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ABSTRACT

Does Labor Market Tightness Affect Ethnic Discrimination in Hiring?

Several studies using observational data suggest that ethnic discrimination increases in downturns of the economy. We investigate whether ethnic discrimination depends on labor market tightness using data from correspondence studies. We utilize three correspondence studies of the Swedish labor market and two different measures of labor market tightness. These two measures produce qualitatively similar results, and, opposite to the observational studies, suggests that ethnic discrimination in hiring decreases in downturns of the economy.

JEL Classification: C93, J15, J21, J71

Keywords: hiring discrimination, ethnic discrimination, labor market tightness, the business cycle, correspondence studies, field experiments, ranking models, screening models

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1. Introduction

In many Western countries, there are substantial ethnic employment gaps, and research show that these gaps, at least partly, can be attributed to ethnic discrimination in the labor market.[1] The ethnic employment gaps tend to widen during recessions and narrow during booms, suggesting that ethnic discrimination varies with the business cycle.[2] However, this body of research uses survey or administrative data in which ethnic discrimination is unidentified, and therefore, it is usually not possible to separate the effect of ethnicity from the effect of unobserved individual characteristics. Thus, it is unclear whether the pattern reflects a relationship between ethnic discrimination and labor market tightness.

[1] A number of recent correspondence studies show that ethnic minorities are discriminated against in hiring. For example, Carlsson and Rooth (2007) study the Swedish labor market and find that job applicants with a Swedish-sounding male name have a fifty-percent higher probability of receiving a callback for a job interview compared to job applicants with a Middle Eastern-sounding male name. Similar results have been found for ethnic minorities in the Australian, Belgian, Norwegian, UK, and US labor markets, to name a few (Booth et al. (2012), Baert et al. (2015), Kaas and Manger (2012), Drydakis and Vlassis (2010), Midtbøen (forthcoming), Fibbi et al. (2006), Woods et al. (2009), Riach and Rich (2002), and Bertrand and Mullainathan (2004)). In contrast, Fryer & Levitt (2004) – a non-experimental study – find no negative effect of having a distinctively black name on later outcomes once background characteristics are controlled for.

[2] See Biddle and Hamermesh (2013), Bratsberg, Barth and Raaum (2006), and Dustman, Glitz and Vogel (2010). This research mainly finds that the ethnic wage/employment gap is increasing in unemployment.

In this study, we use data from correspondence studies[3] to investigate whether ethnic discrimination depends on labor market tightness.[4] Correspondence studies address the problem of unobserved individual variables by introducing random assignment of the signal of ethnicity, thereby solving the identification problem associated with analyses of administrative data.[5] Several correspondence studies have shown ethnic discrimination to be severe in the Swedish labor market, and especially towards job applicants with Middle Eastern sounding names. For instance, Carlsson and Rooth (2007) find that the callback rate for a job interview is 50 percent lower for those with Middle Eastern sounding names compared to those with native Swedish sounding names.[6] This ethnic minority group is also at focus in this study.

[3] In correspondence studies, researchers send fictitious written job applications to employers with a job vacancy. The job applications are designed to be qualitatively identical except for the applicant's name, which is randomly assigned and chosen to signal ethnicity. Discrimination is then measured as the difference in the share of job interview invitations between the majority and minority.

[4] A common definition of labor market tightness, which we also use in this paper, is the vacancy-unemployment ratio, where a higher ratio means a tighter labor market. In a tight labor market, there are many vacancies and few unemployed workers looking for jobs, meaning that vacancies are difficult to fill. In a slack labor market, the opposite is true, i.e., there are few vacancies and many unemployed workers looking for jobs, meaning that vacancies are easy to fill. Empirically, for our main measure we define labor market tightness as the occupation specific vacancy-unemployment ratio which varies over experiments (time) and across regions (cities).

[5] Although a correspondence study identifies the level of discrimination in the market, Heckman and Siegelman (1993) and Heckman (1998) show that correspondence studies cannot distinguish between preference-based and statistical discrimination.

[6] Surveys among potentially discriminated groups indicate that discrimination is worst against individuals with a Middle Eastern background (e.g. Lange, 2000), and Swedish labor force surveys show that the difference in unemployment rates relative to natives are largest for immigrants born in the Middle East (Carlsson and Rooth, 2007).

