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From Ethnic Prejudice to Employment Discrimination: The Role of Small Firms as Mediators

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ABSTRACT

From Ethnic Prejudice to Employment Discrimination: The Role of Small Firms as Mediators*

Hungary's sizeable Roma minority is hit by massive prejudice. Using 2011 Census data and supplementary sources, we study how ethnic bias translates to employment discrimination in local labor markets. The male ethnic employment gap, adjusted for a rich battery of controls, was 20-40 percent wider than average if, and only if, the local population strongly supported an openly anti-Roma far-right party and, at the same time, small firms had a substantial share in the local economy. Roma women's (very low) employment is less responsive to prejudice and the small firm share. The results for men, the sole breadwinners in most Roma families, survive robustness checks and confrontation with alternative explanations. Since small firms easily elude the anti-discrimination regulations, the results draw attention to the limits of legal instruments and call for active policy.

JEL Classification: J15, J71, R23, D22

Keywords: minorities, discrimination, regional labor markets, small firms

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* We describe the data in the text and, in more detail, in the Supplementary Materials (SM 5) attached to the main text. We have uploaded a Replication Package to <https://github.com/KaRo493/From-ethnic-prejudice-to-employment-discrimination>. The package contains (i) Stata dta files of non-proprietary data. (ii) Stata do-files to analyze proprietary data owned by the Hungarian Central Statistical Office (HCSO). These data are available in a research room jointly operated by the HCSO and the Databank of the Center for Economic and Regional Sciences. Instructions on how to gain access to the research room have been added. Read `replication_package_overview.docx` for a concise overview of the whole package.

1 Introduction

Rejection of an ethnic minority does not necessarily lead to discrimination in the labor market. Legislation, the media, and civil control limit discriminatory practices, as do market forces under free competition, unrestricted capital flows, and perfect factor substitution. Some employers may employ discriminated and, therefore, cheaper labor, which can cause a leveling out of employment opportunities and wages (Becker 1957, Arrow 1972, 1973).¹

However, neither the checks and balances nor the market work perfectly: many field experiments and surveys document employer discrimination against minorities already at the recruitment stage. Examples include Hungary Váradi (2014), Orosz et al. (2018), Kende et al. (2020), Slovakia Dasgupta et al. (2020), the United States Bertrand and Mullainathan (2004), or Belgium Baert and Vujić (2016). Meta-analyses by Baert (2018) and Lippens (2021) give an almost complete overview of recent "correspondence surveys", in which researchers apply for jobs using typical majority and minority names.

The focus of research on discrimination in recent decades has shifted from whether it is present in the terrain under study to the mechanisms through which it operates (Guryan and Charles 2013). Our study examines the path leading from ethnic prejudice in the local population to the local residual employment gap between the majority and the Roma people, who form the largest and poorest minority in Hungary (and Europe). The gap in question varies substantially across the small geographical areas under scrutiny, ranging from zero to 26 percentage points, even after adjusting for a rich battery of controls. These gaps markedly differ even if we hold our measure of the ethnic bias constant. We test one of the potential reasons behind this sizeable residual variation: the mediating role of the firm size distribution.

In a biased environment, we expect higher taste-based and statistical discrimination, and employers' precautionary attempts to reduce anticipated losses from inter-ethnic conflict at the

¹ Gábor Kézdi played a significant role in shaping the research concept, and we consulted with him on numerous occasions regarding the details of the analysis. We are grateful to Bence Szabó for his excellent assistance. We thank Rebeka Czucik, Tamás Hajdu, Péter Hegedűs, Rita Pető, and Melinda Tir for their help, and Gábor Békés, Péter Elek, Győző Gyöngyösi, Gábor Havas, Marc Kaufmann, Miklós Koren, Róbert Lieli, Attila Lindner, Ádám Szeidl, and Andrea Weber for their advice. We also appreciate the detailed reviews provided by Sergey Lychagin, Balázs Muraközy, and Rudolf Winter-Ebmer on earlier versions of the paper. This study was partly prepared using the data of the Central Statistical Office (Census 2001 and 2011, Register of Economic Organizations 2010). The calculations and conclusions drawn from them contained herein are solely the intellectual property of the authors.

workplace or consumer alienation.² However, these mechanisms are not equally likely to evolve into small and big business environments. In large organizations, due to the less personalized nature of the hiring process, the sharing of the decision among several actors, and the higher risk of anti-discrimination procedures and negative media coverage, the prevailing prejudice in the social environment does not influence personnel decisions as strongly as in small firms, where informal decisions dominate, referral-based hiring is more common, and the inclusion of a minority worker has a more substantial impact on ethnic composition. Customer aversion also fosters discrimination because there are more jobs where workers directly contact customers.

We test this hypothesis by estimating individual-level employment equations using complete census data from Hungary in 2011, an individual ethnic marker, and district-level indicators of ethnic bias and small-firm density. We find that the Roma–non-Roma employment gap is significantly affected by the *interaction* of ethnic prejudice and the small business share. When both variables are high, we estimate a residual employment gap for men—the sole breadwinners in most Roma families— 2.3–4.8 pp higher than the 11.6 pp average, indicating a significant (20–40 percent) additional gap. This interaction effect is weaker and statistically insignificant for women, which we attribute to their occupational composition (weaker exposure to discrimination) and family obligations (which shape their labor force participation decisions).

Our paper examines Roma's disadvantage in terms of employment rather than wages. This choice is justified by the decisive role of underemployment in affecting Roma's income and well-being—a statement supported by comparisons of earnings and employment differentials. Kertesi and Kézdi (2011b) found a 25 pp residual employment gap for Hungarian Roma males, while the wage gap amounted to only four percent. Aeberhardt et al. (2010) showed similar results in French data: the residual employment disadvantage of workers with at least one parent of African descent was much more significant than the residual wage gap. Dasgupta et al. (2020) also found more substantial discrimination in hiring decisions (at the "extensive margin") than in wage offers, promotion, and task allocation (the "intensive margin") in Slovakia.³

² On these forms of discrimination, see the seminal works of Becker (1957) and Arrow (1972, 1973) and more recent overviews by Charles and Guryan (2011), Guryan and Charles (2013), and Lang and Spitzer (2020).

³ An early (and essentially different) version of this research was summarized in a doctoral dissertation chapter (Szabó, 2021). Later results were presented in a Hungarian-language article (Kertesi et al., 2022).

2 Data and local specifics

Roma. Throughout the paper, we consider someone to be Roma if they declared themselves Roma in first or second place in the 2011 census and the surveys we use in our research. The Roma population share measured this way amounted to 3.1 percent in 2011 (310,000 people). Estimates based on external judgment arrive at significantly higher estimates, reaching 700 thousand in a recent survey by Péntzes et al. (2019). While the levels differ, the relativities do not: the district-level Roma population shares measured in the census and the Péntzes et al. (2019) survey are almost perfectly correlated ($r=0.92$).⁴ An additional remark applies. Hungary's sizeable Roma minority abandoned traveling a long time ago. The vast majority of Roma speak Hungarian as a mother tongue and had a relatively high male employment probability under state socialism (above 80 percent in the early 1980s, as shown by Kertesi 2010) but lost their jobs on a massive scale during the post-socialist transition (Kertesi 2010, Kertesi and Kézdi 2011b).

Employment. We follow the standard International Labor Organization–Organization for Economic Co-operation and Development (ILO–OECD) definition; that is, the respondents are considered employed if they worked at least one hour in the week preceding the interview or did not work any hours but were only temporarily absent from their jobs. Note that the interview-based data includes significant undeclared work (Benedek, Elek, and Köllő 2013).

Education. The Hungarian educational system comprises eight-grade primary schools, three or four-grade vocational training schools, typically four or five-grade secondary schools, and colleges. Exceptions exist: some secondary schools run classes from the 5th (or 7th) to the 12th or 13th grade, and movement from primary school to secondary school may occur after completing grade 4 or 6 of the primary school. For details, see Eurydice (2024).

Districts. The district (*járás*) is considered the geographical unit that best approximates the boundaries of the local labor market. On average, the districts have 57,000 inhabitants and are relatively closed, except for the capital and the surrounding Pest County. According to the 2011 census, on average, 85 percent of a district's jobs are held by residents. We treat Budapest as a single district, aggregating the data from its administrative units to give 175 districts at the national level.

⁴ The survey collected data from mayors and local Roma organizations, and the authors consider the estimate upward-biased. János Péntzes calculated the correlation, for which we are grateful.

A district-level measure of prejudice. A unique opportunity to measure the degree of anti-Roma sentiments came about in 2010 with the emergence of an openly anti-Roma far-right party (*Jobbik*), which made the regional differences in prejudice temporarily visible. Both before and after this, rejection of Roma did not manifest as clearly in party sympathies as in the 2010 parliamentary elections. A part of Hungary's parliamentary seats are won on a "local winner takes all" basis, while the rest is proportional to the popular vote. We use the fraction of popular votes in the district won by *Jobbik* as a measure of anti-Roma bias. In section 6, we examine in detail if this indicator is suitable, confront it with direct measures of prejudice, and define a more elaborate version in which we control for the other drivers of *Jobbik* support.

District-level small-firm share. The census does not include information on the size of employers. The number of workers in firms with more than 20 employees was derived from the 2011 Hungarian Wage Survey, considering that the survey covers all employers in this size category and the data are establishment-level.⁵ The number of employees in smaller firms (but with at least two employees) was drawn from the Hungarian Business Register (KSH 2024), assuming that their establishments are located in the district where their headquarters are located, which does not imply significant bias.⁶ We use the term 'firm' for brevity—the data relate to all employers, including public institutions. The calculated employment weight of enterprises smaller than the chosen size threshold (30 employees) was, on average, 31 percent in 2011, with a standard deviation of 8 percent and extreme values of 4 and 57 percent.

Control variables. In our main equations, we control for age, education, health, language proficiency, religiosity, marital status, partner's education, labor market and transfer status, household size and composition, dwelling size, type of municipality, and accessibility of urban job offers. The exact list is provided in *Supplementary Materials SMI*. The raw Roma–non-Roma employment gaps of 30 and 34 percent for men and women, respectively, fall to 11 and 6 percent, respectively, after including controls in the employment equations.

⁵ The annual Wage Survey has been conducted by the Hungarian Public Employment Service since 1986. For a description, see the KRTK Databank (2024).

⁶ 96.4 percent of firms with 5-20 employees observed in the May 2011 Wage Survey had establishments in only one district.

