3 suggest that the wage of the Non-diverse minority workers is $5\% - 6\%$ lower than that of the Non-diverse Han workers. The significantly positive estimates of ζ_5 suggest that the wage of the Non-diverse minority workers is 5% lower than that of the Diverse minority workers. Therefore, the wage of the Non-diverse minority workers is lower than that of the other three groups of workers whose wage levels are similar: the Non-diverse Han employers, the Diverse Han employers, and the Diverse minority employer. Hence discrimination is more severe at the Non-diverse site than at the Diverse site.

4.5 Employer welfare

Our experimental labor market also allows us to evaluate the welfare of the employers. Although the previous results can imply about employer earnings, we pool employers in treatments TGE and TGEU and conduct the following explicit analysis:

$$\begin{aligned} \text{Employerearning}_{ij} = \quad & \eta_0 \quad + \eta_1 \cdot \text{Signal}_j + \eta_2 \cdot \text{Female}_j + \eta_3 \cdot \text{Minority}_j \\ & + \quad \eta_4 \cdot \text{Urban}_j \cdot \text{TGEU}_i + \eta_5 \cdot \text{Rural}_j \cdot \text{TGEU}_i + \tau_{ij}, \quad (4) \end{aligned}$$

where *Employerearning* is the number of credits employer i earns from evaluating workers j, calculated as $150 - 10 \times |\text{worker } j\text{'s productivity} - \text{employer } i\text{'s belief}|$.

We use this equation to examine how employer earnings depend on worker characteristics. For example, η_3 measures the difference of earnings between evaluating a Han worker and a minority worker. Positive (negative) η_3 implies that employers earn more (less) for evaluating minority workers.

We present the results in Table 10. Columns (1) and (2) suggest that when evaluating a minority worker, the Non-diverse Han employers earn $7.62 - 8.29$ fewer credits than when evaluating a Han worker. We attribute this earning difference to Han employers' discrimination against minority workers. Ethnic discrimination thus reduces the welfare of not only the minority workers but also the Han employers.

Table 10

[9]The fixed-effects estimates are very similar to the random effects specification except that the the variable *Diverse* falls out.

5 Conclusion

We study ethnic discrimination using laboratory experiments at two sites in China that differ by historical shares of minorities in the population. We find that Han participants in the role of the employers at the non-diverse site discriminate against minority workers, but those at the diverse site do not assign lower wages based on ethnic status. In our setting, discrimination is costly both to minority workers who get lower wages and to Han employers who are penalized for mistakes in estimating worker productivity. Observed differences between two sites are consistent with the literature in psychology and economics that highlights diversity and exposure as a remedy for group stereotypes. Our simple two site design suggests that discriminatory patterns in China are not universal and depend on local factors. A more comprehensive study on the role of diversity on discrimination patterns would involve collecting data at multiple sites with different levels of minority shares.

As with a vast body of experimental studies, standard criticisms of our student subject pool apply. The experience of real-world human resource officers might make them less susceptible to making judgments based on the ethnic status of the applicants, even in a non-diverse province. Another important caveat is that we only study a short one-time interaction in the laboratory. Taste-based discrimination is therefore less of a concern compared to the real world where employers and employees have to interact repeatedly. Repeated interaction could help reduce incorrect group stereotypes.

We also do not check the robustness of our findings to different real-effort tasks. The character puzzles in our experiment might be associated by employers to tasks that require high cognitive ability. For some other types of tasks such as hunting or singing, the findings might be different.

Given that we provide very weak priming about minority status, our participants engage in a task for which there is no productivity difference based on ethnicity, and everyone participates in the experiment in both roles as workers and employers, we believe that observed differences are likely to measure a lower bound of possible discriminatory behavior. Since we document distinct behavioral patterns at two sites with different underlying diversity, we think that a more comprehensive study on the determinants of ethnic discrimination is warranted.

A Experimental Instructions

Page 1

There are two roles in this experiment: *workers* and *employers*. In this section, you will play the role of the worker. In the next section we will invite you to play the role of the employer.