There are (at least) two categories of theories that help explain why and how ethnic discrimination in hiring may depend on labor market tightness (a more detailed explanation is given in Section 2). Ranking models (e.g., Blanchard and Diamond, 1994) predict less ethnic discrimination in a tight labor market. The reason is that employers will rank job applicants that belong to the minority higher in a tight labor market, simply because there are fewer job applicants to each vacancy in a tight labor market. For screening models (e.g., Vishwanath, 1989), the prediction could go in both directions, depending on differences in the distribution of unobserved characteristics between majority and minority workers. However, if there is more uncertainty about these characteristics for the minority, belonging to ethnic minority could send a stronger signal (compared to the ethnic majority) about bad unobserved skills in an upturn than in a downturn of the economy. Due to the competing models, the direction and the strength of the relationship between the degree of ethnic discrimination and labor market tightness is purely an empirical issue.

We are only aware of one previous study, Baert et al. (2015), which test the relationship between the degree of ethnic discrimination and labor market tightness.[7] This study is a correspondence study of the Belgian labor market, which focuses on how the hiring of ethnic minorities is affected by labor market tightness. They find that ethnic discrimination is lower when labor market tightness is higher. In fact, when they divide their occupations into two categories defined by the degree of labor market tightness, they find no evidence of discrimination in the tighter labor market. However, their empirical measure of labor market

[7] Another study that is related to ours is Kroft et al (2013), which (without considering the ethnic dimension) analyzes whether the general hiring behavior of employers varies with labor market tightness. They find that the signaling value of an unemployment spell is stronger in a tighter labor market, which is consistent with a screening model.

tightness appear to lack an intuitive property, namely a main effect such that the callback rate for natives is higher in the tighter labor market.

In this study, we return to the important and – with one exception – unexplored question whether there is a relationship between ethnic discrimination and labor market tightness. We use a measure of labor market tightness that has a general positive effect on the probability of finding a job. We put great effort into measuring labor market tightness and employ two quite different measures. The most preferred measure, from a theoretical perspective, of labor market tightness is the vacancy-unemployment ratio by occupation, further divided by region and time. However, not all unemployed are registering with the public unemployment agency and not all jobs are posted their either which makes analyses using alternative measures of labor market tightness warranted, at least as a sensitivity check. One such proxy measure of labor market tightness is taken from an additional correspondence study in which we sent job applications with a native female name, and we simply use the callback rate of applicants with a female name as a proxy measure of labor market tightness. This measure should closely mimic the degree of occupation specific labor market tightness, especially because other studies have shown that females are not discriminated against in hiring in the Swedish labor market (see, e.g., Carlsson, 2011, and Eriksson and Lagerström, 2012). However, this measure is potentially endogenous to ethnic discrimination if the female callback rate is increased due to firms discriminating the ethnic minority. Importantly, both measures are in our study found to have a general effect on the callback rate since they have a strong association with the callback rate for native Swedish men. For example, if we simply divide the occupations into tight(er) and slack(er) labor markets around the median of labor market tightness using the vacancy-unemployment ratio, then the callback rate is 17 percent higher in the tighter labor market.

Our study also makes a contribution in terms of arriving closer to a causal interpretation of the results. Because labor market tightness is not randomly assigned, it could potentially pick

up other characteristics related to labor market tightness, leading to biased inferences. Due to the data at hand, we are able to address some of the potential omitted variable biases by incorporating occupation fixed effects into the regression model. A remaining issue, which also could lead to biased inferences, is whether there are unobserved variables that are correlated with the change in the occupational labor market tightness over time. To address this problem, we add time-varying control variables at the firm level.

Using these different measures of labor market tightness we find that in Sweden, ethnic discrimination in hiring increases (decreases) with labor market tightness (in downturns of the economy), that is, an improving labor market increases the number of job interviews relatively more for natives than for the ethnic minority. This result is in contrast to the only previous study that has investigated this issue, Baert et al (2015). On a more general note, our results hint that a screening model of hiring better explains the data than a ranking model, which is consistent with the results reported in Kroft et al (2013).

The next section discusses the theoretical background with a focus on ranking and screening models. Section 3 describes the correspondence studies and construction of the labor market tightness variables. Section 4 presents the main results, and section 5 concludes.

2. Theoretical background

There are (at least) two categories of theories stating that labor market tightness should affect ethnic difference in callback rates, providing different expectations.

The first category of models is ranking models (e.g., Blanchard and Diamond, 1994), which do not consider an ethnic dimension but can be applied to our case with a slight modification. In these models, employers consider the length of the unemployment spell as a signal of low unobserved productivity, and employers then rank the job applicants according to the length of their unemployment spells. One can then exchange the long-term unemployed signal with the

ethnic minority signal. Now, the ethnic minority name sends a signal about low unobserved productivity. In a tight labor market, there is less competition for jobs, meaning that the ethnic minority is ranked higher. As a result, the ethnic difference in callbacks is lower in a tight labor market. The opposite pattern holds in a slack labor market. Note, in these models the strength of the signal of ethnic belonging do not change with labor market tightness.