Sample restrictions. The sample is restricted to primary and vocational school graduates because, according to the 2011 census, the proportion of secondary school and college graduates among the Roma amounted to only 6.5 percent, compared to 54 percent in the non-Roma population. Furthermore, since our study is concerned with the employment gaps in the wage labor market, we exclude the self-employed and their assisting family members, employed persons in family businesses (whose spouse or partner runs a sole-proprietorship with only one or two employees), public works program participants, and full-time students. We address the consequences of these restrictions in robustness checks.

We present statistics on the composition and employment rates of the working-age Roma and non-Roma population in *Supplementary Materials SM2* and the district-level variables in *Supplementary Materials SM3*. The maps of *Supplementary Materials SM4* show the (rather different) spatial distributions of the essential variables. We give brief descriptions of the data sources used (population censuses of 2011 and 2001; Hungarian Labor Force Survey; Hungarian Wage Survey; Társi Life Course Survey; Társi Omnibus Survey; Hungarian Business Register; BISZ Central Credit Information, KRTK Databank Admin3, administrative data of the Ministry of Public Education and Culture 1985, 1989, 1992; and valasztas.hu, a register of election results) in *Supplementary Materials SM5*.

3 On minorities' access to small-firm jobs

In this section, we discuss why minority workers are particularly susceptible to unequal treatment by small firms. We provide evidence that in Hungary, Roma workers are underrepresented in small firms, especially in jobs that require teamwork or contact with customers.

Both discrimination and nondiscrimination imply losses. The costs of the former consist of reputational losses and foregone profit due to suboptimal selection. Nondiscrimination also has costs in a biased environment if "color-blind" selection leads to interethnic workplace conflicts or the turning away of some customers. It can be assumed that in small firms, (i) the reputational damage is relatively small, (ii) the instruments of productivity-based selection are not ethnically neutral, and (iii) the employer is more accurate in detecting shop-floor conflicts but has a poorer toolbox to resolve them.

(i) A small firm is likely to pay a lower price for discriminatory practices because of the lower risk of legal and civil action and media attention (Holzer 1998), a fact openly admitted in the *small firm exemption* of the US anti-discrimination law (Section VII of the Civil Rights Act of 1964): companies with fewer than 15 employees are not subject to the provisions of the law (Carrington et al. 2000, Carlson 2012). The presumed reason for this is that small firms would face disproportionately high costs of anti-discrimination litigation compared to the amount of damages claimed. Leonard (1985), examining compliance with Executive Order 1124 (1965)⁷ requiring nondiscriminatory employer practices, found that the probability of an audit in 1975–1979 was 33–45 percent for firms with more than 250 employees, 17 percent for those with 100–250 employees, but only six percent for those with 50–100 employees, and three percent for firms with fewer than ten employees.

(ii) The HR departments of large companies have a better understanding of the distribution of skills essential to the company and the positions of the candidates in it, based on a large number of hiring, interviews, and tests—they are less constrained to use simple, group-level information to predict individual productivity (Arrow 1973, Baert 2018). Reliable estimates of individual productivity mitigate discrimination, as highlighted, for example, by the Hedegaard and Tyran (2018) experiment in Denmark: minority bias was demonstrably present in hiring decisions but had a weaker effect when the experimental "employers" also received information on the productivity of candidates.

In small firms, the most important tool for selection by productivity is recruitment by referral, which is used more often than average (Holzer 1987a, 1998, Tanova 2003, Carlsson and Rooth 2007, Burks et al. 2015).⁸ However, this practice is not neutral, even if the employer intended to select based on the quality of the candidates. The first problem is the *size* of the social network useful for job-seeking. The vast majority of referrers (more than two-thirds reported by Holzer 1998) are employees of the targeted company and of the same race as the job seeker. A study by Green et al. (1999) in three major US cities found that 84 percent of the referrers of black job applicants were black. Racial homogamy in itself limits the number of jobs available through referrals. In Hungary, there is an average of 1.3 Roma employees for every Roma job seeker compared to almost seven non-Roma employees for every non-Roma candidate; thus,

⁷ <https://www.dol.gov/agencies/ofccp/executive-order-11246/as-amended>.

⁸ However, Marsden (2001) found the difference by firm size to be relatively small.

the difference in the number of potential referrers of the same ethnicity is already huge.⁹ For a minority job seeker, it is even harder to find *influential* referrers. But even if suitable referrers are found, some of them are difficult to *mobilize*, as this would usually require some form of guarantee on the part of the referrer (Royster 2003, Smith 2005, Marin 2012, Smith and Young 2017, Pedulla and Pager 2019). It may not be the case that employers will value a minority referrer in the same way as a majority worker. In Silva's (2018) experiment, which also measured the manager's bias, white applicants benefited greatly from a white referrer, while black applicants benefited greatly only if the referrer was white and a nonprejudiced manager evaluated the referral.

(iii) Small firms are more vulnerable to ethnic conflicts on the shop floor and the aversion of consumers due to more intensive interpersonal relationships (Holzer 1987b, Ioannides and Loury 2004) and more interactions with customers. Additionally, these disturbances are more challenging to overcome in small firms. There is less scope for separating parties or introducing collective pay for ethnically mixed groups, which may be the second-best solution for larger firms. An illuminating example is provided by Hjort (2014) of a flower-packing plant in Kenya with nearly 1,000 workers, where stumbling cooperation among workers from different tribes caused demonstrable damage. The company responded by introducing a group wage system while accepting the losses caused by free-riding.

Based on the above considerations, we expect that minority workers are disadvantaged in the race for small-firm jobs. This finding is confirmed by several empirical studies, including Holzer (1998) in the US, Carlsson and Rooth (2007) in Sweden, Kaas and Manger (2012) in Germany, and Wood et al. (2009) in the UK. A small-sample study by Baert et al. (2018) in Belgium is an exception. Carrington et al. (2000), drawing on US data, exploited the quasi-experimental situation created by the US 'small-firm exception' and found that employment of blacks and women shifted toward large firms subject to anti-discrimination procedures following the adoption of the law, which contributed significantly to an increase in employment of these groups and a reduction in their wage disadvantage.

The Hungarian data confirm the above predictions by showing that Roma are less likely than average to be employed in small firms and even less likely in small-firm jobs requiring

⁹ Authors' calculation using 2015–2020 waves of the Hungarian Labor Force Survey.

teamwork or customer contact. We use data from the Hungarian Labor Force Survey (LFS), a rolling panel. We pool the quarterly waves of the survey between Q1 2015 (the first wave that registered ethnicity) and Q1 2021 (the last wave before the COVID-19 pandemic). Individuals in the sample typically have six quarterly observations, so their employers and occupations can change within their histories.

Table 1. Employment in small firms - Impact of Roma ethnicity

Dependent variable: the observed job is in a small firm. Linear probability models			
	Small firm definition		
	2-50 workers	2-20 workers	2-10 workers
Roma	-0.026* (2.0)	-0.052*** (4.3)	-0.084*** (10.6)
Constant	0.524	0.411	0.265
Number of observations	165,651	165,651	165,651
Roma observations	9,150	9,150	9,150
R ²	0.002	0.005	0.007
F-test	7.8***	17.9***	28.3***

Controls: male, age, education, calendar years.

Sample: jobs of employees aged 15-60 with no secondary or tertiary qualification. The firm size data refer to establishments, not the entire firm.

Data: Labor Force Survey, pool of quarterly waves 2015 Q1 – 2021 Q1.

Note: The standard errors are clustered by individuals, t-values in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The linear probability models in Table 1 analyze the effect of ethnic affiliation on the probability of holding a job in a given firm size category. Roma were 2.6, 5.2, and 8.4 percentage points less likely to work in enterprises with less than 50, 20, and 10 employees, respectively.

To support the second claim, we use two job characteristics: the extent to which it requires (i) teamwork or (ii) direct contact with customers. These indicators have been translated from the American O*Net classification (<https://www.onetonline.org/>) into the Hungarian typology (four-digit occupation codes) by Pető and Koren (2022).¹⁰ The Pető-Koren indices are stricter than the original: they differ from zero if physical presence and face-to-face communication are necessary. The equations in Table 2 look at the character of job-worker matches along these dimensions. The job's O*NET index is on the left-hand side, while the explanatory variables measure whether i) the job is found in a small firm, ii) the job holder is Roma, and iii) the job holder is Roma in a small firm. Various controls have been added.

¹⁰ On their work with the O*Net indexes, see Koren and Pető (2020).

Table 2. Teamwork and customer contact by firm size in jobs held by Roma and non-Roma

Ordinary Least Squares

Ordinary Least Squares		Small firm definition				
	2-50 workers		2-20 workers		2-10 workers	
Dependent variable: the observed person's job involves teamwork (scale: 0-100)						
Roma	-1.022**	(2.5)	-1.430***	(3.6)	-1.684***	(4.9)
Small firm	0.564***	(3.0)	0.989***	(5.0)	1.322***	(5.5)
Roma × Small firm	-2.360***	(3.6)	-2.390***	(5.0)	-3.297**	(2.3)
Constant	44.015		43.911		43.966	
R ²	0.004		0.004		0.004	
F-test	11.07***		12.74***		12.81***	
Dependent variable: the observed person's job implies customer contact (scale: 0-100)						
Roma	-1.712***	(4.0)	-2.204***	(5.3)	-2.630***	(7.2)
Small firm	3.985***	(19.2)	4.709***	(20.8)	5.093***	(18.3)
Roma × Small firm	-3.737***	(5.3)	-4.025***	(5.0)	-4.730***	(3.2)
Constant	43.011		43.177		43.769	
R ²	0.055		0.058		0.055	
F-test	111.4***		121.9***		115.0***	
Number of observations	165 160		165 160		165 160	
Roma observations	9,150		9,150		9,150	

Controls: male, age, vocational education, calendar years.*Sample:* jobs of employees aged 15-60 with no secondary or tertiary qualifications in firms with at least two employees. Firm size data refer to the establishment, not the entire firm.*Data:* Labor Force Survey, pool of quarterly waves 2015 Q1 – 2021 Q1.*Means (standard deviations) of dependent variables:* Teamwork: 43.5 (14.6). Customer contact: 39.9 (16.1)*Note:* Standard errors are clustered by individuals, t-values in parentheses.

