Roma employment in Hungary after the post-communist transition[1]

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Abstract

We analyse the magnitude and the causes of the low formal employment rate of the Roma in Hungary between 1993 and 2007. The employment rate of the Roma dropped dramatically around 1990. The ethnic employment gap has been around 40 percentage points for both men and women and has remained remarkably stable. Differences in education are the most important factor behind the gap, the number of children is important for female employment and geographic differences play little role once education is controlled for. Conditional on employment, the gap in log earnings is 0.3, and half of it is explained by educational differences.

JEL classifications: J15, J21, J70.
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1. Introduction

The Roma (also known as the Romani people or Gypsies) constitute one of the largest and poorest ethnic minorities in Europe.[2] Nearly 80 percent of the Roma live in former communist countries in Central and Eastern Europe. The size of the Roma population is notoriously hard to assess because ethnic data are not collected in accurate and systematic ways (this is explored in detail in the data section). One of the more reliable estimates of the size of the Roma population in Central and Eastern Europe put it slightly over 4 million in the early 1990s (Barany, 2002). According to these figures, the percentage of Roma in the total population was close to 10 percent in Bulgaria and Slovakia, between 4 and 7 percent in Hungary, Macedonia, Romania and Serbia and around 2 percent in Albania and the Czech Republic. Little representative evidence exists on the wellbeing of the Roma, but all available data indicate widespread poverty, low formal employment, low education, poor health and social exclusion in all countries (Higgins and Ivanov, 2006; Milcher, 2006; Ringold *et al.*, 2005; UNDP, 2002).

The purpose of this article is to shed light on the extent and causes of the low formal employment rate of the Roma in Hungary. This is a descriptive article with four main contributions. First, we estimate the ethnic employment gap using the most reliable surveys that span 15 years of post-communist history. Second, we decompose the employment gap into differences in demographics, education and geographic distribution, on one hand, and a residual component, on the other. Third, we document and decompose the gap in earnings conditioned on employment. While the estimates for the Roma inevitably suffer from severe selection bias, these conditional comparisons can be informative in their own right. Finally, after establishing the importance of education for the employment and earnings gaps, we describe the evolution of educational differences between the Roma and the non-Roma.

The article focuses on Hungary because of data availability. For most of the past 20 years, Hungary has been a relatively successful post-communist economy with a significant Roma minority. It is also one of the few countries with reliable survey data on the Roma. The Hungarian economy went through the post-communist transition relatively quickly, and the transition was accompanied by a significant decline in jobs (Svejnar, 2002). By the late 1990s, Hungary had become one of the

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[2] There is some controversy about the name of the Romani ethnic group. In Central and Eastern Europe, the name Roma is used both as a noun (plural: Roma) and as an adjective. It is also used by some international organizations and initiatives, such as the Roma Education Fund or the Decade of Roma Inclusion. The United Nations, the US Library of Congress and other international associations use the term 'Romani' as an adjective and a noun as well ('Romanies' is the plural form). The name 'Gypsy' is used by many non-Roma, but not by the Roma; it is a name created by outsiders and is derived from the misconception of Egyptian origin. The alternative local names such as Tsigane, Zigeuner or Cigany are also disliked by many Romanies because of negative connotations about lifestyle and image that are inaccurate for most of them. In this article, we use Roma and Romani interchangeably.

more successful transition economies in terms of privatization, institution building and economic growth. In the past decade, the relative position of Hungary has deteriorated significantly. Thus, by analysing the employment of the Roma in Hungary, we can look at not only the effect of post-communist transition but also subsequent large swings in macroeconomic conditions.

The results imply that the employment of Romanies in Hungary dropped dramatically in the first years of the post-communist transition and remained largely unaffected by macroeconomic conditions. By 1994, the ethnic gap in employment rates reached almost 40 percent (0.29 for Romani men vs. the 0.66 national average and 0.17 for Romani women vs. the 0.53 national average). Since then, the employment gap has widened slightly as the employment rate of the non-Roma increased somewhat more than the employment rate of the Roma. Although the estimated levels vary in different surveys, all surveys indicate that the absolute employment gap is roughly the same for men and women. The decomposed results are also similar across surveys. About one-third of the gap is explained by the lower education of the Roma, and the role of education in this gap is increasing. This result is all the more remarkable because we do not control for the quality of education. The number of children plays an important role for women, but geographic location explains little of the gap once education is controlled for. The slight increase in the employment gap is because of the increased role of education in employment prospects, which hurts the Roma because of their low education levels. We also estimate and decompose the wage gap. It is conditional on employment and is thus measured with a large selection bias. The gap in hourly wages is about one-third for both men and women, and at least half of it is explained by educational differences.

The remainder of the article is organized as follows. The next section gives a short historical background of the Romani minority in Central and Eastern Europe. Section 3 introduces the datasets, and Section 4 offers descriptive evidence on the employment of the Roma of Hungary. Section 5 presents the methods and the results of the decomposition exercise, and Section 6 shows the results of earnings differences. Section 7 offers some evidence on trends in the education of Romanies and Section 8 sets out the conclusions.