The second category of models is screening models (Vishwanath, 1989; Lockwood 1991), where the strength of the signal could vary by labor market tightness. Screening models also consider the relationship between long-term unemployment and hiring without an explicit ethnic dimension. In these models, it is assumed that some productive characteristics of a worker are unobserved to the employer. However, the employers learn from their own experience of hiring and from other firms that long-term unemployed workers tend to have worse unobserved skills. Rational employers then use long-term unemployment as a signal of unobserved productivity in the hiring decision. As a result, the probability of being hired will be lower for long-term unemployed workers, implying a duration dependency.

In screening models, duration dependency, i.e. the strength of the signal of unemployment, varies by labor market tightness. Duration dependency will be stronger in a tight labor market, where mostly low-skilled workers are long-term unemployed, and, as a result, unemployment duration is a stronger signal of bad productivity. In contrast, duration dependency will be weaker in a slack labor market, where both low- and high-skilled workers are long-term unemployed, and, as a result, unemployment duration is a weaker signal of bad productivity

Similarly, variation in duration dependency over the business cycle could depend on ethnic group belonging. This can be illustrated by a simple example. Say that there are four skill levels (where four is the most skilled) of workers, and the ethnic minority is evenly distributed over skill level 1-3 while the ethnic majority is evenly distributed over skill level 2-4. Now assume that in a tight labor market, mostly workers with skill level 1 are unemployed due to structural

unemployment. In addition, one can imagine that a small share of workers evenly distributed over the other categories is unemployed due to frictional unemployment. In this case, the signal of long-term unemployment will essentially contain no information about unobserved productivity for the ethnic majority, while it will send a precise and negative signal for the minority. Now instead imagine a slack labor market and a situation where long-term unemployed workers mainly belong to skill level 1-3 (evenly distributed). In this case, the signal of long-term unemployment will in contrast contain very little information about unobserved productivity for the ethnic minority, while it will send a precise negative signal for the majority. We see that in this simplified example ethnic discrimination is higher in a tight labor market. The reason is that (compared to the ethnic majority) the minority sends a stronger signal about bad unobserved skills in an upturn than in a downturn of the economy.

To illustrate this cyclical pattern in a more formal way, imagine a bell-shaped distribution of unobserved skills where the variance is relatively larger for ethnic minority workers (while the mean is the same as for the majority). In a tight labor market, only low-skilled minority and majority workers, located far to the left in the skill distribution, are long-term unemployed. The left tail of the skill distribution is more stretched out for the minority group, and this results in an ethnic difference in skill composition among the long-term unemployed, implying that job seeking minority and majority workers in this situation send signals about their group's productivity of different strengths.

Now, imagine that the labor market weakens. Consequently, slightly better skilled workers, who were previously on the margin of being long-term unemployed, become long-term unemployed. Due to the ethnic difference in the variance of the skill distribution, the density of workers at the margin is different for minority and majority workers. As a result, the compositional skill change among long-term unemployed workers changes differently for minority and majority workers. This is why the strength of the long-term unemployment signal

varies differently for minority and majority workers over the business cycle, and why the degree of discriminatory treatment changes with labor market tightness.

Notice that the direction of the change in discriminatory treatment depends on the shape of the skill distribution for majority and minority workers. Here we assumed that the variance of the skill distribution is relatively larger for minority workers, but the opposite can be true as well, leading to reversed expectations.

Finally, also notice that if we find a negative empirical relationship between ethnic discrimination and labor market tightness, we cannot distinguish between ranking and screening models. However, a positive relationship in which ethnic discrimination increases when the labor market tightens can only be explained by screening models.

3. Data

This section describes the correspondence studies and the two different measures of labor market tightness that we use to test the relationship between the degree of ethnic discrimination and labor market tightness.

3.1 The correspondence studies

The data are taken from three correspondence studies, Carlsson and Rooth (2007), Carlsson (2010), and Rooth (2011). These experiments were conducted between 2005 and 2007 in the Swedish labor market.[8] In Carlsson and Rooth (2007), we applied to 1,552 job advertisements; in Carlsson (2010), to 1,314 job advertisements; and in Rooth (2011), to 3,821 job advertisements. These studies posed somewhat different research questions but were similar enough to allow us to pool the data. The most important similarity is that all three experiments studied ethnic discrimination against applicants with Middle Eastern sounding names. The

[8] The interested reader should turn to these sources for further detail.

experiments are also similar in that, for the most part, the same occupations were included and the same procedures for applying to jobs and receiving responses were used.