** p < 0.05, *** p < 0.01.

The upper block of Table 2 suggests that small firms require teamwork more frequently than firms with more employees. Jobs held by Roma require less teamwork, which is particularly true if they work in a small firm. For Roma working in companies with fewer than ten employees, the teamwork index is 3.3 pp lower, almost a quarter of the indicator's variance. The difference is roughly one-sixth of the variance for slightly larger but still small firms.

In the bottom block, the dependent variable is the index measuring customer contacts. Such jobs are much more common in small firms. Roma are less likely to have contact with consumers in general, but this is mainly the case when they work in small firms, as the coefficients of the interactive terms show. The effects account for 23, 29, and 32 percent of the variance of the dependent variable in firms with less than 50, 20, and 10 employees, respectively.

The literature and the findings in Table 2 support the hypothesis that employee and consumer bias may play a role in the underrepresentation of Roma in wage employment in general and

small firms in particular. However, Roma's disadvantage does not necessarily stem from discrimination. Their disadvantage can be explained by unobserved attributes such as insufficient communication skills or unwillingness to cooperate. We need a *direct measure* of prejudice to get closer to understanding the role of discrimination.¹¹

4 Anti-Roma prejudice and its measurement

The unanimous experience of opinion polls conducted in the decades around the Millennium (Enyedi et al. 2006) is that the majority population is, on average, highly hostile toward Roma, but no data are available on this at a more granulated geographical level. In this section, we argue that the popular vote for Jobbik cast in the 2010 parliamentary elections adequately characterizes the sentiments of a local community toward the Roma.

The elections saw the emergence of Jobbik, a far-right party that drew its identity primarily from its anti-Roma rhetoric and the intimidating parades of its actionist paramilitary "Hungarian Guard." A disproportionate number of voters with anti-Roma prejudices migrated to the party's supporters.¹² This is confirmed by the Tárki Omnibus data, which included reactions to two popular anti-Roma stereotypes in addition to party sympathies. Respondents could choose from four options: strongly agree, tend to agree, tend to disagree, and strongly disagree.

In Figure 1, we plot the percentage of respondents who agree with the above statements as a function of party preference. The curves show responses of the supporters of the two major political parties at the time (Fidesz and the Socialist Party) and the total for those with and without party sympathies. The responses of Jobbik voters (denoted with a circle) could only be measured in 2011, as the number of its supporters had not previously reached a level at which further questions could break it down.

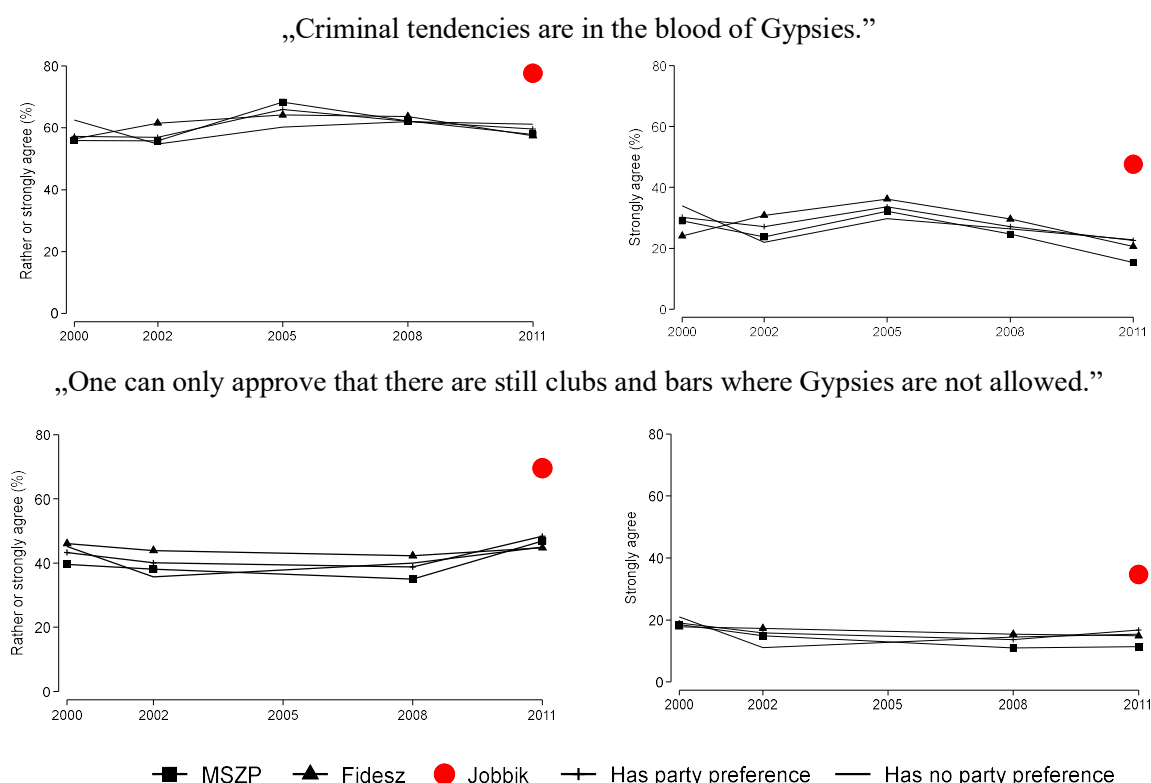
The proportion of opinions firmly rejecting Roma varied narrowly between 2000 and 2008 by party sympathies and willingness to vote. By 2010, the situation had changed: Jobbik was a magnet for those who shared the prejudice, while the proportion of those who agreed with the stereotypes decreased or remained unchanged among voters of the two major parties

¹¹ Our model for the census, in which district-level variables play a key role, cannot be estimated with LFS data. The LFS sample is small, just over half percent of the census in 2011, and is not representative of districts.

¹² Jobbik has suddenly become a major political party. Although it already existed in 2006, it became a significant national force in 2009, with 15 percent of the votes cast in the 2009 European Parliament elections and 16.7 percent in the 2009 European Parliament elections, making it the third largest party in the country.

(and among all respondents). Among Jobbik supporters, the fraction agreeing with the two statements was 20–30 percentage points higher than average, depending on the question and the degree of agreement. The data suggest that Jobbik support was strongly correlated with the negative sentiments of the majority toward Roma.

Figure 1. Agreement with two Anti-Roma stereotypes by respondents' party preferences



Data: Társi Omnibus surveys 2000–2011. *Note:* The survey questions used the term Gypsy (*cigány*) that corresponds to the popular parlance. We follow the original wording. MSZP (Hungarian Socialist Party) and Fidesz (Federation of Young Democrats) were the leading political parties in 2010.

We qualify this statement in three ways. First, we account for the impact of the 2008–2010 financial and economic crisis on Jobbik support. Second, as far as the support for Jobbik reflects prejudice—and it is more persistent than party preferences—we expect that it exerts a similar impact on the ethnic employment gap in years other than 2010. We sketch a plan for testing this hypothesis in this section, but present the results only after estimating our benchmark model for 2011. Third, we show that the *district-level* vote cast for Jobbik successfully predicts *personal* agreement with a series of anti-Roma stereotypes.

A. Indebtedness and Jobbik support

As pointed out by Verner and Gyöngyösi (2020) and Gyöngyösi and Verner (2022), Jobbik's support was significantly boosted by the rising repayment burden of loans denominated in foreign currencies (mostly Swiss Franc) in 2009. When the crisis hit Hungary in October 2008, the dramatic depreciation of the Forint led to the collapse of many foreign currency loans. Nonperforming loans rose from three percent in 2008 to 11 percent by December 2011 (MNB 2012). Household debt rose to 40 percent of GDP, half of which was accounted for by foreign currency debt (MNB 2020). Apart from anti-Gypsyism, another key message of Jobbik's 2010 campaign was to save the debtors: the party recruited supporters by stressing the responsibility of banks and demanding a radical reduction of the debt burden. According to Gyöngyösi and Verner (2022), a 10 percent increase in the share of foreign currency loans in total loans increased the share of votes cast for Jobbik by 2.1 percentage points (20 percent) within the zip code areas examined. In addition, Jobbik's support may have been boosted by a decline in economic performance.

To remove these factors, we estimate equation (1), where J_k is the share of popular votes for Jobbik in the k -th district and H_k and dY_k are indicators for the population's foreign currency debt and the degree of local economic decline, respectively.

$$J_k = \sum_{l=1}^3 \alpha_l H_k^l + \sum_{m=1}^2 \beta_m dY_k^m + u_k \quad (1)$$

In Eq. 1, the key explanatory variables are the per capita number of nonperforming loans (H) and its squared and cubed values. We control for the change in sales revenues (dY) of the employers between 2008 and 2010 and for its squared. Firm level revenue drops are weighted by the number of their workers in 2008 to capture the relative size of earnings losses inflicted on the residents of different districts (computed from KRTK Databank Admin3 data, see *Supplementary Materials SM5*). The estimation results are presented in Table 3. The per-capita number of defaulted loans (H) had a positive and significant effect on Jobbik's support, confirming the results of Verner and Gyöngyösi (2020) and Gyöngyösi and Verner (2022). The residual of the equation is used as a proxy for the bias in right-wing votes. We refer to it as the "residual support for Jobbik". A comparison of the raw and crisis-adjusted values of Jobbik vote shares suggests a strong correlation between the two indicators, with values being essentially equal in the case of high Jobbik support (*Supplementary Materials SM6*).

Table 3. Support for Jobbik: the impact of indebtedness and economic downturn

Dependent variable: Jobbik vote share 2010. OLS regression on district-level data.		
	Coefficient	t-value
Non-performing foreign currency loan/resident (<i>L</i>)		
linear	9.114***	3.9
squared	-72.301***	2.9
cube	174.569**	2.2
Change in sales revenues 2010/2008 (<i>dY</i>)		
linear	18.492***	3.2
squared	-9.147***	3.1
Constant	-9.484***	3.3
Number of observations	175	
R ²	0.236	
Mean of the dependent variable	0.188	
(standard deviation)	(0.057)	

Data: BISZ Central Credit Information Ltd., KRTK Databank Admin3, valasztas.hu

(see *Supplementary Materials SM5*)

p* < 0.10, ** *p* < 0.05, * *p* < 0.01.

B. A test of Jobbik support as a proxy of persisting prejudice

Whether Jobbik's year-2010 support correctly indicates the fraction of strongly prejudiced inhabitants of a district could be tested by analyzing its impact in *other* years. The underlying assumption is that ethnic bias is persistent, as suggested in Figure 1, at the national level. If it also applies to districts, Jobbik's vote share is expected to behave similarly on dates *other* than 2011. To test this proposition, we re-estimate our employment equation using earlier (2001) census data and Jobbik's 2010 election results. The results of this exercise, which support our expectations, are presented in Section 6.