2. Some background on Roma history

The Roma have no historical homeland in Europe. They originated in India and migrated to Eastern Europe 700 years ago.[3] The Roma are a heterogeneous people spread across many countries. Some speak dialects of the Romani language, whereas others adopted the language of their host country, often in the form of a special dialect. The vast majority of the Roma of Central and Eastern Europe settled a long time ago, and their romanticized image as travellers is based on exceptions,

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[3] For more details, see Barany (2002), Guy (2001) and Hancock (2002).

which are often cases from Western Europe. The Roma were enslaved in some parts of Central and Eastern Europe for centuries, and they were often targeted by law enforcement. Historical evidence on the wellbeing of the Roma communities and their relationship to mainstream societies is relatively scarce. The following two paragraphs describe a widely accepted but not uncontested view of their history (see, e.g. Barany, 2002; Hancock, 2002; Kemény, 2006).

For centuries, the integration and assimilation of the Roma remained limited. In many respects, they lived outside mainstream society both before and well into the Industrial Revolution. The Roma had no land or any other formal property, and when they were not slaves, they worked as independent labourers or sold their own products and services. The Industrial Revolution and the emergence of centralized nation states brought the Roma minority closer to mainstream society, but they also undermined their traditional communities. During the Second World War, the Roma were subjects of deportations and mass executions, similar to the Jews (the Roma Holocaust is known as Porajmos). The communist regimes hastened the dissolution of the Roma communities and instigated a paternalistic assimilation process. Many Roma faced relocation into villages and towns inhabited by the majority (often into segregated settlements), obligatory employment in the state sector and compulsory schooling for their children. As a result, many (in some countries, most) Roma families have had stable wage earners under the communist regimes and have seen their children achieve literacy or vocational qualifications. At the same time, many of the ties within the Roma communities have been destroyed.

The fall of the communist system led to a deep recession and a thorough transformation of labour demand in most transition countries. Demand for unskilled labour collapsed. The more successful post-communist economies started to grow quickly during the mid-1990s, but even they did not experience an increase in demand for unskilled labour. Many unskilled people who lost their employment during the transition period have been left without a regular formal job ever since. A widely accepted view is that the dramatic drop in demand for low-skilled workers affected the Roma especially severely. Hard evidence is rare in general (UNDP, 2002), but the Hungarian Roma surveys of 1994 and 2003 (to be introduced later) show a dramatic picture (Kemény and Janky, 2006). As a result, a large and persistent employment gap emerged between the Roma and the non-Roma. Kemény and Janky (2006) provide some evidence on the significant role of education and a regional distribution in the employment gap, but they do not go beyond pairwise correlations.

3. Data

The most important contribution of our article is evidence on Romani employment from multiple surveys. We use data on the Roma from four surveys: the ethnic sample of the 1993 Hungarian Labor Force Survey (HLFS), the Hungarian Roma

Surveys of 1994 and 2003 and the Hungarian Life Course Survey (HLCS) of 2007. For comparison, we also use data from the 1994 and 2003 HLFS.

Nationally representative data for the Roma in Central and Eastern European countries are rare.[4] Administrative data and standard, nationally representative surveys (such as labour force surveys) contain no ethnic markers. National censuses and some representative surveys, particularly in Hungary, ask for respondents' nationality. For the nationality question, the Roma identity is only available as an alternative to other nationalities. To the extent that the Roma have multiple or multi-level identities, their answers to such questions provide inappropriate measures. In Hungary, most Romanies consider themselves both Roma and Hungarian. In the HLCS (to be introduced later), which allows for multiple identities, virtually all Roma consider themselves to be Hungarian as well. In contrast, in the Census of Hungary, the Roma have to choose, and many seem to choose Hungarian. A potential reason for such a choice is fear of enumeration as Romanies; the Roma have the reputation of preferring to be left alone, a preference that is unsurprising given their troubled history. As a result, census data on the Roma are non-representative and very unstable. The Census of Hungary enumerated 160,000 Roma by nationality in 2001, 143,000 in 1990 and a mere 6,000 in 1980. More reliable estimates place the Hungarian Roma population at 485,000 in 1994 and 600,000 in 2003 (estimates are from the Roma surveys introduced next).

The 1993 ethnic sample of the HLFS is a regular quarterly sample of the labour force survey. For the first and last time in the history of the HLFS, it contained ethnic markers as well. The ethnicity of the respondents was assigned by the interviewers without consulting the respondents themselves. In principle, this survey should be ideal for comparing Roma and non-Roma employment because it allows for within-survey comparisons in a nationally representative sample. The sampling frame includes all dwellings in Hungary, including those in segregated Roma settlements. Unfortunately, though, the representative nature of the Roma subsample is questionable in this survey for two reasons with opposing effects. First, the marker assigned by the interviewer may result in a Roma subsample that is biased towards Roma of lower status. There is some evidence suggesting that these one-time labels by outsiders tend to be unstable and to omit middle-class Romanies (Ladányi and Szelényi, 2001). Second, non-response patterns to the survey are highly selective: the poorest Roma were less likely to be included in the final sample than average households. Kertesi (1996) showed that the second problem is very