The occupations included accountants, business sales assistants, computer professionals, construction workers, motor vehicle drivers, nurses, restaurant workers, teachers (math/science and language teachers in upper level compulsory school and secondary school teachers), and shop sales assistants.[9] These are among the most common occupations in the Swedish labor market and include skilled, semiskilled and unskilled occupations employing varying shares of immigrants (see Eriksson and Rooth, 2014).

The job applications were designed to be realistic but not represent real persons. In addition, because competition from other applicants was considerable, the fictitious applications were constructed to signal well-qualified applicants. The applications consisted of quite general biographies on the first page and detailed CVs listing education and work experience on the second page. To signal ethnicity, common Swedish- and Middle Eastern-sounding male names were randomly assigned to resumes.

In all three experiments, the same procedures were used to apply for jobs and measure callbacks for job interviews. All vacancies in the chosen occupations found on the webpage of the Swedish employment agency were collected. Vacancies were collected in the two major cities of Sweden: Stockholm and Gothenburg. Callbacks for job interviews were received via telephone or email.

Beyond the data on callbacks, we have access to a number of firm characteristics, such as firm size, sex ratio of the employees, and sex of the recruiter.

[9] In addition, Carlsson and Rooth (2007) and Carlsson (2010) included preschool teachers, and Rooth (2011) included cleaners and mechanics. However, for the analysis in this study we only include occupations that exist in all experiments, because the other occupations will not contribute to identification once we pool the data from these experiments and employ occupational fixed effects.

3.2 Measures of labor market tightness

Our preferred measure of labor market tightness on theoretical grounds is the vacancy-unemployment ratio. We have access to an occupation and city-specific measure of the vacancy-unemployment ratio, which further varies across experiments (time). Although being our preferred measure of labor market tightness, the vacancy-unemployment ratio can potentially contain measurement error (which we discuss below). Therefore, as a sensitivity analysis, we also employ a proxy measure that is expected to reflect labor market tightness: the native female callback rate. This measure too is measured at the occupational and city level, and varies across experiments.

The occupation and region specific vacancy-unemployment ratio

Data on the number of unemployed and the number of posted job vacancies is obtained from the Swedish Employment Agency. First, we collected the number of workers flowing into unemployment between May 2005 and February 2006, between August 2006 and April 2007, and then from March 2007 until November 2007, respectively. The three experiments were conducted during these periods. Then, we collected the number of new vacancies being reported to the Agency during the same time periods. For all three experiments we observe the number of unemployed and the number of posted job vacancies separately for each occupation and region/city. Table A2 shows the mapping of the occupations in the experiment to the occupational coding in the Swedish Employment Agency register. To obtain our occupational and region specific measure of labor market tightness we divide the number of posted vacancies by the number of unemployed, for each occupation and region. Since the first two experiments (Carlsson and Rooth, 2007, and Carlsson, 2010) included only vacancies posted in Stockholm and Gothenburg, while the second experiment (Rooth 2011) included vacancies all over Sweden we make a geographical restriction, only including vacancies in the Stockholm and

Gothenburg labor market area (the county). The clear majority of job vacancies are in the Stockholm and Gothenburg labor market areas. As is evident from Figure 1, the vacancy-unemployment ratio varies within occupations across experiments (time), and, in the empirical section we also find that this measure of labor market tightness has a strong general positive effect on the callback rate of native men.

Although this labor market tightness measure is our preferred one, we expect some measurement issues. First, not all job applicants are registered at the labor market agency and not all jobs are either. Whether one is more misreported than the other, leading our measure to be larger or smaller than the true one, we do not know. Hence, this potential bias should be kept in mind when interpreting the results.

The occupation and region specific female callback rate

Our employed proxy measure of labor market tightness is the callback rate for native Swedish female applicants. It is possible to construct this measure because, in connection to the experiments in Carlsson and Rooth (2007) and Rooth (2011), additional applications with a native female name were sent to the employers. The resulting data enable us to construct occupation and city specific native female callback rates, which constitute our proxy measure of labor market tightness. The distribution of the female callback rate across occupations is shown in Figure A2 in the Appendix. From this figure, it is evident that the female callback rate varies between occupations and within occupations over time. The correlation with the vacancy-unemployment ratio is approximately .39.