Workers have the task to solve as many character puzzles as possible within a five-minute period. You will be able to perform a few practice puzzles on the next page to familiarize yourself with the task. For each puzzle that you solve during the five minute period, you will receive 40 credits. For example, if you solve 5 puzzles, you will receive 200 credits.

As a worker, you will be evaluated by several employers who set your wages. Each employer will see your performance in a timed practice game and might also see your gender, Hukou, ethnicity or major. The employer's task is to estimate as precisely as possible how many puzzles you are able to perform during the five-minute period. The employer's earnings will be higher the better he/she predicts your performance.

The employers' estimates of your puzzle-solving skills can increase your earnings as a worker. For each employer, you earnings will increase by the employers' average estimate of your puzzle-solving skills times 40 credits. For example, if the employers estimate on average that you can solve 5 puzzles, then you would receive 5 times 40 = 200 credits additionally.

Page 2

On this page, you have the opportunity to solve two example puzzles to familiarize yourself with your task. The square with characters on the right differs from the square of characters on the left in two letters. You have to find those letters and click on them to solve the puzzle.

CHARACTER PUZZLE

Page 3

On the next page, you are asked to solve a timed practice game. You see a running clock that measures your time until you solve the puzzle. This practice time will be visible to employers who later estimate your puzzle-solving ability.

Remember, that the higher each employers' average estimate of your puzzle-solving ability, the higher are your earnings, as the employers' average estimate will be mul-

tiplied by 40 credits and added to your earnings.

Only go to the next page when you are ready. The practice game will start immediately.

Page 4

Please solve this time practice puzzle as quickly as possible.

CHARACTER PUZZLE

Page 5

On the next page, you are asked to solve as many puzzles as possible within a five-minute period. You will receive 40 credits for each solved puzzle.

Only go to the next page when you are ready. The game will start immediately.

Page 6

Please solve as many puzzles as possible within the next five minutes.

CHARACTER PUZZLE

Page 7

In this section of the experiment, you will play the role of the employer.

On the next page, we will ask you to evaluate 10 workers who just completed their five-minute puzzle-solving task.

As an employer, you have to estimate the performance of each worker. We will provide you with some basic information about each worker, such as worker's performance in the timed practice puzzle. For each worker, you will receive 150 credits if you predict the worker's performance in the five-minute task precisely. If your estimate is off by X puzzles for this worker, then you will receive 150 credits minus X times 10 credits. For example: If you predict that the worker can solve 5 puzzles and he or she solves 3, then your earnings are 130 credits (150 credits minus 2 times 10 credits). Similarly, if a worker solves 8 puzzles and you predict that he or she can solve 5 puzzles, then your estimate is off by 3 and you earn earns 120 credits (150 credits minutes 3 times 10 credits).

Your estimates of a worker's puzzle-solving skills can increase that worker's earnings. Each worker will be evaluated by several employers, and the worker's earnings

will increase by the average estimate of all employers times 40 credits.