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[4] Many sociologists and anthropologists oppose the definition of a Roma ethnic group, arguing that ethnic groups are 'social constructions', the boundary of ethnic groups is 'fuzzy' and the results of any classification depend on who does the classifying and under what circumstances (see, e.g. Ladányi and Szelényi, 2001). Of course, there is potentially a large amount of truth in these assertions. However, empirical investigations must use operational definitions of ethnicity even if they are subject to uncertainty or measurement error. We use different datasets with different measures of ethnicity. An important contribution of our article is our demonstration that the qualitative conclusions (and even many of the quantitative results) of our empirical investigation are very similar regardless of the exact measure of ethnicity that is used.

important and has significant consequences (thus apparently dominating the first problem by a large margin). As a result, the Roma subsample of the 1993 HLFS is not only smaller than it should be but is also significantly less disadvantaged than it should be.

Two targeted, nationally representative Roma surveys that are free of the bias of the 1993 HLFS are available for Hungary. One was collected in the first quarter of 1994, and the other was collected in 2003 (see Kemény and Janky, 2006; Kemény *et al.*, 1995). These two surveys are very similar in their focus and sampling design. Both were led by the sociologist István Kemény. The sampling procedure and interviewer instructions ensured that the samples were representative of the Hungarian Roma minority (ethnicity defined by both non-Romanies and Romanies).[5] Results from these two surveys are therefore comparable. We compare Romani figures from these surveys to national data, as opposed to non-Roma figures. In particular, we use the 1994.Q1 and 2003.Q1 samples of the HLFS for comparison. The labour force surveys contain no ethnic markers; consequently, non-Romanies are impossible to identify. The national data that we use for comparison certainly include Romanies as well. As a result, the differences we show are somewhat smaller than the true ethnic differences.

The fourth dataset consists of the parents of the students in the 2007 wave of the HLCS. The survey was organized by TARKI (a survey agency and research institute) and Educatio Kht (an administrative agency of the Hungarian Ministry of Education), and it follows the model of the National Longitudinal Surveys of Youth in the United States. The HLCS is a yearly panel from the cohort of students who were in eighth grade in May 2006. The initial sample consisted of 10,000 students. The first wave of interviews was conducted in the 2006/2007 school year, and the second wave was conducted in the 2007/2008 school year. The potentially selective nature of survey non-response was handled by financial incentives for answering and stratified replacement of non-respondents from the same geographic area and test score quantile.

In this article, we use the sample of parents of these students and restrict the sample to those who responded to both the first and the second waves of the survey (the attrition rate was 7 percent and largely exogenous to the parents' characteristics). Naturally, the sample is not representative of the Hungarian population. Instead, it is representative of the parents of eighth graders. As a result, it is more concentrated in terms of age, labour market activity (because of the age range) and household size (at least one child, by design). It also under-represents households in which children

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[5] In the first step, neighbourhoods were sampled (stratified by the expected number of Roma households). In the second step, all Romani households were enumerated in the selected neighbourhoods, based on information from kindergartens, primary schools, district pediatricians or social workers. The household sample was taken from those lists. Interviewers told the respondents that the survey was meant to represent the Romani population of Hungary. Only households who agreed to participate in such a survey and who thus declared themselves Roma were interviewed. The representative nature of the resulting sample was checked and approved by Kertesi and Kézdi (1998) using various measures of internal consistency and external comparisons.

drop out of school before completing the eighth grade, which may be relevant for approximately 10 percent of the Roma students.[6] The survey asked the parents for their national and ethnic identity in the first two waves. Most importantly, there were two questions in each survey (identity as a first and second choice), allowing respondents to state multiple identities. In this article, we consider Roma to be all those who chose to self-identify as Roma for their first or second choice in either of the two waves.[7] The sample of the parents of the HLCS offers several advantages. It offers direct comparisons between the Roma and the non-Roma, using comparable measures from the same survey. It also contains detailed measures of inactivity, participation in welfare and employment history. The survey is largely free of the selective non-response bias that plagues the 1993 ethnic sample of the HLFS. It is, therefore, a valuable dataset for our analysis, despite the fact that the interviewed persons are representative of a relatively specific sub-population.

Although the main focus of this article is the employment gap, we consider the wage gap as well. Wage data are even more sensitive to differences in definition than employment are. As a result, we restrict the wage analysis to the HLFS 1993 and the HLCS 2007 surveys, where the Roma and non-Roma variables are measured within the same survey using the same definitions. In addition to the potential problems of using separate Roma and national surveys, analysing wage differentials in 1994 and 2003 is impossible because the HLFS, which would be used for the national comparison group, contains no wage data at all (except for the 1993 survey, which we use). The wage variable in both surveys is the after-tax hourly earnings, which is calculated from the monthly wage and hours.