We believe the native female callback rate to be a proxy for labor market tightness for several reasons. First, it should reflect labor market tightness directly and precisely in the occupations for which we study ethnic discrimination. Second, the female callback rate is likely to be a fair measure of labor market tightness because there is convincing evidence that this

group is not discriminated against in hiring in the Swedish labor market (see, e.g., Carlsson, 2011 and Eriksson and Lagerström, 2012). However, related to this point, this measure also has a potential short coming. The female callback rate could be endogenous to the ethnic difference in the callback rate if women have a higher chance to get a callback with firms discriminating the ethnic minority, perhaps simply as a consequence of the pool of job applicants being potentially smaller. Empirically, we find that this proxy measure of labor market tightness has the important property that it shows a strong general positive effect on the callback rate of native men.

4. Results

In this section, we first introduce the model specification and then proceed with the empirical analysis using the different measures of labor market tightness.

4.1 Model Specification

To test the relationship between ethnic discrimination and labor market tightness, we estimate the following simple model as our main specification:

$$Callback_{iotr} = \beta_0 + \beta_1 Minority_{iotr} + \beta_2 Tightness_{otr} + \beta_3 [Minority_{iotr} * Tightness_{otr}] + \varepsilon_{iotr}$$

$Callback_{iotc}$ is a dummy variable indicating whether application i, in occupation c, at time t, in region r resulted in a job interview, $Minority_{iotr}$ is a dummy variable indicating whether this application was assigned an ethnic minority name, and $Tightness_{otr}$ is a continuous (normalised) variable measuring either of our two measures of labor market tightness. The constant β_0 gives the callback rate for the ethnic majority, while β_1 is the difference in the callback rate between minority and majority job applicants measured at the mean value of labor

market tightness. β_2 is the general effect of labor market tightness on the callback rate of native men. For any sensible measure of labor market tightness, β_2 is positive because an increase in labor market tightness should increase the probability of being invited for a job interview. β_3 is the main parameter of interest, measuring whether the ethnic minority is differently affected by labor market tightness compared to native men. A negative coefficient β_3 says that ethnic discrimination increases with labor market tightness, meaning that an increase in labor market tightness does not help the minority as much as the majority in getting a callback for a job interview, while a positive coefficient says that ethnic discrimination decreases with labor market tightness. In light of the earlier theoretical discussion, we have ambivalent expectations about the sign of this coefficient.

While the ethnic dummy is exogenous by design, this is not true for labor market tightness. Therefore, we are worried that the estimate of labor market tightness captures a spurious correlation due to omitted variables. To try to address this potential problem, and to arrive closer to an estimate with a causal interpretation, we include occupation fixed effects and firm characteristics and interactions between these variables and the ethnic dummy indicator in the model. This is made possible since our employed measures of labor market tightness vary by occupation, time (experiments) and region. Adding occupation fixed effects and interactions with the ethnic dummy indicator neutralizes the influence of unobserved factors that relate to labor market tightness, ethnic discrimination, and the callback rate for a job interview operating at the occupational level. Hence, if employers in certain occupations are discriminating more, or less, in unobserved ways, then this will be controlled for. A remaining issue that may cause bias is that the interaction term may be correlated with some time-variant unobserved characteristics of the occupations. In an attempt to address this potential bias, we include a number of firm characteristics, and their interactions with the ethnic dummy indicator, that vary within occupations across experiments.

4.2 Main results: The vacancy-unemployment ratio

In this section we make use of data from all three correspondence tests, using the observations in Stockholm and Gothenburg in the occupations that exist in all three studies. We focus on the normalized vacancy-unemployment ratio as the measure of labor market tightness. We start by regressing the callback dummy on the ethnic minority indicator and the measure of labor market tightness. The results in the first column of Table 1 reveal that applications assigned a Middle Eastern sounding male name have an 11 percentage points lower probability of receiving a callback for a job interview compared to applications assigned a native Swedish sounding male name. The results also show that the return to labor market tightness is positive and statistically significant at the one-percent level. An increase of one standard deviation in the vacancy-unemployment ratio increases the probability of receiving a callback for a job interview by 4.5 percentage points.

Next, we add the main variable of interest, the interaction between the measure of labor market tightness and the ethnic minority indicator (see column 2). Interestingly, we find that the estimate is -.006, which implies that when labor market tightness increases, the probability of receiving a callback for a job interview increases more slowly for the ethnic minority relative to the majority, that is, ethnic discrimination increases. However, the estimate is imprecisely estimated with p=.13.