Page 8

ESTIMATION OF WORKER PERFORMANCE

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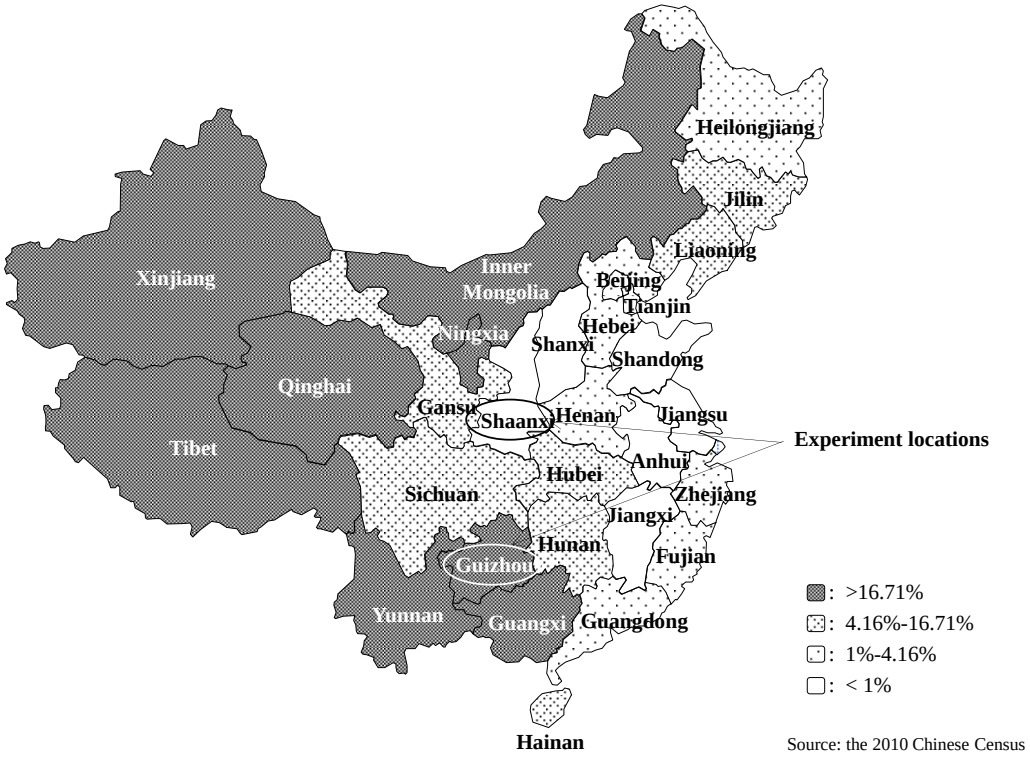
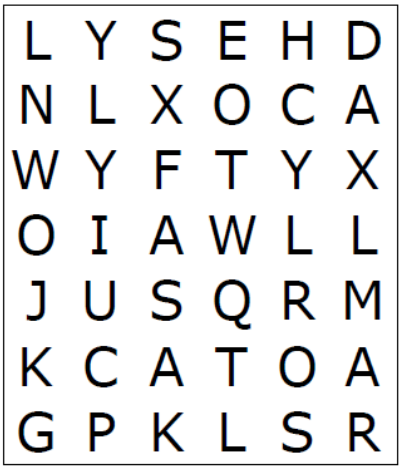
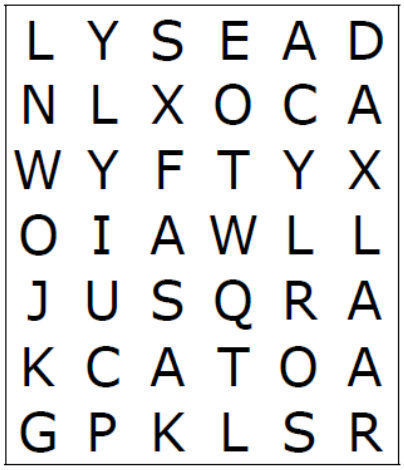


Figure 1 Shares of Ethnic Minorities in the Population of the Mainland China



L	Y	S	E	H	D
N	L	X	O	C	A
W	Y	F	T	Y	X
O	I	A	W	L	L
J	U	S	Q	R	M
K	C	A	T	O	A
G	P	K	L	S	R



L	Y	S	E	A	D
N	L	X	O	C	A
W	Y	F	T	Y	X
O	I	A	W	L	L
J	U	S	Q	R	A
K	C	A	T	O	A
G	P	K	L	S	R

Figure 2 The Character Puzzle

TG

Worker
Practice time:
Gender:
Your evaluation:

TGE

Worker
Practice time:
Gender:
Ethnicity:
Your evaluation:

TGEU

Worker
Practice time:
Gender:
Ethnicity:
Urban/rural:
Your evaluation:

TGPU

Worker
Practice time:
Gender:
Province of origin:
Urban/rural:
Your evaluation:

Figure 3 Resume Treatments

Table 1 Minority Population and Shares by Province

Province	Minority Population (million)	Province	Minority Share (%)
1. Guangxi	17.11	1. Tibet	91.69
2. Yunnan	15.34	2. Xinjiang	59.90
3. Xinjiang	13.07	3. Qinghai	46.98
4. Guizhou	12.55	4. Guangxi	37.17
5. Liaoning	6.64	5. Guizhou	36.12
6. Hunan	6.55	6. Ningxia	35.40
7. Inner Mongolia	5.06	7. Yunnan	33.37
8. Sichuan	4.91	8. Inner Mongolia	20.48
9. Hebei	2.99	9. Hainan	16.71
10. Tibet	2.76	10. Liaoning	15.18
11. Qinghai	2.64	11. Hunan	9.97
12. Hubei	2.47	12. Gansu	9.43
13. Gansu	2.41	13. Jilin	7.98
14. Ningxia	2.23	14. Chongqing	6.72
15. Jilin	2.19	15. Sichuan	6.11
16. Guangdong	2.06	16. Hubei	4.32
17. Chongqing	1.94	17. Hebei	4.16
18. Hainan	1.45	18. Beijing	4.08
19. Heilongjiang	1.37	19. Heilongjiang	3.58
20. Zhejiang	1.21	20. Tianjin	2.55
21. Henan	1.13	21. Zhejiang	2.22
22. Fujian	0.80	22. Fujian	2.17
23. Beijing	0.80	23. Guangdong	1.98
24. Shandong	0.73	24. Shanghai	1.22
25. Anhui	0.40	25. Henan	1.20
26. Jiangsu	0.38	26. Shandong	0.76
27. Tianjin	0.33	27. Anhui	0.67
28. Shanghai	0.28	28. Shaanxi	0.51
29. Shaanxi	0.19	29. Jiangsu	0.48
30. Jiangxi	0.15	30. Jiangxi	0.34
31. Shanxi	0.09	31. Shanxi	0.25

Source: The 2010 Chinese Census, National Bureau of Statistics of China.

Table 2 Summary Statistics of Variables

	Non-diverse		Diverse	
Variable	Mean	Std.Dev	Mean	Std.Dev
$Signal$	18.86	7.03	15.78	5.80
$Belief$	18.59	3.50	17.41	3.26
$Productivity$	16.21	5.50	15.23	4.65
$LnSignal$	2.87	0.38	2.69	0.40
$LnBelief$	2.91	0.18	2.84	0.19
$LnProductivity$	2.71	0.43	2.67	0.34
$Minority$	0.18	0.38	0.42	0.49
$Female$	0.51	0.50	0.39	0.49
$Rural$	0.54	0.50	0.70	0.46

Table 3 Productivity Regression

	$LnProductivity$					
	Non-diverse			Diverse		
	(1)	(2)	(3)	(4)	(5)	(6)
$LnSignal$	0.34**	0.41**	0.40**	0.32**	0.35**	0.34**
	(0.07)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)
$Female$	0.05	0.06	0.06	0.08*	0.07†	0.06†
	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)
$Minority$	0.05	-0.05	-0.06	-0.03	-0.04	-0.05
	(0.08)	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)
$Rural$	-0.08		-0.08	-0.07†		-0.09*
	(0.05)		(0.05)	(0.04)		(0.04)
Province dummies	Yes	No	No	Yes	No	No
N	291	291	291	276	276	276
R^2	0.22	0.14	0.15	0.27	0.18	0.20

Notes: Significance levels of 10%, 5%, and 1% are denoted by †, $*$, and $**$, respectively; dummies of provinces are included in columns (1) and (4); N is numbers of workers.