4. Roma employment in Hungary

The overall employment level in Hungary fell significantly in the first years of the post-communist transition. According to the Hungarian Census, the employment

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[6] Kemény and Janky (2006) put this figure at 17 percent for the late 1990s (confidence interval is ±7 percent, according to our own calculations). Data from the most recent waves of the HLFS (in 2009) show that 1 percent of the 18- to 20-year-olds have less than eight grades of education (1.1 ± 0.3 percent). Because around 11 percent of the cohort is Roma (see the next footnote), this implies that, at most, 10 percent of the 18- to 20-year-old Roma drop out of school before eighth grade, even if all of the dropouts are Roma. It is likely that they are not, so the estimate should be well below 10 percent; if half of them are Roma, it should be around 5 percent. Recall, however, that the HLFS under-represents the most disadvantaged households, so the 5 percent figure may be biased downwards. Taking all these uncertainties together, we settle for a guesstimate of 10 percent for the fraction of Roma students who drop out of school before finishing grade 8.

[7] Using this definition, 8 percent of the students in the sample have one or two parents identified as Roma (very few of whom have one parent identified as Roma and the other as non-Roma). This 8 percent should be compared with an estimated 11 percent of Roma students in the cohort. The latter estimate is based on the HLCS answers to the question about the fraction of Romani students in the class of the respondents in eighth grade. This figure is also in line with the 10–12 percent estimate in the relevant birth cohort using the Roma survey of 2003.

Table 1. Employment rates, 16–64 years of age

	1993*	1994†	2003†	2007‡
Men				
Roma	0.41	0.29	0.32	0.35
Non-Roma	0.68			0.82
National average		0.66	0.72	
Male employment gap	−0.28	−0.37	−0.40	−0.47
Women				
Roma	0.26	0.17	0.18	0.24
Non-Roma	0.54			0.71
National average		0.53	0.58	
Female employment gap	−0.28	−0.36	−0.40	−0.47

Notes: *The source is the ethnic sample of the 1993 Hungarian Labor Force Survey (HLFS). The sample is likely to under-represent the most disadvantaged Roma households.
†Roma figures are from the 1994 and 2003 Representative Roma Surveys. The national employment data are from the 1994 and 2003 samples of the HLFS. The HLFS data contain no ethnic markers. As a result, the employment gap refers to the Roma employment rate minus the national employment rate.
‡Data are from the parents of the Hungarian Life Course Survey (HLCS), wave 2007. The HLCS sample is representative of the parents of eighth graders. As a result, it is biased towards age groups characterized by higher labour market participation.

rate of the 15–64-year-old population was 72 percent in 1980, 66 percent in 1990 and 53 percent in 2001. By the mid-1990s, Hungarian employment rates reached levels that were low in international comparison, even among post-communist countries (Svejnar, 2002). While the employment rate for men was 78 percent in 1994 in the Organization for Economic Cooperation and Development (OECD) countries, it was only 66 percent in Hungary (Table 1). By 2003, Hungarian male employment increased to 72 percent and approached the OECD average at that time, which was 75 percent. Female employment in Hungary decreased with male employment but never went below the OECD average. By 2003, it increased slightly above that level, reaching 58 percent. The employment rates among the Roma were significantly below the national rates in both 1994 and 2003. Table 1 shows the differences.

By 1994, Roma employment was below 30 percent among men and at 17 percent among women, and it did not improve significantly afterwards. In 2003, employment of Roma men was at a mere 32 percent, and employment of Romani women remained at 17 percent. The differential between the rate of employment of the Roma vs. the national employment rate was at 36–37 percentage points in 1994. It increased to 40 percentage points by 2003 because employment increased among the non-Roma. Both the level and the change in the employment gap are very similar between men and women. The employment gap has been stable not only through time but also across age groups.

Figure 1. Roma and national employment rates in Hungary by gender. Cohort contains those 20–39 years old in 1984

Male

Female
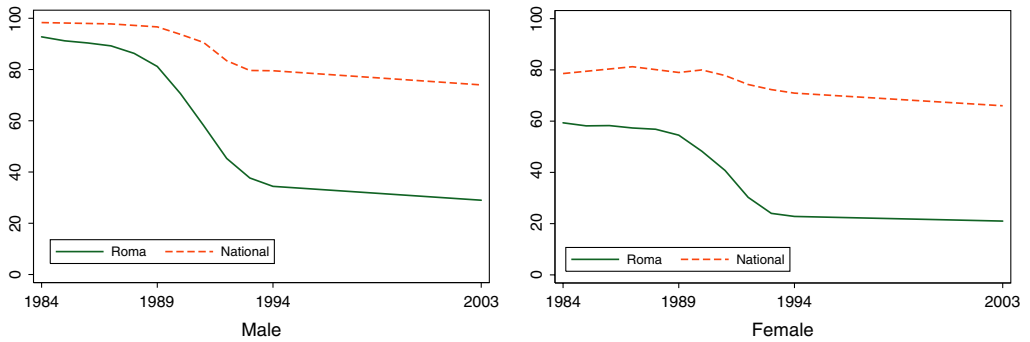
Sources: *Romanies*: Roma Survey of 1994 (with retrospective work histories) and Roma Survey of 2003. *National data*: cohort-based quasi-panel created from successive large-scale nationwide surveys (Micro Census of 1984, the Central Statistical Office (CSO) Household Budget Survey of 1987 and 1989, Census of 1990, CSO Household Budget Survey of 1991 and HLFS, 1992–1994 and 2003).