*** Table 1 about here ***

In column 3, we add occupation fixed effects and controls for firm characteristics. The estimate for the interaction between the measure of labor market tightness and the ethnic minority indicator does not change much, which is expected given the experimental design.

In column 4, we also add interactions between the ethnic dummy indicator and the occupation fixed effects and the controls for firm characteristics. The interactions with the occupation fixed effects facilitate a more causal interpretation by relying on variation within occupations over time and across cities. This is an extension of Baert et al (2015), who rely solely on variation across occupations. Adding firm characteristics and interactions with the ethnic dummy indicator is an attempt to also address the fact that the characteristics of firms could be different across experiments (within occupations). Such differences could lead to biased results if the firm characteristics are correlated with labor market tightness and also affect discrimination. We add the firm characteristics that are available from the experiment: firm size, female share at the firm, and sex of the recruiter.[10] Interestingly, in column 4 we arrive at an interaction effect that has a point estimate of -.015, which is statistically significant at the ten percent level. The interpretation of the estimate is that the level of discrimination increases from 11.1 (the estimate of minority in column 3) to 12.6 percentage points (that is, by 14 percent) when labor market tightness increases by one standard deviation.[11]

[10] For a small number of firms, information on these variables is missing. We do not exclude these firms from the regressions. Instead, we include a dummy variable that indicates whether the information is missing. For continuous variables, we also impute the mean value for variables with missing information. The missing indicators are also interacted with the ethnic minority indicator.

[11] The reason for using the estimate of the minority indicator from column 3 (-.111) as the benchmark in the calculation is that the one in column 4 shows the ethnic difference in callbacks for the specific occupation used as the reference category. The estimate in column 3 shows the average level of ethnic discrimination across all occupations in the experiment.

4.3 An alternative measure of labor market tightness[12]

In this section, we re-estimate the analysis from the previous section but employ the occupation specific female callback rate as the measure of labor market tightness. Since this measure does not directly measure labor market tightness we expect the results to be qualitatively, but not quantitatively, the same. The results in the first column of Table 2, without controlling for occupation fixed effects and firm characteristics, reveal that applications assigned a Middle Eastern sounding male name have a 8.8 percentage points lower probability of receiving a callback for a job interview compared to applications assigned a native Swedish sounding male name. The results also show that the return to labor market tightness is positive and statistically significant at the one-percent level. An increase of one standard deviation in the occupation specific callback rate of native females increases the probability of receiving a callback for a job interview by approximately eleven percentage points. In column 2, we add the interaction effect of interest to the specification in the previous column. The estimate is -.017 and statistically significant at the five percent level. Hence, we again arrive at a negative estimate, implying that the return to labor market tightness is lower for minority relative to majority job applicants. Including occupation fixed effects and firm characteristics do not change the parameter of interest much, see column 3. However, the estimate increases to -.024, and is still statistically significant, when including the interaction between these variables and the ethnic minority indicator, see column 4. Hence, the level of discrimination increases from 9.0 to 11.4 percentage points (that is, by 26 percent) when this proxy of labor market tightness measured increases by one standard deviation.

[12] In a previous version we used yet another proxy measure of labor market tightness, the actual number of job applicants to the job vacancy included in the experiment, see Carlsson et al (2015). This analysis arrived at qualitatively the same conclusion, i.e., that ethnic discrimination increased when labor market tightness increased, but the analysis was based on interviews with only 98 firms, creating uncertainties about sample selectivity.

*** Table 2 about here ***

4.4 Discussion

Both empirical measures of labor market tightness present qualitatively a very similar picture - the return to labor market tightness is lower for the ethnic minority than for the majority, and, hence, ethnic discrimination is larger when the labor market is tighter. This is opposite to what is found in many observational studies which are not able to identify ethnic discrimination.

That said, labor market tightness is not an experimental variable and could be correlated with other trends in the economy, like an increase in the level of ethnic discrimination. For instance, labor market tightness, measured by the vacancy-unemployment ratio, increased over the course of the experiments and so did the votes for the Swedish Democrats, a rightwing party aiming at reducing immigration to Sweden. In the 2006 election for the Swedish Parliament they arrived at some 1.5 percent of the votes, but in 2010 they got over 5 percent of the votes and passed the 4 percent hurdle needed to get seats in the parliament. However, two facts speak against this reflecting our results. First, the support for the Swedish Democrats is the lowest in the larger cities and for instance, in Stockholm city council elections they only got 3% of the votes in 2010 (and 1.5% in 2006). Second, attitudes towards immigration have actually moved in the opposite direction during the same time period. Thus, the increased vote share for the Swedish Democrats is unlikely to be a result of more negative attitudes towards immigration. For another project we have access to SOM attitude data (see Carlsson et al, 2016) showing that the share being negative towards immigration clearly has decreased during the course of the study.