Table 4 Means of Employer Belief

Employers	Non-diverse				Diverse			
	Han		Minority		Han		Minority	
Workers	Han	Minority	Han	Minority	Han	Minority	Han	Minority
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TG	19.21	17.80	17.56	16.08	17.10	17.17	16.61	16.36
TGE	19.72	18.65	20.09	20.59	18.90	17.72	16.87	16.71
TGEU	18.62	17.13	18.85	18.97	17.57	17.79	17.02	17.04
TGPU	18.32	18.55	17.11	16.39	16.90	16.50	19.19	18.99

Table 5 Wage Regression for Treatment TG

Dependent variable: $LnBelief$								
Employers	Non-diverse				Diverse			
	Han		Minority		Han		Minority	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$LnSignal$	0.39**	0.42**	0.35	0.36**	0.28*	0.29**	0.50**	0.56**
	(0.10)	(0.03)	(0.20)	(0.06)	(0.10)	(0.04)	(0.11)	(0.04)
$Female$	-0.07**	-0.06*	0.05	-0.06	-0.03	0.00	0.05	0.03
	(0.02)	(0.02)	(0.08)	(0.06)	(0.04)	(0.03)	(0.03)	(0.04)
$Minority$	-0.04	-0.04	-0.06	-0.05	0.01	0.01	-0.05†	-0.05
	(0.03)	(0.03)	(0.06)	(0.06)	(0.02)	(0.03)	(0.03)	(0.03)
N	382	382	78	78	320	320	160	160
R^2	0.20	0.20	0.24	0.21	0.08	0.08	0.38	0.38

Notes: Significance levels of 10%, 5%, and 1% are denoted by †, $*$, and $**$, respectively; N is numbers of evaluated workers.

Table 6 Wage Regression for Treatment TGPU

Dependent variable: *LnBelief*								
Employers	Non-diverse				Diverse			
	Han		Minority		Han		Minority	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LnSignal	0.08	0.10*	0.52*	0.53**	0.42**	0.49**	0.33†	0.23**
	(0.13)	(0.05)	(0.11)	(0.13)	(0.09)	(0.04)	(0.16)	(0.05)
Female	0.02	-0.08*	-0.20	-0.14	0.02	0.02	0.04	0.02
	(0.07)	(0.04)	(0.16)	(0.10)	(0.03)	(0.03)	(0.08)	(0.04)
Minority	0.05	0.00	0.05	0.01	0.00	0.01	0.02	-0.02
	(0.11)	(0.06)	(0.22)	(0.15)	(0.02)	(0.04)	(0.05)	(0.04)
Rural	-0.01	-0.01	0.12	0.12	-0.08†	-0.07†	-0.08	-0.10*
	(0.05)	(0.04)	(0.11)	(0.09)	(0.05)	(0.04)	(0.09)	(0.04)
N	377	377	85	85	270	270	180	180
R^2	0.06	0.01	0.49	0.42	0.26	0.26	0.23	0.16

Notes: Significance levels of 10%, 5%, and 1% are denoted by †, ∗, and ∗∗, respectively; dummies of provinces are included in each column; N is numbers of evaluated workers.

Table 7 Wage Regression for Treatment TGE

Dependent variable: *LnBelief*								
Location	Non-diverse				Diverse			
Employers	Han		Minority		Han		Minority	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LnSignal	0.24	0.31**	0.27	0.35**	0.35*	0.36**	0.25*	0.18**
	(0.16)	(0.04)	(0.15)	(0.07)	(0.15)	(0.04)	(0.09)	(0.04)
Female	-0.02	-0.02	-0.07	-0.06	-0.07*	-0.02	0.01	-0.07*
	(0.03)	(0.03)	(0.06)	(0.08)	(0.03)	(0.03)	(0.09)	(0.03)
Minority	-0.07†	-0.05†	0.03	0.04	-0.03	-0.03	-0.01	0.01
	(0.04)	(0.03)	(0.08)	(0.08)	(0.04)	(0.03)	(0.04)	(0.03)
N	375	375	89	89	240	240	230	230
R^2	0.06	0.06	0.13	0.13	0.13	0.13	0.02	0.02

Notes: Significance levels of 10%, 5%, and 1% are denoted by †, *, and **, respectively; N is numbers of evaluated workers.