C. District-level support for Jobbik and personal agreement with anti-Roma stereotypes

We test a direct link between district-level support for Jobbik and personal agreement with anti-Roma stereotypes. We use fourteen questions in the 2009 wave of the Tárki Institute's Life Course Survey to show that the respondents (non-Roma youth aged 17–22) living in districts that support Jobbik were much more likely to agree entirely with statements rejecting Roma.

As a first step, we used principal component analysis to examine how the responses to the statements are related. Two groups were formed: the first principal component comprised the rejection statements, and the second comprised the acceptance statements (*Supplementary Materials SM7*). Table 4 lists the seven variables with high factor loadings in the first principal component. Then, dummy variables indicating complete agreement

with a given statement were regressed on the district quintiles formed by the residual support for Jobbik. The reference category is the one-fifth of districts where Jobbik performed worst. Compared to them, the percentage of those who ultimately agreed with the negative statements was 5–16 pp (14–60 percent) higher in the districts where Jobbik garnered the most votes. With one exception, we also see significantly (by 4–8 pp) more agreement responses in the fourth quintile.

Table 4. Agreement with statements rejecting Roma in district quintiles by Jobbik support (non-Roma respondents of age 17–22)

Dependent variable: complete agreement^a with the stereotypical statement (no = 0, yes = 1). Linear probability models

Stereotypical statement	Quintiles of districts by the extent of residual Jobbik support ^b				R^2
	Q2	Q3	Q4	Q5	
„Increasing Gypsy population threatens the security of society.”	0.059*** (2.62)	0.046 (1.56)	0.083*** (2.81)	0.163*** (5.74)	0.027
„Gypsy families want to live on benefits. That is why they have so many children.”	-0.057** (2.24)	0.015 (0.45)	0.080** (2.43)	0.129*** (4.32)	0.043
„One can approve that there are clubs and bars where Gypsies are not allowed.”	-0.016 (0.76)	0.018 (0.06)	0.064** (2.23)	0.100*** (3.59)	0.027
„The problems with Gypsies would be solved if they finally started working.”	0.017 (0.69)	0.026 (0.83)	0.058* (1.82)	0.113*** (3.72)	0.010
„Criminal tendencies are in the blood of Gypsies.”	-0.025 (1.04)	0.035 (1.16)	0.043 (1.41)	0.069** (2.36)	0.022
„Gypsies must be separated from the rest of society.”	-0.037** (2.09)	-0.012 (0.52)	0.032 (1.34)	0.044* (1.89)	0.023
„Gypsies should not pretend not to be Gypsies.”	-0.013 (0.51)	-0.004 (0.14)	0.005 (0.16)	0.071** (2.31)	0.007

Controls: gender, age, mother's education, 8th grade reading test scores.

^a „Completely agrees” (1) versus „not at all”, „rather not”, or „rather yes” (0).

^b Jobbik's support after adjusting for the nonperforming foreign currency loan/population ratio and the effect of the 2008–2010 change in sales revenues.

Data: Tárki Life Course Survey 2009, wave 4, non-Roma respondents aged 17–22. Observations per question range from 3,920 to 4,251.

Note: The survey questions used the term Gypsy (*cigány*), which corresponds to the popular parlance. We follow the original wording.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5 Prejudice, small-firm share, and the ethnic employment gap

Turning to our main equation, we estimate the following linear probability model:

$$e_{ik} = \beta_1 r_{ik} + \beta_2 r_{ik} J_k + \beta_3 r_{ik} S_k + \beta_4 r_{ik} J_k S_k + \theta_k + \mathbf{X}_{ik} \boldsymbol{\gamma} + u_{ik} \quad (2)$$

where $e_{ik} = 1$ if the i -th person in the k -th district is employed and $r_{ik} = 1$ if they are Roma. S_k is the share of persons employed in enterprises with less than 30 workers in the district. In the preferred specification, J is the share of votes for Jobbik after removing the effects of foreign currency debt and the change in corporate sales revenues.

Table 5. The effect of Roma ethnicity, district-level Jobbik support, and small firm density on the probability of employment, 2011

Dependent variable: 0=non-employed, 1= employed. Linear probability models

	Men			Women		
	(1)	(2)	(3)	(4)	(5)	(6)
Roma	-0.310*** (145.1)	-0.112*** (22.8)	-0.105*** (5.9)	-0.340*** (221.7)	-0.059*** (15.8)	-0.071*** (5.8)
Roma×Jobbik			0.959*** (2.6)			0.851*** (2.9)
Roma×Small firm share			-0.037 (0.5)			0.036 (0.7)
Roma×Jobbik×Small firm share			-3.933*** (2.5)			-2.317** (1.9)
Controls		yes	yes		yes	yes
District fixed effects		yes	yes		yes	yes
Number of observations	1,257,207	1,257,207	1,257,207	985,713	985,713	985,713
R ²	0.017	0.237	0.237	0.027	0.246	0.252

Controls: age, education, health, language proficiency, religiosity, marital status, partner's education, labor market and transfer status, household size and composition, dwelling size, type of municipality, and accessibility of urban job offers. For a complete list of control variables, see *Supplementary Materials SM1*.

Jobbik: residual support for Jobbik. Estimated as a residual of Eq. 1.

Small firm share: enterprises with 2-30 employees in district employment.

Data: Census 2011, Wage Survey 2011, Business Register 2010, *valasztas.hu*. 2010.

Note: The standard errors for Roma × Jobbik and Roma × Jobbik × Small firm share were estimated using a two-step bootstrap procedure.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. t-values in parentheses.

Since J is an estimated variable in this specification, standard errors are calculated using a two-step bootstrap procedure.¹³ θ_k represents district fixed effects, \mathbf{X}_{ik} is a vector of control variables, and u_{ik} is a random error. The model was estimated separately for men and women. We hypothesized that $\beta_4 < 0$.

The estimation results are shown in Table 5. For comparison, columns (1)–(2) and (4)–(5) show the results with and without controls and no interaction effects. The estimation results of equation (2) are reported in columns (3) and (6). As expected, the parameter (β_4) of the triple interactive term is negative and significant for both sexes.

¹³ Equation (1) was estimated with 30 iterations, and equation (2) was estimated with 500 iterations; in the latter case, swapping the residuals calculated from equation (1). For the two variables in equation (2) with J members, the standard error was taken to be the standard deviation of 15,000 parameters per variable generated during the procedure.

The predictions are based on the parameters of Eq. 2 and predetermined values of J and S : 20, 25, 30, 35, 40, and 45 percent for the small firm share and -5, 0, 5 and 10 for the residual support for J . In choosing the values, we strived to avoid out-of-sample prediction. For the joint distribution of J and S , see *Supplementary Materials SM8*. By calculating the expression in Eq. 3, we compare Roma persons to their non-Roma counterparts with the same demographics, family, labor market, and social status (i.e., with the same \mathbf{X} vector). The selected values of J and S are indicated by the subscripts a and b , respectively:

$$[(e_{a,b}^R - e_{a,b}^N)|X, \theta] = \hat{\beta}_1 + \hat{\beta}_2 J_a + \hat{\beta}_3 S_b + \hat{\beta}_4 J_a S_b \quad (3)$$

We expect the difference to be most significant when both indicators simultaneously have large values. We test the standard error of the predicted values with the hypothesis $H_0 : \hat{\beta}_1 + \hat{\beta}_2 J_a + \hat{\beta}_3 S_b + \hat{\beta}_4 J_a S_b = 0$ using Stata's *lincom* procedure, where (J_a, S_b) is a pair of selected values.

Table 6. Predicted Roma-non-Roma employment gap at selected combinations of residual Jobbik support and small firm share

Residual support for Jobbik ^a	Small firm share (percent)					
	20	25	30	35	40	45
<i>Men</i>						
-5	-0.121 (0.007)	-0.113 (0.007)	-0.105 (0.012)	-0.097 (0.017)	-0.089 (0.023)	-0.081 (0.029)
0	-0.112 (0.005)	-0.114 (0.005)	-0.116 (0.006)	-0.118 (0.009)	-0.120 (0.013)	-0.121 (0.016)
5	-0.103 (0.007)	-0.115 (0.006)	-0.127 (0.006)	-0.139 (0.009)	-0.150 (0.012)	-0.162 (0.015)
10	-0.095 (0.010)	-0.116 (0.009)	-0.138 (0.012)	-0.159 (0.016)	-0.181 (0.021)	-0.202 (0.027)
<i>Women</i>						
-5	-0.083 (0.008)	-0.075 (0.007)	-0.067 (0.009)	-0.060 (0.011)	-0.052 (0.014)	-0.045 (0.018)
0	-0.063 (0.004)	-0.061 (0.004)	-0.060 (0.005)	-0.058 (0.007)	-0.056 (0.009)	-0.054 (0.011)
5	-0.044 (0.004)	-0.048 (0.005)	-0.052 (0.008)	-0.056 (0.011)	-0.060 (0.015)	-0.064 (0.018)
10	-0.024 (0.008)	-0.034 (0.009)	-0.044 (0.013)	-0.054 (0.019)	-0.063 (0.025)	-0.073 (0.031)

^a Estimated as a residual of Eq. 1.

Note: see Eq. 3. for the method of calculation. The mean ($J = 0, K = 30$) and relevant extreme values are printed in bold. Out-of-sample estimates are printed in light grey. Standard errors of the estimated values are in parentheses.

Table 6 shows the prediction results. The best way to use Table 6 is to read its values starting from the $J = 0, S = 30$ point, with values close to their averages. The values change little in the

men's table as we move from left to right. At low J levels ($J = -5$), the employment gap slightly decreases as we reach higher values of S . Where support for Jobbik is stronger ($J = 5$), the disadvantage grows as S increases, and this is especially true if support for the party is even more vital ($J = 10$). In this case, the difference between the predictions for low (20 percent) and medium (30 percent) small business density is 4.3 percentage points.

Moving upward in the columns, we see that Roma's disadvantage slightly decreases at a low density level of small firms ($S = 20$), does not change when $S = 25$, and worsens at higher small-firm density levels. By reading the table diagonally, from the top left to the bottom right corner, we see that Roma's disadvantage becomes more severe as J and S increase together.