5. Conclusion

The strength of correspondence studies compared to other methods of measuring ethnic discrimination is their ability to identify discrimination. However, it has proven difficult to understand some of the more subtle patterns in the results of correspondence studies, such as variation in ethnic discrimination across occupations. A potential explanation for variation in ethnic discrimination across occupations is that ethnic discrimination depends on labor market tightness, which may vary by occupation.

Using two quite different measures of labor market tightness, we find that, in Sweden, ethnic discrimination in hiring increases with labor market tightness. In other words, an improving labor market produces more job opportunities for natives than for the ethnic minority. This result stands in contrast to the only previous study that has investigated this issue, Baert et al. (2015). Potential explanations for this difference in results include that we use other measures of labor market tightness and study a different labor market. On a more general note, our results hint that a screening model of hiring better explains the data than a ranking model, which is consistent with the results reported in Kroft et al (2013). An interpretation of our results is that (compared to the ethnic majority) the minority sends a stronger signal about bad unobserved skills in an upturn than in a downturn of the economy.

Our result points to two important facts for policy makers. The first is that ethnic discrimination increases when the labor market improves, which conflicts with research on ethnic employment gaps and the business cycle. Hence, it points to ethnic gaps in labor supply characteristics or labor market institutions being responsible for the widening of ethnic employment gaps during recessions, and policies should be focused on addressing these issues. In addition, one additional piece of advice for policy makers is to maintain measures to reduce ethnic discrimination even when the business cycle improves.

Finally, we note that there could be ethnic discrimination not only in hiring, but also in, for example, wage setting and firings. To what extent such discrimination exist and varies with the business cycle is left for future research.

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Tables:

Table 1. The probability of a job interview. Labor market tightness measured by vacancies/unemployment.

	(1)	(2)	(3)	(4)
Constant	.326***	.326***	.330***	.344***
	(.028)	(.028)	(.018)	(.023)
Minority	-.111***	-.111***	-.111***	-.138***
	(.009)	(.008)	(.008)	(.015)
Labor market tightness	.045***	.048***	.040**	.045***
	(.012)	(.012)	(.016)	(.012)
Labor market tightness * Minority	-	-.006	-.006	-.015*
		(.004)	(.004)	(.008)
Occupation FEs	No	No	Yes	Yes
Firm characteristics	No	No	Yes	Yes
Occupation FEs * Minority	No	No	No	Yes
Firm characteristics * Minority	No	No	No	Yes
Number of observations	8,601	8,601	8,601	8,601

Notes: This table employ data from Carlson & Rooth (2007), Carlsson (2010) and Rooth (2011). The dependent variable is an indicator of whether the applicant was invited to a job interview. Labor market tightness is measured by the occupation and region specific vacancy-unemployment ratio, which is normalized with mean 0 and standard deviation 1. All regressions include experiment and city fixed effects. The firm characteristics are firm size, share of females at the firm, and sex of the recruiter. The estimates are from a linear probability model. Standard errors are clustered at the occupational level in all models. *** p <.01, ** p <.05, * p <.1.

Table 2. The probability of a job interview. Labor market tightness measured by the female callback rate.

	(1)	(2)	(3)	(4)
Constant	.270***	.270***	.214***	.215***
	(.018)	(.018)	(.039)	(.058)
Minority	-.088***	-.090***	-.090***	-.062***
	(.0097)	(.0101)	(.0101)	(.0171)
Labor market tightness	.112***	.120***	.112***	.116***
	(.011)	(.012)	(.009)	(.007)
Labor market tightness * Minority	-	-.017**	-.017**	-.024*
		(.006)	(.006)	(.012)
Occupation FEs	No	No	Yes	Yes
Firm characteristics	No	No	Yes	Yes
Occupation FEs * Minority	No	No	No	Yes
Firm characteristics * Minority	No	No	No	Yes
Number of observations	6,770	6,770	6,770	6,770

Notes: This table employ data from Carlson & Rooth (2007) and Rooth (2011). The dependent variable is an indicator of whether the applicant was invited to a job interview. Labor market tightness is measured by the occupation and region specific female callback-rate, which is normalized with mean 0 and standard deviation 1. All regressions include experiment and city fixed effects. The firm characteristics are firm size, share of females at the firm, and sex of the recruiter. The estimates are from a linear probability model. Standard errors are clustered at the occupational level in all models. *** p <.01, ** p <.05, * p <.1.