These dramatic differences were brought about by the post-communist transition. In communist Hungary, the ethnic employment gap was virtually non-existent for men and was much smaller for women. Figure 1 shows the employment rate of people born between 1945 and 1964, from 1984 (when they were 20–39 years old) to 2003 (when they were 39–58 years old). The figures show that virtually all working-age Roma and non-Roma men were employed in the communist economy. The difference among women in the 1980s is probably because of more children born in Romani families. Roma employment started a gradual decline earlier than the national rate, a result of selective job destruction that began in Hungary a few years before 1989 (Köllő, 1998). The employment gap emerged in full within the 5 years between 1989 and 1994, and later years produced no significant changes to it.

Similar to other communist countries, registered employment was compulsory for all working-age citizens of Hungary except for special groups (e.g. mothers raising many children). As a result, almost all Roma men and the majority of women worked in stable and registered jobs. The representative Roma survey of 1994 contains a retrospective employment history that enables us to take a closer look at what working-age Romanies did. In 1985, for example, 87 percent of Roma men and 58 percent of Roma women worked in registered jobs. Employment was not concentrated in certain sectors, although agriculture, construction (for men) and textiles (for women) employed many Romanies. Employment was not only regular and registered but was also stable; the average duration of employment that included the year 1985 was over 10 years for both Romani men and women (calculated for those who were above 30 and below 55 years of age). Most non-employed Romani men were disabled, whereas most non-employed Romani women were at home with children. The vast majority of the jobs filled by Roma were unskilled

Table 2. Labour market participation and fraction of months in formal employment in previous year. Parents in the Hungarian Life Course Survey (HLCS) in November 2007, 30–59 years of age

	Men		Women	
	Roma	Non-Roma	Roma	Non-Roma
Distribution by employment				
Employed in regular job	35	82	24	71
Employed in irregular jobs	11	3	3	2
Unemployed*	32	5	27	9
At home with children	1	0	27	9
Disabled	14	6	11	6
Other inactive	7	4	8	4
All	100	100	100	100
Implied unemployment rate†	0.41	0.06	0.50	0.11

Notes: The HLCS sample is representative of the parents of eighth graders.
*Searching for a job.
†The ratio of unemployed over unemployed plus employed (both regular and irregular).
Source: Parents of the HLCS, wave 2007.

Table 3. Employment duration (average fraction of months in regular employment in the previous 12 months) by labour market status in November 2007. Parents in the Hungarian Life Course Survey (HLCS), 30–59 years of age

Labour market status in 2007	Men		Women	
	Roma	Non-Roma	Roma	Non-Roma
Employed in regular jobs	0.90	0.97	0.85	0.96
Employed in irregular jobs	0.04	0.09	0.08	0.12
Unemployed*	0.07	0.27	0.07	0.22
All inactive	0.02	0.10	0.03	0.05
All	0.35	0.83	0.25	0.72

Note: *Searching for a job. The HLCS sample is representative of the parents of eighth graders in Hungary.
Source: Parents of the HLCS, wave 2007.

jobs that were no longer productive in a market economy and were destroyed in the first years of the transition.

Using the data of parents in the HLCS in 2007, we can take a closer look at the characteristics of the current labour market participation of the Roma and non-Roma in a directly comparable way. Table 2 shows the distribution of different types of labour market activities, and Table 3 shows attachment to the formal

labour market (fraction of months worked in the previous 12 months). Recall that the data are non-representative for the population both because of their age range (restricted to those between 30 and 59 years of age) and because of the over-representation of adults living with children.

The first row in Table 2 repeats the last column of Table 1. The second row shows that irregular employment is more widespread among the Roma. The majority of non-employed Roma reported searching for a job and thus can be classified as unemployed. The unemployment rate, defined here as the ratio of job searchers over job searchers plus employed (either regular or irregular), is at 41 percent for Romani men (compared with a rate of 6 percent for the non-Romani) and 50 percent for Romani women (0.11 for non-Romani women). The majority of the non-employed and non-job-seeking male population is on disability pension in both ethnic groups, but this is more pronounced among the Roma. Similarly, most of the non-employed and non-job-seeking women are at home with children in both ethnic groups, but more so among the Roma.

Table 3 shows the fraction of months worked in regular job(s) in the previous 12 months, a measure of stability of employment for the employed and a measure of attachment to the labour market for the others. Within each category, time spent in regular jobs is less for the Roma than for the non-Roma. The difference is especially apparent among the unemployed, indicating that unemployment durations are significantly longer for the Roma. Kertesi (2005) argues that the lower employment stability among the Roma may be caused by their concentration in more seasonal sectors, such as construction and agriculture (a short version of the paper is available in English in Kertesi, 2010). He also shows that public employment projects, combined with incentives built into the welfare system, are likely to contribute to the short employment spells and are thus likely to reinforce welfare dependency.