The results for *women* do not follow the pattern we observed for men (even though the broadest gap is found at strong Jobbik support and high small-firm density). We assume two underlying reasons for this discrepancy.

On the one hand, the purely demand-side mechanism assumed in our hypothesis ought to explain a small residual gap with women. When we controlled our employment equation for family composition, number of children, commuting opportunities and other factors essential for the labor force participation decision, it narrowed the gap to one-third for men and one-sixth for women by falling from 31 to 11 pp for men and from 34 to only 6 pp for women.¹⁴

On the other hand, Roma women tend to work in occupations that typically occur in medium-sized and large organizations, which reduces their exposure to discrimination. The charts in *Supplementary Materials SM9* show that jobs held by Roma women are heavily concentrated in a few occupations. The seven most frequently attended occupations of 130 (street sweepers, cleaners of business premises, elementary jobs in agriculture, machinery assemblers of electric devices, auxiliary kitchen staff, and packing machine operators) account for 61 percent of employment acquired by Roma women. With only one exception, medium-sized and large firms have an above-average share in employment within these vocations. The occupational affiliation of non-Roma women is far less concentrated (the 'big seven' account for only 27 percent), and small firms dominate some of the most populous professions. The contrast

¹⁴ The tradition of a single-earner family with quite a few children is still living in the Roma community. Low-educated non-Roma women aged 15-60 raise 0.6 dependent children (aged 0-14) on average as opposed to 1.9 children with similar Roma mothers. These figures have been calculated using the Census 2011.

between Roma men and non-Roma men is also sharp in terms of occupational segregation (although not as extreme as with women). However, we do not see a remarkable difference in the distribution of jobs by firm size.

6 Additional tests, alternative explanations, and robustness checks

A. Testing the 'effect' of year-2010 residual Jobbik support in 2001

We use 2001 census data to estimate a model with r , $r \times J$, $r \times S$, and $r \times J \times S$ on the right-hand side. The r and S variables are contemporaneous, while J is imported from the 2010 election results. Jobbik's vote share (as of 2010) is expected to behave similarly in an employment equation for 2001 if it correctly indicates the fraction of strongly prejudiced inhabitants of a district and the geographical dispersion of ethnic bias changes little over time.

Table 7. The effect of Roma ethnicity, district level Jobbik support, and small firm density on the probability of employment, 2001 (estimating Eq. 2 for 2001)

Dependent variable: 0=non-employed, 1=employed. Linear probability models

	Men	Women
Roma 2001	-0.044** (2.1)	-0.028 (1.3)
Roma 2001 \times Jobbik 2010	1.262*** (3.2)	1.325*** (3.2)
Roma 2001 \times Small firm share 2001	-0.178** (2.1)	-0.072 (0.9)
Roma 2001 \times Jobbik 2010 \times Small firm share 2001	-3.900** (2.1)	-2.853 (1.6)
Controls	yes	yes
District fixed effects	yes	yes
Number of observations	1,628,353	1,441,671
R ²	0.180	0.227

Controls: age, education, health, language proficiency, religiosity, marital status, partner's education, labor market and transfer status, household size and composition, dwelling size, type of municipality, and accessibility of urban job offers. For a complete list of control variables, see *Supplementary Materials SM1*.

Jobbik: residual support for Jobbik. Estimated as a residual of Eq. 1.

Small firm share: enterprises with 2-30 employees in district employment.

Data: Census 2001, Wage Survey 2001, Labor Force Surveys 1999-2003, valasztas.hu.

Note: The standard errors for Roma \times Jobbik and Roma \times Jobbik \times Small firm share were estimated using a two-step bootstrap procedure.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. t-values in parentheses

The variables differ at some points. The 2001 census allowed only a single choice of ethnicity (Hungarian or Roma). However, the district-level Roma population shares are almost perfectly correlated ($r=0.92$) between the 2001 census and the 2011 census. We also continue to measure

the employment share of medium-sized and larger-sized firms using the Wage Survey, which covers the universe of firms with more than 20 workers in 2001. To assess the share of smaller firms (2-20 workers), we use a five-year pool of the LFS 1999-2003. We could reproduce the control variables used in Eq. 2.

The employment equation specified in Table 7 behaves similarly to our main model: the parameters obtained for the $r \times J$ and the $r \times J \times S$ interactions are similar in sign and magnitude to those obtained in the 2011 equation. This is a further argument in favor of using the 2010 Jobbik vote as a proxy for prejudice.

A. Reverse causality?

Our study tests a demand-side explanation for the Roma/non-Roma employment gap and attributes a vital role to the bias manifested in Jobbik's support. This approach should be confronted with the widespread opinion that the ethnic gap is attributed to Roma's 'laziness' (lower labor supply), and precisely this is what strengthened Jobbik.

Table 8. Willingness to vote for Jobbik and agreement with an anti-Roma stereotype^a of non-Roma respondents aged 17-22

Linear probability models

	Would you vote for Jobbik? (0,1)		Agrees with the stereotype (0,1) ^c	
	Coefficient	t-value	Coefficient	t-value
Fraction of Roma searching for jobs ^b	-0.091	0.7	-0.282	1.6
Fraction of non-Roma searching for jobs ^b	-0.074	0.4	0.040	0.2
Constant	0.189		0.578	
Tests of coefficients' equality (lincom)	-0.017	0.1	-0.322	0.9
Number of observation		4,251		4,251
R ²		0.024		0.010

^a Stereotype: "The problems with Gypsies would be solved if they finally started working."

^b Fraction of non-employed persons actively looking for jobs (ILO-OECD unemployed) in the district.

^c „Completely agrees” (1) versus „rather yes”, „rather not”, or „not at all” (0)

Dependent means: Would vote for Jobbik: 14.4 percent. Complete agreement with the stereotype: 47.0 percent

Controls: age, gender, mother's education, reading test score at grade 8

Data: Társi Life Course Survey 2009, wave 4, non-Roma respondents aged 17-22. District-level job search data: Census 2011.

Estimation sample: answered both questions.

We return to the Life Course Survey to examine the strength of this inverse relationship. The data relate to 17–22 year old non-Roma respondents. The survey records the respondents' willingness to vote for Jobbik (a dummy variable) and their agreement with the stereotype "The problems with Gypsies would be solved if they finally started working."¹⁵ The latter is measured

¹⁵ The survey question used the term Gypsy (cigány), which corresponds to the biased popular parlance.

on an ordinal scale of four categories: not at all, rather not, rather yes, and completely. We explore how these outcomes are associated with the search intensity of nonemployed Roma and non-Roma in the respondent's district. By search intensity, we mean the fraction of nonemployed persons actively looking for a job who demonstrate that they want to work while out of employment. We estimate a linear probability model for the choice of Jobbik and another for complete agreement with the stereotype. Table 8 presents the key parameters and the tests for statistical significance.

The parameters obtained for Roma's job search activity are negative but not significantly different from zero or those received for non-Roma search activity. The effect is also negligible in terms of magnitude. Given the Roma parameter in the first row (-0.091), a Roma search intensity one standard deviation lower (0.07) would increase the probability that the respondent identifies Jobbik as their preferred party by a mere 0.6 pp. Roma search intensity's effect on agreement with the stereotype is 2 pp, or 4 percent of the mean. The data do not support the idea that spatial differences in Roma's labor market behavior drive spatial differences in prejudice toward Roma.

Robustness checks

To address the possibility that industries (technologies) rather than firm size is what matters for Roma underemployment, we re-estimated our employment equations by replacing the small-firm share with the shares of agriculture, construction, and services. We found no effect, as shown in *Supplementary Materials SM10*. We also tried to address the role of unobserved quality differences between Roma and non-Roma labor as far as possible with the data at hand. In many districts, Roma children receive inferior education in a segregated environment (Kertesi and Kézdi 2011a, 2016). Higher levels of school segregation in the past may capture a part of the quality difference today. Substituting Jobbik's support for district-level measures of past segregation did not yield significant results (*Supplementary Materials SM11*). We examine whether Roma workers can eliminate the consequences of prejudice prevailing in the wage labor market by escaping to self-employment. We re-estimated Eq. 2 after including self-employment in the left-hand-side variable. As shown in *Supplementary Materials SM12*, this does not change our main results: the predicted employment gaps are the same, regardless if we include or exclude self-employment.

7 Discussion and policy implications

We attempted to explore the role of ethnic bias as a cause and the firm size as a mediator in shaping the Roma–non-Roma residual employment gap within local labor markets. We hypothesize that ethnic bias leads more easily to employment discrimination in markets with a high share of workers in small firms. In addition to expectedly more frequent taste discrimination on the part of employers, ethnic bias leads to labor market discrimination through the rejection of potential co-workers and customers, especially in small businesses where conflictual interactions (teamwork and customer encounters) are more likely. We tested this hypothesis with cross-sectional data from 2011, exploiting that ethnic bias manifested itself in political sympathies with unprecedented strength.

For men, we found that where one of the two key variables is low, the employment gap remains unchanged or even slightly narrows as the other variable increases. Where one of the two key variables is high, the employment gap widens as the other variable increases. When both variables are high, we estimate a residual employment gap for men—the sole breadwinners in the majority of Roma families—that is, 2.3–4.8 percentage points higher than average, indicating a significant (20–40 percentage points) additional gap compared to the average ethnic gap of 11.6 percentage points.

The Jobbik vote share is an (approximate) measure of a highly prejudiced minority of the population, but it does not allow us to infer the average level of prejudice or other moments of its distribution. Suppose that an openly anti-minority party receives the votes of people above a certain threshold of prejudice and that in district *B*, the party receives more votes than in *A*. Behind this situation may lie different patterns in the distribution of prejudice. The density functions can be similar in the two districts, but in *B*, the density is shifted to the right so that more people fall above the critical bias level than in *A*. Another case with similar consequences is if mean prejudice levels are the same, but the population of *B* is more polarized (the distribution is flatter), so more people vote for the party. In such and similar cases, mean Jobbik votes do not allow for the inference of the degree of bias of the average voter or the distribution of prejudice. This is worth emphasizing because, in the Becker model, the spatial dispersion of the residual disadvantage of a minority is explained by the *marginal discriminator* at the edge of considering minority job seekers. See Charles and Guryan (2008) for empirical support for this hypothesis. The Becker prediction, however, refers to taste discrimination by *employers*. The strength of discrimination aimed at preventing cooperation breakdowns or averting

customers' aversion would depend, using common sense, on the proportion of highly prejudiced employees and customers that the Jobbik election results probably measure well.¹⁶

Our analysis has not exhausted the range of mechanisms that lead from prejudice to employment disadvantage. (i) We have seen that discriminative anti-Roma stereotypes are shared by a broad section of the population, even in the least prejudiced areas in terms of Jobbik support. This consensus certainly plays a role, albeit to an unknown extent, in the formation of the *average* residual gap. (ii) The role of *taste-based employer* discrimination remains unclear. An empirical investigation of this would require preferably longitudinal data on prejudice distributions within geographical units, such as those used in the Charles and Guryan (2008) study. (iii) A further source of discrimination is when an employer uses information on group-level *productivity* to predict individual productivity. While there is no evidence of lower group-level productivity among Roma, the suspicion is that Roma children receive below-average education, and many of their families lack the means to support the acquisition of average cognitive and non-cognitive skills.¹⁷ Given the impact that employees across a wide range of economic sectors have on each other's performance (Mas and Moretti 2009), the *presumed* group-level difference may make it more profitable for some employers to reject minority applicants than to map their skills carefully. However, we have neither data nor assumptions about the spatial distribution of expected mean differentials in Roma versus non-Roma productivity.