Appendix

Table A1. Description of Swedish occupational categorizations (SSYK)

Occupational categories	Description of occupations using the occupational scheme (in Swedish)	Swedish occupational code (SSYK)
High skill occupations:		
Computer occupations	"Dataspecialister"	213
Accountants and auditors	"Redovisningsekonomer, administrativa assistenter mm"	343
Registered nurses	"Sjuksköterskor", "Barnmorskor, sjuksköterskor med särskild kompetens"	223, 323
Middle school teachers	"Grundskollärare", "Speciallärare"	233, 234
Secondary school teachers	"Gymnasielärare"	232
Medium/low skill occupations:		
Sales representatives and buying and purchasing agents	"Säljare, inköpare, mäklare mm"	341
Retail sales persons and cashiers	"Försäljare, detaljhandel; demonastratörer mfl "	522
Installation, maintenance and repair occupations	"Maskin- och motorreparatörer", "Elmontörer, tele- och elektronik-reparatörer mfl"	723, 724
Construction laborers and carpenters	"Byggnads- och anläggningsarbetare"	712
Bus, truck and taxi drivers	"Fordonsförare"	832
Janitors and cleaners	"Städare mfl"	912
Food serving and waitress	"Storhushålls- och restaurangpersonal", "Köks- och restaurangbiträden"	512, 913

Figure A1. The vacancy-unemployment ratio by occupation

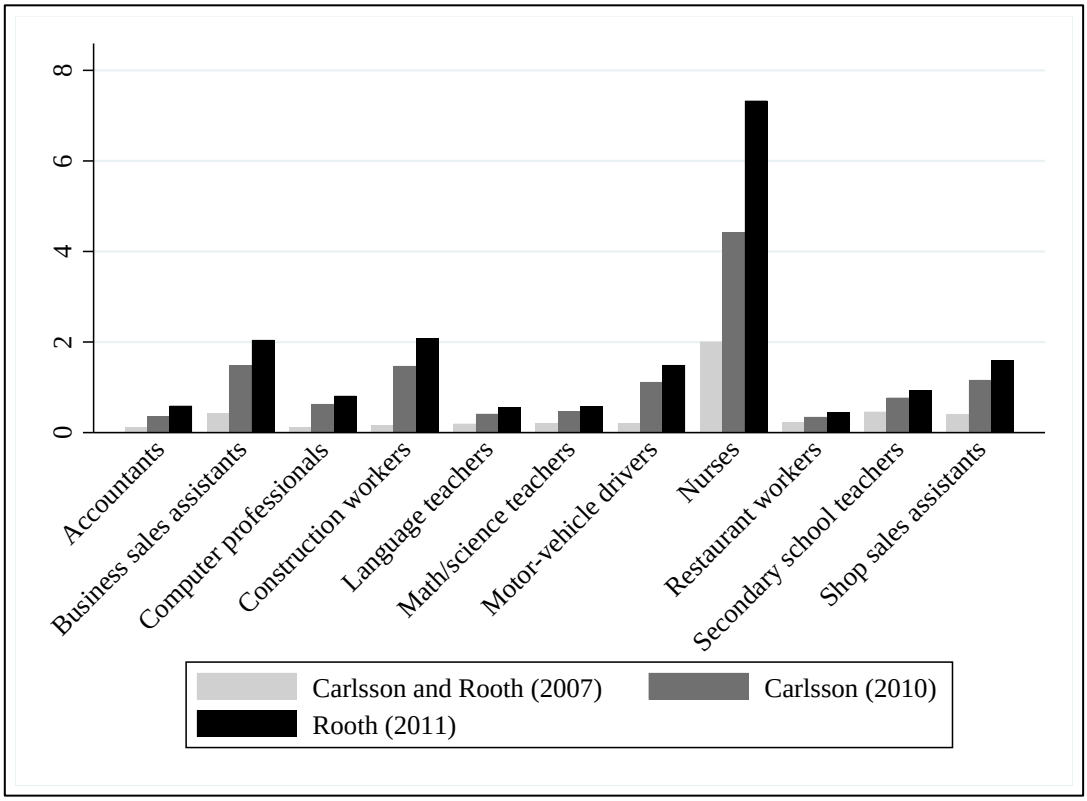

Figure A2. The callback rate for female applicants by occupation