5. Decomposing the employment gap

In this section, we take a closer look at the gap in formal employment. We focus on three non-exclusive explanations for the dramatically large gap. First, the majority of Roma may lack the skills needed for formal employment. Second, they may live in parts of the country where there are fewer jobs available. Third, their labour supply may be lower (presumably because of higher reservation wages). We decompose the employment rate differentials into differences in education, geographical location, household size and number of children (and age) using the standard Oaxaca–Blinder methodology (Blinder, 1973; Oaxaca, 1973). Education proxies skills, and our geographic location variables measure geographic isolation (see more details later). Differences in labour supply are very hard to capture. We use household size and the number of children as proxies. The Hungarian welfare system includes relatively generous child-related direct transfers (see, e.g. Gábos et al., 2009), which may strengthen the negative relation for women and may also create negative effects for

men. Naturally, the number of children is endogenous and we do not claim causal effects of children on the labour supply. Nevertheless, ethnic differences in terms of the number of children are likely to be related to ethnic differences in labour supply. Age may be related to skills and labour supply as well. The unexplained part of the employment gap is likely because of a mixture of unobserved differences in educational quality, other sources of pre-market skills and labour supply preferences. The unexplained part may include the effects of labour market discrimination, too.

We analyse the difference in the Roma and the non-Roma employment rate (or the national rate, if non-Romani data are not available). We estimate linear probability models separately for men and women. The decomposition is based on regressions of the following form:

$$y_{sti} = \beta'_{st} x_{sti} + u_{sti}, \tag{1}$$

where y represents employment (1 if employed and 0 otherwise), index s denotes the sample (Romani, non-Romani or national), index t denotes time and i represents the individual. β is the vector of ordinary least squares (OLS) coefficients, and x_i is the vector of right-hand-side variables. The right-hand-side variables include a constant, age group dummies, household size and number of children in the household (two variables: 0- to 18-year-old children and 19+-year-old children), dummies for education attainment, dummies for NUTS-2 regions, town type dummies (capital, city, town or village), whether the family lives in a remote village (to be explained later) and the local unemployment rate. The excluded categories are the age group of 36–45, eight grades of education, living in the south-east and living in villages. Each regression was run separately for men and women and for each survey. In 1993 and 2007, the employment rate of the Roma is compared with the employment rate of non-Roma, whereas in 1994 and 2003, Roma employment is compared with national averages. As a robustness check, we included micro-regional fixed effects among the geographic variables when it was feasible (see more details next).

Equation (1) specifies a linear probability model. The advantage of the linear model in our case is that it allows for a simple linear decomposition. Nonlinear models of probability render more complicated decomposition methods (Fairlie, 1999, 2006). Linear probability models cannot be correctly specified if there are unbounded right-hand-side variables. On the other hand, when right-hand-side variables are dummies that cover mutually exclusive categories, the model is saturated and linear probability models are correctly specified and are, in fact, equivalent to probit and logit models. Our case falls between these extremes. Most of our right-hand-side variables are dummies (and are thus bounded), but they do not comprise all possible interactions. Recall, however, that the focus of our analysis is on the decomposition exercise. The unconditional probabilities are in the middle range (never below 0.17 and never above 0.82). As Fairlie (2006) demonstrates, decompositions based on linear vs. nonlinear models of probability yield very similar results when the unconditional probabilities fall in the middle range.

Table 4. Composition of the Roma minority vs. national composition in 1994: demographics, education and geography. Covers those 16–64 years old and not enrolled in school

	Men		Women	
	Roma	National	Roma	National
Age group (years)				
16–25	0.31	0.14	0.33	0.13
26–35	0.31	0.21	0.32	0.20
36–45	0.24	0.28	0.23	0.27
46–55	0.10	0.21	0.08	0.22
56–65	0.04	0.16	0.04	0.18
Household composition				
Household size	5.97	3.43	5.88	3.29
Number of children, 0–18 years	2.45	0.86	2.49	0.86
Number of children, students, 19+ years	0.00	0.09	0.01	0.08
Education				
0–7 grades	0.30	0.05	0.44	0.09
8th grade	0.48	0.25	0.45	0.37
Vocational	0.19	0.37	0.09	0.15
Secondary	0.03	0.22	0.02	0.29
Higher	0.00	0.11	0.00	0.10
Region				
Central	0.14	0.29	0.15	0.29
Mid-West	0.06	0.12	0.06	0.11
West	0.06	0.10	0.06	0.10
Southwest	0.18	0.10	0.18	0.10
North	0.23	0.11	0.23	0.11
East	0.26	0.15	0.26	0.15
South	0.07	0.14	0.07	0.14
City–town–village				
Budapest	0.08	0.19	0.09	0.20
Big city	0.09	0.18	0.10	0.19
Small town	0.24	0.26	0.23	0.27
Village	0.60	0.36	0.58	0.34
Remote village	0.22	0.08	0.21	0.08
Local unemployment rate (percent)	13.16	10.45	12.96	10.37

Source of the Roma figures: the 1994 Representative Roma Survey.
Source of the national data: the 1994 Q1 sample of the Hungarian Labor Force Survey.