An important policy conclusion emerges from the results. Tackling discriminatory practices by enforcing the rules of law is complicated because legal, civilian, and media actions have little impact on small firms. It is therefore worth considering hiring and in-work subsidies that help Roma job seekers enter small businesses so their employers can gain experience on their productivity and learn about the reactions of co-workers and customers. Such programs could help, albeit at a substantial deadweight loss, all the more, as they cannot be directly targeted at the Roma.¹⁸

¹⁶ Note that the models of Becker (1957) and Charles and Guryan (2008) explain wage differentials. However, lower wages intended to be offered to minority applicants may lead to an employment gap if they cannot be actually offered due to anti-discrimination regulations, union resistance, or in defense of the internal wage ladder. If the company still goes to the market with these wage offers, some of them will not be accepted by minority job seekers.

¹⁷ When such conditions are identical, no ethnic differences can be found on tests of cognitive skills (Kertesi and Kézdi 2011a, 2016).

¹⁸ None of the Hungarian administrative registers record ethnicity.

A further constraint is set by the *stigma* of being Roma, the presence of which is clearly indicated by widespread agreement with rejectionist stereotypes. Loury (2002, p. 167-8) writes, "A diagnosis of *discrimination* yields a search for harmful or malicious actions as the treatment, using the law and moral suasion to curtail or modify those actions. But seeing *stigma* as the disease inclines one to look for insidious habits of thought, selective patterns of social intercourse, biased processes of social cognition, and defective public deliberations when seeking a cure." Legal and employment policy instruments are not effective enough in fighting the stigma—challenging it in education, out-of-school activities, civil organizations, the media, and other arenas where “race-mediated social meanings are constructed” promises better results.

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Supplementary Materials

SM1. Control variables in Equation (2) – sample means by gender and ethnicity

Variable	Men		Women	
	Non-Roma	Roma	Non-Roma	Roma
Age	41.5 (11.4)	35.9 (12.0)	43.5 (11.6)	35.1 (12.0)
Age-squared	1853.7 (939.5)	1431.4 (906.3)	2026.0 (966.6)	1378.3 (900.9)
Incomplete primary, grades 0-7 (0,1)	0.018	0.166	0.028	0.261
Vocational training school (0,1)	0.727	0.240	0.551	0.130
Long-term ill (0,)	0.100	0.128	0.138	0.148
Disabled (0,1)	0.021	0.039	0.019	0.025
Long-term ill and disabled (0,1)	0.030	0.048	0.034	0.041
Illness/disability: no answer (0.1)	0.057	0.004	0.054	0.004
Speaks English (0,1)	0.035	0.018	0.025	0.015
Speaks German (0,1)	0.056	0.022	0.039	0.018
Belongs to a church (0,1)	0.748	0.792	0.778	0.806
Married or cohabiting (0,1)	0.577	0.641	0.636	0.654
Married or cohabiting; partner: primary education (0,1)	0.009	0.142	0.011	0.110
Married or cohabiting; partner: vocational training school (0,1)	0.209	0.121	0.371	0.163
Married or cohabiting; partner: secondary education (0,1)	0.178	0.032	0.096	0.018
Married or cohabiting; partner: college (0,1)	0.048	0.005	0.016	0.003
Married or cohabiting; partner: employed (0,1)	0.321	0.104	0.358	0.188
Married or cohabiting; partner: retired (0,1)	0.056	0.044	0.143	0.074
Married or cohabiting; partner: living on assets (0,1)	0.000	0.001	0.000	0.000
Married or cohabiting; partner: welfare recipient (0,1)	0.019	0.071	0.011	0.072
Number of children aged 0 living in the dwelling	0.030 (0.174)	0.118 (0.348)	0.036 (0.192)	0.150 (0.387)
Number of children aged 1-3 living in the dwelling	0.097 (0.327)	0.342 (0.650)	0.118 (0.364)	0.441 (0.721)
Number of children aged 4-6 living in the dwelling	0.099 (0.329)	0.310 (0.607)	0.121 (0.364)	0.392 (0.667)
Number of children aged 7-14 living in the dwelling	0.272 (0.602)	0.776 (1.086)	0.342 (0.677)	0.920 (1.166)
Number of children aged 15-18 living in the dwelling	0.163 (0.423)	0.385 (0.660)	0.191 (0.455)	0.394 (0.662)
Number of working persons in the dwelling (excluding the respondent)	0.472 (0.797)	0.301 (0.658)	0.457 (0.753)	0.253 (0.593)
Number of pensioners in the dwelling (excluding the respondent)	0.320 (0.602)	0.221 (0.503)	0.215 (0.504)	0.180 (0.460)
Number of people living on assets in the dwelling (excluding the respondent)	0.000 (0.021)	0.001 (0.034)	0.000 (0.020)	0.001 (0.028)
Number of welfare recipients in the dwelling (excluding the respondent)	0.038 (0.217)	0.221 (0.577)	0.038 (0.220)	0.209 (0.559)
Is there a person in need of long-term care in the home (0,1)	0.047	0.085	0.051	0.083

Number of persons living in the dwelling	3.434 (1.648)	5.257 (2.890)	3.538 (1.723)	5.530 (2.956)
The floor area of the dwelling (m2), log	4.312 (0.402)	4.239 (0.434)	4.299 (0.398)	4.236 (0.425)
No bathroom in the dwelling (0,1)	0.067	0.256	0.061	0.274
No flush toilet in the dwelling (0,1)	0.075	0.282	0.069	0.300
Dwelling with domestic water supply (0,1)	0.035	0.036	0.035	0.035
No running water in the dwelling (0,1)	0.031	0.148	0.028	0.166
Extremely low-status neighborhood ^a in the central part of the residential area (0,1)	0.003	0.036	0.003	0.040
Extremely low-status neighborhood ^a in the peripheral part of the residential area (0,1)	0.001	0.013	0.001	0.015
Place of residence = Budapest (0,1)	0.103	0.078	0.100	0.073
Place of residence = county capital (0,1)	0.169	0.105	0.172	0.100
Place of residence = village, 5000+ inhabitants (0,1)	0.024	0.019	0.023	0.019
Place of residence = village, 2000-4999 inhabitants (0,1)	0.081	0.097	0.081	0.099
Place of residence = village, 1000-1999 inhabitants (0,1)	0.059	0.083	0.059	0.081
Place of residence = village, -999 inhabitants (0,1)	0.101	0.143	0.101	0.145
No. of towns with employment agency accessible by public transport by 6-8 a.m. = 1 (0,1)	0.018	0.039	0.019	0.039
No. of towns with employment agency accessible by public transport by 6-8 a.m. = 2 (0,1)	0.231	0.267	0.230	0.273
No. of towns with employment agency accessible by public transport by 6-8 a.m. = 3 (0,1)	0.177	0.180	0.176	0.174
No. of towns with employment agency accessible by public transport by 6-8 a.m. = 4+ (0,1)	0.246	0.173	0.245	0.169
No. of towns with employment agency accessible by public transport by 6-8 a.m. = missing (0,1)	0.008	0.008	0.008	0.008

Standard deviations of continuous variables are shown in parentheses.

^a Classified as an extremely low-status neighborhood by the census enumerators.

Data: Census 2011

SM2. Employment composition of the Roma and non-Roma population

Without full time students in public or higher education.

	15-74 years old		15-60 years old		15-60 years old, less than secondary education ^a	
	Non-Roma	Roma	Non-Roma	Roma	Non-Roma	Roma
Men						
Employed	54.2	25.3	66.2	26.7	59.1	24.7
Self employed	8.1	2.6	7.7	2.5	6.9	2.2
Public worker	1.0	8.6	1.3	9.0	2.0	9.4
Non-employed	36.7	63.5	24.9	61.8	32.0	63.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of observations	3,190,576	87,852	2,590,891	83,076	1,376,405	78,054
Women						
Employed	44.4	13.4	57.8	14.3	44.2	11.9
Self employed	4.6	1.1	4.7	1.0	4.1	0.8
Public worker	0.8	4.9	1.0	5.3	1.7	5.4
Non-employed	50.2	80.6	36.5	79.4	50.0	81.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of observations	3,504,092	91,921	2,674,454	86,076	1,028,851	80,151

Data: Census 2011

SM3. District-level variables and estimates

	Mean	Std. dev.	Min	Max
Male population				
Roma population share	4.9	4.7	0.2	24.4
Non-Roma employment rate	66.5	6.0	52.2	80.1
Roma employment rate	38.0	11.4	9.8	90.0
Roma – non-Roma raw employment gap ^a	-28.5	10.0	-59.0	28.0 ^d
Roma – non-Roma residual employment gap ^b	-11.5	7.5	-35.2	36.8 ^d
Female population				
Roma population share	4.6	4.4	0.1	22.7
Non-Roma employment rate	47.5	7.3	29.2	63.9
Roma employment rate	16.9	8.4	3.9	42.9
Roma – non-Roma raw employment gap ^a	-30.6	6.2	-46.4	-13.1
Roma – non-Roma residual employment gap ^b	-6.1	5.1	-31.1	11.1 ^c
Other variables				
Jobbik share in popular votes	18.8	5.7	10.3	38.5
Jobbik residual vote share ^c	0.0	5.0	-10.4	17.4
Small firm share ^d	31.2	8.3	3.7	56.5
Number of non-performing loans / population	0.078	0.025	0.041	0.193
Change in sales revenues 2010/2008	98.3	2.6	93.5	107.3

Unless otherwise indicated, the data show unweighted district means and standard deviations as a percentage.