Table 8 Wage Regression for Treatment TGEU

Dependent variable: *LnBelief*								
Location	Non-diverse				Diverse			
Employers	Han		Minority		Han		Minority	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LnSignal	0.34**	0.34**	0.16	0.17**	0.38**	0.35**	0.37**	0.34**
	(0.06)	(0.02)	(0.11)	(0.05)	(0.07)	(0.02)	(0.07)	(0.03)
Female	-0.03	-0.03	-0.01	-0.02	0.05	-0.01	0.01	-0.01
	(0.03)	(0.02)	(0.04)	(0.04)	(0.04)	(0.02)	(0.03)	(0.02)
Minority	-0.04†	-0.06**	-0.03	-0.03	-0.00	-0.00	-0.01	-0.01
	(0.02)	(0.02)	(0.05)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Rural	0.04	0.01	-0.08	-0.04	0.01	-0.06**	0.01	-0.01
	(0.04)	(0.02)	(0.06)	(0.04)	(0.04)	(0.02)	(0.04)	(0.02)
N	1099	1099	231	231	760	760	610	610
R^2	0.09	0.08	0.04	0.04	0.12	0.11	0.13	0.13

Notes: Significance levels of 10%, 5%, and 1% are denoted by †, ∗, and ∗∗, respectively; N is numbers of evaluated workers.

Table 9 Pooled Wage Regression for Han Employers

	$LnBelief$	
	OLS	RE
	(1)	(2)
$LnSignal$	0.34**	0.34**
	(0.04)	(0.01)
$Female$	-0.01	-0.02†
	(0.02)	(0.01)
$Minority$	-0.05*	-0.06**
	(0.02)	(0.02)
$Diverse$	0.02	0.02
	(0.05)	(0.05)
$Minority * Diverse$	0.05†	0.05*
	(0.02)	(0.02)
$Urban * TGEU$	-0.08	-0.05
	(0.05)	(0.06)
$Rural * TGEU$	-0.05	-0.07
	(0.05)	(0.06)
N	2474	2474
R^2	0.10	0.09

Notes: Significance levels of 10%, 5%, and 1% are denoted by †, ∗, and ∗∗, respectively; N is numbers of evaluated workers.

Table 10 Employer Welfare

Dependent variable: *Employerearnings*								
Employers	Non-diverse				Diverse			
	Han		Minority		Han		Minority	
	OLS	RE	OLS	RE	OLS	RE	OLS	RE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Signal	-1.28**	-1.47**	-2.40**	-2.18**	-0.09	0.31	0.23	0.32
	(0.05)	(0.22)	(0.72)	(0.48)	(0.68)	(0.28)	(0.57)	(0.31)
Female	5.19	5.84†	19.02*	20.69**	-12.12	-5.45	-4.85	-2.44
	(3.46)	(3.35)	(9.06)	(7.87)	(7.62)	(3.41)	(4.68)	(3.61)
Minority	-8.29*	-7.62*	-10.78	-8.88	-2.19	-2.04	2.18	2.12
	(4.04)	(3.57)	(8.77)	(8.42)	(3.25)	(3.22)	(3.03)	(3.45)
Urban_TGEU	10.02	6.24	-0.73	-2.78	12.80	3.55	2.77	1.62
	(14.84)	(13.93)	(20.29)	(21.55)	(14.87)	(15.80)	(9.86)	(8.96)
Rural_TGEU	-2.43	-0.48	25.16**	24.60	4.34	6.92	8.89	9.59
	(17.86)	(13.89)	(8.47)	(21.56)	(17.77)	(15.52)	(9.16)	(8.51)
N	1474	1474	320	320	1000	1000	840	840
R^2	0.01	0.01	0.09	0.09	0.01	0.00	0.01	0.01

Notes: Significance levels of 10%, 5%, and 1% are denoted by †, ∗, and ∗∗, respectively; N is numbers of evaluated workers.