Table 4 shows the composition of the Roma population and the national sample in terms of the right-hand-side variables of our baseline model, estimated from the 1994 surveys. Data from the other surveys show very similar differences.

The Roma minority is significantly younger than the national sample. Part of the age difference among the population considered for the employment analysis is because of the fact that Romanies leave school earlier. The larger part, however, is because of demographics. The Roma are considerably behind the majority ethnic group in terms of the demographic transition (Hablicsek, 2004). Roma households are 2.5 persons larger on average, due primarily to their having more children. The average number of children below 18 years of age is 2.5 in Roma households, compared with the national average of 0.9. The Roma are significantly less educated than the national sample. A total of 30 percent of Roma men and 44 percent of Roma women have less than an eighth grade level education, compared with the corresponding national averages of 5 and 9 percent, respectively. The other side of the distribution is similarly unequal: 3 percent of Roma men and 2 percent of Roma women have secondary or higher education, compared with the national averages for men and women of 33 and 39 percent, respectively.

The geographic distributions show significant differences as well. The Roma are over-represented in the southwestern, northern and eastern regions of Hungary. Unemployment and non-participation rates are well above the national average in these regions (see, e.g. Horváth and Hudomiet, 2005). Sixty percent of the Roma live in villages, compared with the national 35 percent, and the villages where Romanies live are more likely to be 'remote'; that is, they are more likely to have little connection to economically important towns and cities.[8] Kertesi (2000) and Köllő (2002) show that villages in general, and remote villages in particular, are characterized by significantly lower employment prospects than towns and cities, in part due to prohibitive commuting costs. The Roma are concentrated in villages and towns that are characterized by higher unemployment. We measure unemployment at the municipal level, by the ratio of the registered unemployed to the population aged 18–59 years.

The large differences documented before may be a significant reason for the employment gap. Based on the linear models specified in Equation (1), the decomposition of the difference in average employment rates at time t is in the familiar Oaxaca–Blinder form:

$$\bar{y}_{rt} - \bar{y}_{nt} = \beta'_{rt}\bar{x}_{rt} - \beta'_{nt}\bar{x}_{nt} = \beta'_{nt}(\bar{x}_{rt} - \bar{x}_{nt}) + \left(\beta'_{rt} - \beta'_{nt}\right)\bar{x}_{rt} \tag{2}$$

or

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[8] A village is considered 'remote' if there was no town or city (within a 40 km radius) that could be reached by public transportation (bus or train) on weekdays between 5:30 and 7:30 a.m. in 1995. The data were compiled by János Köllő, and we thank him for allowing us to use his data. Although the transportation data refer to 1995, the remoteness of the village defined this way maintains a high predictive power for various measures of non-employment in later years (Köllő, 2002, 2006).

$$\Delta \bar{y}_t = \beta'_{nt} \Delta \bar{x}_t + \Delta \beta'_t \bar{x}_{rt}. \tag{3}$$

Upper bars mean averages, y is employment so that $\bar{y}$ is the employment rate, and $\bar{x}$ is the vector of mean right-hand-side variables. Δ denotes ethnic differences (as opposed to changes through time); r denotes the Romani sample; and index n denotes the non-Romani (in 1993 and 2007) or the national sample (in 1994 and 2003). The average left-hand-side variables are equal to the sum of the average right-hand-side variables multiplied by the corresponding regression coefficient, plus the constant, by the properties of OLS.

The first term in the decomposition, $\beta'_{nt} \Delta \bar{x}_t$, measures the difference due to the different compositions of the two samples. It is often called the endowment component, but we prefer the term *composition term*. It measures the difference that is because of the different compositions of the Roma and the non-Roma (or, in 1994 and 2003, the national) samples. If the regression coefficients in the Roma sample were the same as the non-Roma (national) coefficients, the employment rate differential would be equal to this term. The non-Roma (national) coefficients can be thought of as the 'normal' reduced-form relationships between covariates and employment. Therefore, this term shows what the 'normal' employment rate differential would be as a result of different compositions of Romanies (younger, less educated, living in larger households and more remote areas).

The second term in the decomposition, $\Delta \beta'_{nt} \bar{x}_{rt}$, represents the part of the employment gap that is not because of composition differences in terms of the right-hand-side variables. Technically, the second term shows the part of the employment gap that is due to the fact that regression coefficients, including the constant, are different. When regressions are taken as demand functions, differences in the slope-coefficient term are usually interpreted as price effects. Because employment differentials may be because of differences in supply as well as differences in demand, we do not follow this interpretation. Instead, we use the less intuitive but more agnostic label *coefficient term*. Recall that most of our right-hand-side variables are dummies. Differences in the constant reflect Romani vs. national employment differences among people in the reference group, while differences in the slope coefficients reflect differences in differences: the extent to which the difference in the employment rate between the Roma and the non-Roma (or national) is different relative to their difference in the reference category. Because the choice of the reference group is arbitrary, we do not present the results separately by coefficient; we use the entire coefficient term.