^a Estimated gap without controlling for variables in SM1.

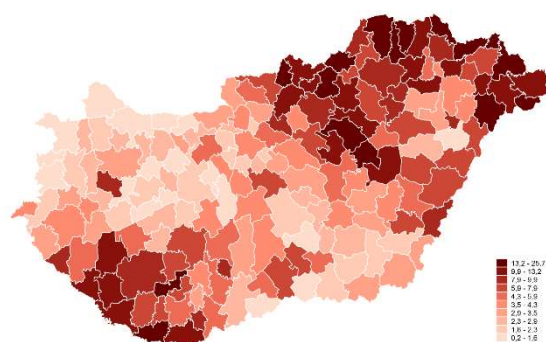
^b Estimated gap after controlling for variables in SM1.

^c Residual support for Jobbik. Estimated as a residual of Eq. 1.

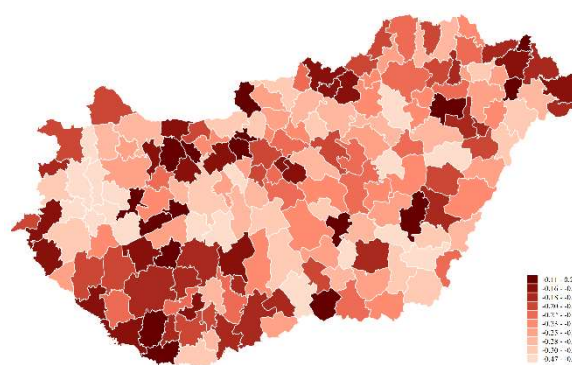
^d Percentage of workers employed in firms with 2-30 workers.

^e The district of Mórahalom is a heavy outlier, and only in this case do we see a positive gap.

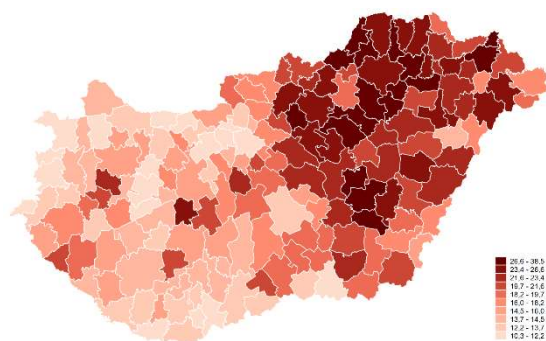
SM4. Maps of the key district-level variables



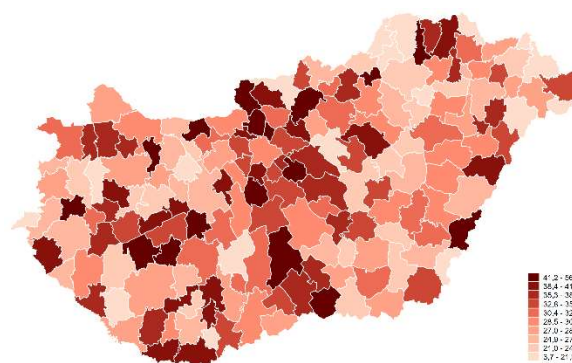
Roma population share (2011)



Roma – non-Roma employment gap (2011)

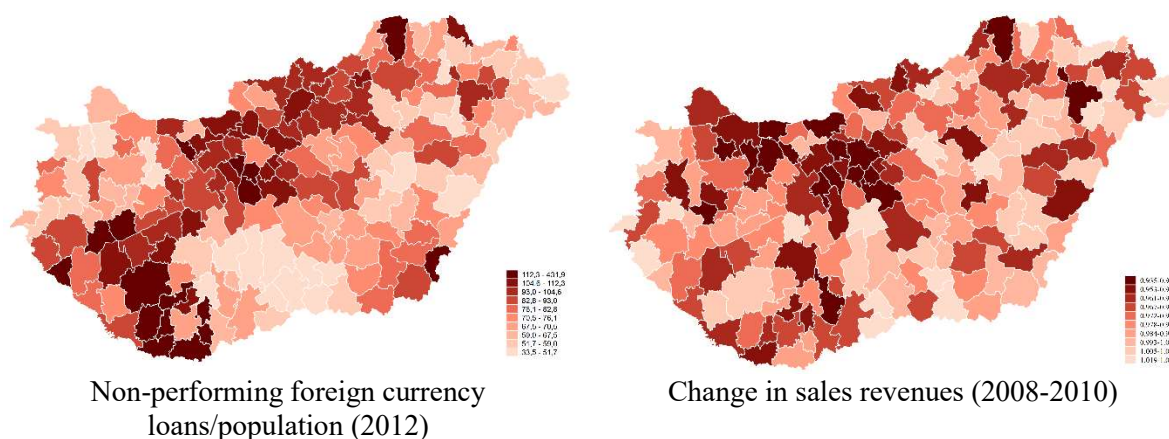


Jobbik's share in popular votes (2010)



Small firm density (2010-2011)

Maps of the key district-level variables (cont.)



We present these maps to show that the spatial distributions of the key variables follow different patterns. The ethnic employment gap, small-firm density, and Jobbik vote share are weakly correlated with Roma's population share. The occurrence of non-performing loans and the changes in firm revenues during the crisis also follow distinct patterns.

SM5. Data sources

Population census 2011. Conducted by the Hungarian Central Statistical Office (HCSO) in October 2011. The data cover 10 million persons in 4.4 million dwellings. The microdata is available for academic research in a remote-controlled Research Room jointly operated by the Central Statistical Office (HCSO) and the Databank of the Center for Economic and Regional Studies (CERS). See <https://adatbank.krtk.mta.hu/en/kutatoszoba/>

Population census 2001. Conducted by the Hungarian Statistical Office in October 2001. Methodology: similar to the Census 2011. The microdata are also available in the HCSO-CERS Research Room. <https://www.nepszamlalas2001.hu/eng/volumes/volumes.html>

Labor Force Survey, 1992-2024, quarterly data. Conducted by the Hungarian Statistical Office. Information provided on the economic activity of the population, following Eurostat guidelines. Rotating panel, with each cohort staying in the sample for six quarters. *The reference population is Hungary's residents living in private households.* The sampling units are dwellings. The sample contains 45,000-70,000 people aged 15-74 and between 15,000 and 20,000 people outside this age range. People aged 15-74 are asked about their economic activity. https://www.ksh.hu/emef_en

Wage Survey, 1986, 1989, 1992-2024, annual data. Conducted by the Hungarian Public Employment Service in 1986-2018 and the HCSO from 2019 onwards. The survey covers all firms employing more than 20 workers and a random sample of businesses employing 5-20 workers. In private firms employing more than 50 workers, the individual data relate to a random sample of the employees. In the case of smaller firms, the data cover all employees. In the case of the public sector, the survey covers all employees of all budget institutions. Data collection is carried out separately at each site/branch of an enterprise. *Sample size:* 100-200 thousand employees, depending on year.

<https://adatbank.krtk.mta.hu/en/adatbazisok/elerheto-adatbazisok/>

CSO Register of Economic Organizations, annual data. The data covers all registered businesses and nonprofit organizations holding a tax number. Records contain information on continuing, newly registered, and closed enterprises and their main characteristics (industry, firm size, etc.) <https://www.ksh.hu/gazdasagi-es-nonprofit-szervezetek>

BISZ Central Credit Information System. Our district-level data on the number of non-performing foreign currency loans per capita in 2012 were purchased from BISZ in 2019. Some loans entered into the credit information system are removed after 5 or 10 years or when the debt is settled. Therefore, the data is biased towards debts on longer-term non-performing loans. On the original BISZ data see <https://bisz.hu/en/homepage/>

National election results 2010. Results in popular votes, aggregated to the electoral ward level, are downloadable from https://sscu-budapest.github.io/explorer/dataset-pages/hungarian_elections.html / Vote Record Table.

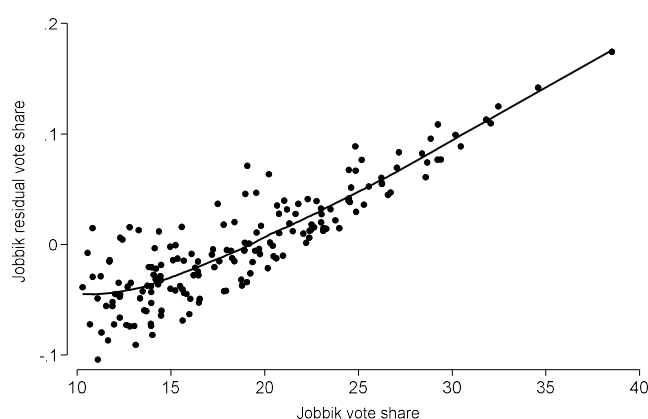
Tárki Life Course Survey (TLCS) 2006-2012. The TLCS is a panel survey that follows 10,000 youths annually, beginning in the fall of 2006 and ending in the 2011/12 school year. The survey sampled students participating in the nationwide, all-encompassing National Assessment of Basic Competencies (NABC) as 8th-grade students in May 2006. For detailed information, consult https://adatbanktest.tarki.hu/cgi-bin/katalogus/tarkiser_en.pl. In this paper, we use data from the Youth Questionnaire of the 4th wave, 2009 (questions 5-9): http://adatbanktest.tarki.hu/adatbank-h/katalog/dokument/kerdoiv/h84_ques_complementary.pdf

Tárki Omnibus Surveys, 2000–2011. The surveys measure the social and political attitudes of the Hungarian population on national representative samples. https://adatbanktest.tarki.hu/cgi-bin/katalogus/tarkiser_en.pl

KRTK Databank Admin3. Admin3 is a LEED panel covering a 50 percent random sample of the population aged 0-74 in January 2003. People are followed monthly until December 2017. Data come from the Pension Directorate, Tax Authority, Health Insurance Fund, Public Employment Service, and the Office of Education. In this paper, we use the 2008 residence data at the district level and the sales revenue data of the district residents' employers in 2008 and 2010. See details at <https://adatbank.krtk.mta.hu/en/admin3-2003-2017/>.

Ministry of Public Education and Culture administrative data 1985, 1989, 1992. School level administrative data of the Ministry of Education and Culture of Hungary are available in the Databank of the Centre for Economic and Regional Studies. Primary data are available for the international research community via remote access. Write to adatkeres@krtk.hu to request access.

SM6. Raw versus residual vote share of Jobbik



The curve was estimated using locally weighted regression (Stata *lowess*).

Residual: residual of the district-level Eq. 1. estimating Jobbik's support.

SM7. Principal component analysis to separate statements that reject and accept Roma

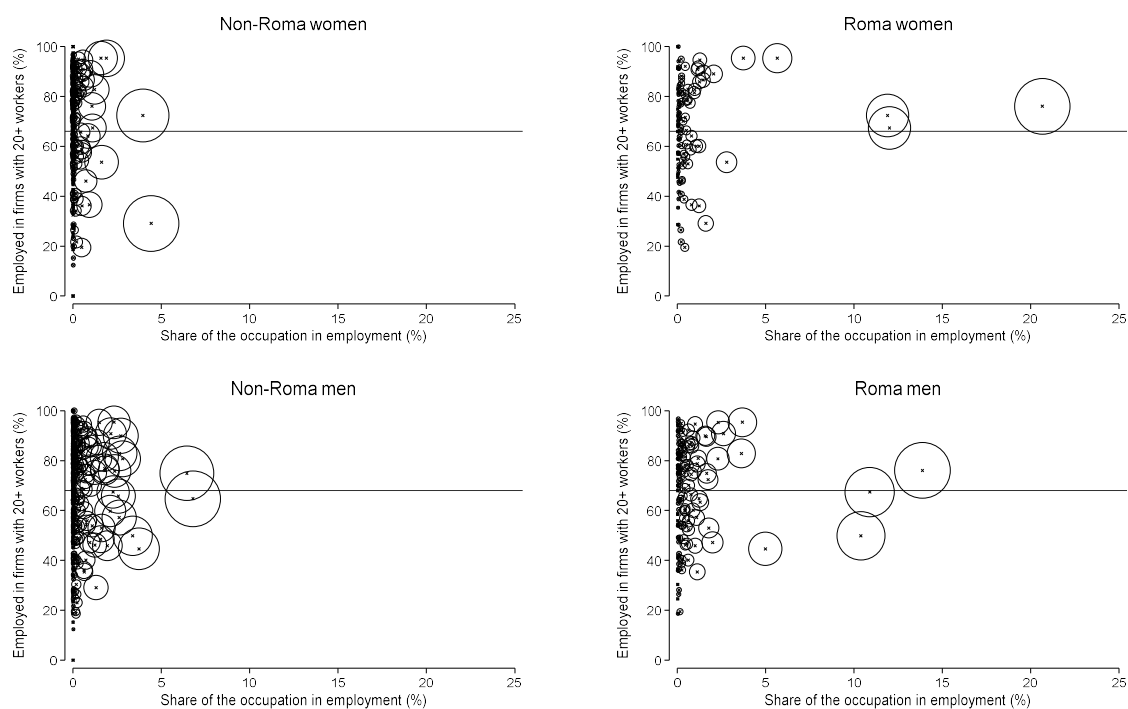
Stereotypical statements	1.	2.
	Factor loadings	
'Increasing Gypsy population threatens the security of society.'	0.7778	-0.0585
'Criminal tendencies are in the blood of Gypsies.'	0.7457	-0.0422
'One can only approve that there are still clubs and bars where Gypsies are not allowed.'	0.7234	-0.0132
'Gypsy families want to live on benefits. That is why they have so many children.'	0.7055	-0.0358
'Gypsies must be completely separated from the rest of society.'	0.6957	-0.0744
'Gypsies should not pretend not to be Gypsies.'	0.5812	0.2074
'The problems with Gypsies would be solved if they finally started working.'	0.4647	0.2276
'Gypsies must be made to live like others.'	0.3439	0.3967
'Every Gypsy child has the right to learn with non-Gypsy children.'	-0.1696	0.6505
'Respect for traditional family values is stronger among Gypsies than among non-Gypsies.'	0.1085	0.5276
'Gypsies do not work because they cannot get a job.'	-0.0564	0.6021
'Gypsies can decide their own affairs in every way.'	-0.0558	0.6045
'There are as many criminals among Gypsies as among non-Gypsies in similar circumstances.'	0.0252	0.5880
'Gypsies should be given more support than non-Gypsies.'	-0.0001	0.3812
Eigenvalue	3.3928	2.1778

Source: TÁRKI Life Course Survey, wave 2009, total number of non-Roma respondents to all prejudice questions: 4055. The survey questions used the term Gypsy that corresponds to the popular parlance. We follow the original wording.

SM8. The points chosen for prediction in the space of small firm share and residual support for Jobbik



SM9. Occupations of Roma and non-Roma women and men



Data: LFS pool of quarterly waves in 2015-2021. All data relate to people with lower than secondary education. *Note:* The LFS distinguishes firm size brackets of 0-10, 11-20, 21-50, and higher.

The four charts follow the same logic. Occupations are the units of observation. On the horizontal axis for Roma women, for instance, we measure the share of occupations in *Roma women's* employment. The circles around the points are proportional to the number of observations of Roma women in the occupation. On the vertical axis, we measure the percentage share of workers employed by medium-sized or larger firms (with more than 20 employees) within the occupation, *irrespective of gender and ethnicity*. The horizontal line indicates the mean 'big-firm shares' for men and women in the sample: 68 and 66 percent, respectively. Since 98 percent of the sample consists of non-Roma, this measure is free of the effect of employers' distaste for Roma workers

10. Placebo regressions: industry shares instead of small firm shares, 2011

Dependent variable: 0=non-employed, 1=employed. Linear probability models

	Men			Women		
	Industry: Services	Industry: Construct.	Industry: Agriculture	Industry: Services	Industry: Construct.	Industry: Agriculture
Roma	-0.183*** (8.0)	-0.107*** (4.8)	-0.104*** (16.1)	-0.097*** (3.1)	-0.066*** (3.7)	-0.074*** (14.1)
Roma × Industry	0.001*** (3.2)	-0.000 (-0.22)	-0.001 (1.5)	0.001 (1.2)	0.001 (0.3)	0.002** (2.5)
Roma × Jobbik	-0.547 (0.9)	0.510 (1.0)	0.217 (1.1)	-0.572 (0.8)	0.674** (1.9)	0.711*** (4.6)
Roma × Jobbik × Industry	0.012 (1.0)	-0.041 (0.9)	-0.019 (0.9)	0.018 (1.3)	-0.033 (1.1)	-0.046*** (2.7)
Controls	yes	yes	yes	yes	yes	yes
District fixed effects	yes	yes	yes	yes	yes	yes
Number of observations	1,257,207	1,257,207	1,257,207	985,713	985,713	985,713
R ²	0.252	0.252	0.252	0.237	0.237	0.237

Controls: age, education, health, language proficiency, religiosity, marital status, partner's education, labor market and transfer status, household size and composition, dwelling size, type of municipality, and accessibility of urban job offers. For a complete list of control variables, see *Supplementary Materials SM1*.

Jobbik: residual support for Jobbik. Estimated as a residual of Eq. 1.

Data: Census 2011

Note: The standard errors for Roma × Jobbik and Roma × Jobbik × Industry shares were estimated using a two-step bootstrap procedure.

* p<0.10, ** p<0.05, *** p<0.01. t-values in parentheses.

SM11. Placebo regressions: interschool segregation (as a proxy for school quality) instead of support for Jobbik, 2011

Dependent variable: employed (0,1). Linear probability models

	Men	Women
Roma	-0.116*** (3.6)	-0.117*** (4.9)
Roma × Interschool segregation	0.099 (0.8)	0.230*** (2.7)
Roma × Small firm share	0.026 (0.2)	0.145 (1.6)
Roma × Interschool segregation × Small firm share	-0.460 (1.0)	-0.565 (1.6)
Controls	yes	yes
District fixed effects	yes	yes
Number of observations	1,257,207	985,713
R ²	0.237	0.252

Controls: age, education, health, language proficiency, religiosity, marital status, partner's education, labor market and transfer status, household size and composition, dwelling size, type of municipality, and accessibility of urban job offers. For a complete list of control variables, see *Supplementary Materials SM1*.

Interschool segregation: district-level interschool segregation of Roma students (as a proxy measure for the quality of primary education of Roma job seekers of age 33-40 in 2011) is measured by their interschool segregation index (S) in 1985-1992 when they graduated from primary school ($0 \leq S \leq 1$). Segregation index shows the fraction of interethnic contact possibilities that are made impossible by the uneven distribution of students of different ethnicity across schools. $S = 0$ stands for the no segregation, $S = 1$ for the full segregation case. For the calculation see Clotfelter (1999) or Kertesi and Kézdi (2010).

Small firm share: enterprises with 2-30 employees in district employment.

Data: Census 2011, and school-level administrative data of the Ministry of Public Education and Culture of Hungary 1985, 1989 and 1992.

* p<0.10, ** p<0.05, *** p<0.01. t-values in parentheses.

SM12. The effect of Roma ethnicity, district-level Jobbik support, and small firm density on the probability of employment (including the self-employed), 2011

Dependent variable: 0=non-employed, 1=employed. Linear probability models

	Men		Women	
	(1)	(2)	(3)	(4)
Roma	-0.273*** (130.3)	-0.107*** (6.4)	-0.320*** (211.2)	-0.079*** (6.7)
Roma × Jobbik		0.964*** (3.1)		0.737*** (3.6)
Roma × Small firm share		-0.038 (0.6)		0.045 (0.9)
Roma × Jobbik × Small firm share		-4.001*** (2.9)		-1.802** (2.1)
Controls		yes		yes
District fixed effects		yes		yes
Number of observations	1,353,770	1,353,770	1,028,238	1,028,238
R ²	0.012	0.234	0.024	0.250

Controls: age, education, health, language proficiency, religiosity, marital status, partner's education, labor market and transfer status, household size and composition, dwelling size, type of municipality, and accessibility of urban job offers. For a complete list of control variables, see *Supplementary Materials SM1*.

Jobbik: residual support for Jobbik. Estimated as a residual of Eq. 1.

Small firm share: enterprises with 2-30 employees in district employment.

Data: Census 2011, Wage Survey 2011, Business Register 2010, *valasztas.hu*. 2010.

Note: The standard errors for Roma × Jobbik and Roma × Jobbik × Small firm share were estimated applying a two-step bootstrap procedure.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. t-values in parentheses.