We present results of the decomposition separately for men and women and for each survey year (1993, 1994, 2003 and 2007). The results are in Table 5. We show estimates of the composition term by groups of variables of age, household composition, education and geographical location. Below the point estimates, we present standard errors that are calculated from the variance–covariance matrices of the estimated parameters (assuming independence across subsamples and zero

Table 5. Decomposition of the ethnic employment gap in Hungary.
Results from Oaxaca–Blinder decompositions of ordinary least squares regression estimates.
Left-hand-side variable: employed

	Men				Women			
	1993	1994	2003	2007	1993	1994	2003	2007
Composition								
Age	+0.02	+0.04	+0.04	+0.02	+0.01	+0.05	+0.05	+0.01
(SE)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.004)
Household size, children	+0.01	+0.03	+0.01	−0.01	−0.04	−0.12	−0.14	−0.10
(SE)	(0.002)	(0.008)	(0.005)	(0.007)	(0.003)	(0.008)	(0.005)	(0.007)
Education	−0.09	−0.12	−0.19	−0.16	−0.09	−0.11	−0.18	−0.24
(SE)	(0.005)	(0.005)	(0.005)	(0.013)	(0.004)	(0.004)	(0.005)	(0.013)
Geography	−0.03	−0.04	−0.03	−0.07	−0.02	−0.03	−0.01	−0.04
(SE)	(0.003)	(0.003)	(0.002)	(0.007)	(0.003)	(0.003)	(0.002)	(0.007)
Sum of compositional components	−0.09	−0.09	−0.16	−0.22	−0.13	−0.21	−0.29	−0.38
(SE)	(0.006)	(0.011)	(0.007)	(0.014)	(0.006)	(0.011)	(0.007)	(0.014)
Coefficients								
Sum of coefficient components	−0.19	−0.26	−0.23	−0.25	−0.15	−0.16	−0.10	−0.12
(SE)	(0.020)	(0.014)	(0.013)	(0.028)	(0.018)	(0.014)	(0.012)	(0.024)
Overall employment gap	−0.28	−0.37	−0.39	−0.47	−0.29	−0.37	−0.39	−0.50
Fraction explained by compositional differences	0.31	0.26	0.41	0.47	0.47	0.56	0.73	0.76

Notes: The Oaxaca–Blinder decompositions are based on linear probability models, using non-Roma (or national) coefficients for the composition terms (and Roma means for the coefficient terms). The standard errors, in parentheses, are based on heteroskedasticity-robust covariance matrix estimates of the coefficients. For data, see notes to Table 1.

sampling variation of sample means). The regression coefficients and the sample means are in Tables A1–A4.

All terms in the decomposition exercise are significant at the 1 percent level. Most results are similar across surveys, which is remarkable given their differences. Age differences work slightly in favour of Roma employment, as the Roma population is younger. Differences in household size and the number of children do not contribute to the employment gap among men, but they do play an important role in the employment gap among women. Except for the 1993 results, which are based on a survey that seems not to cover the most disadvantaged Roma households, household size and number of children explain 10–14 percentage points, or one-fifth to one-third, of the employment gap. These results highlight the important role of fertility in the low employment rate of Roma women. On the other hand, the zero effects for men suggest that, at least through this channel, social assistance is not a major determinant of the employment gap.

The most important element in the composition term is because of differences in education. It accounts for one-third of the entire gap both for men and women, and its role is increasing over time. The figures are biased downward because they do not account for school quality, which is known to be lower for the Roma. In all likelihood, quality-adjusted educational differences would account for an even larger part of the employment gap.

Geographic differences explain a smaller part of the employment gap once the other factors are controlled for. This is a robust but somewhat surprising result given the large differences in residential patterns. The Roma in Hungary live in higher proportions in the less-developed regions and are significantly more concentrated in rural areas and remote villages, which are characterized by higher unemployment. However, these differences play a more modest role than expected in the Roma vs. non-Roma employment gap once the other factors, especially education, are also controlled for.

According to our estimates, differences in composition explain over one-third of the overall gap in 1993 and 1994 for both men and women. In 2003 and 2007, composition differences explain more: slightly less than half of the gap for men and more than half for women. Compositional differences explain less of the employment gap among men than women because of the role of children.

We also carried out a few robustness checks. First, we added micro-regional fixed effects to the geographic variables when it was feasible. Hungary is divided into 168 such regions, each representing a city or town and the surrounding villages. These micro-regions can be considered the smallest local labour markets. The inclusion of micro-region fixed effects would therefore allow controlling for geographic differences in the finest and perhaps most appropriate way. Unfortunately, however, their inclusion is possible only in 1993 and 2007 but not in the other two survey years we consider. Recall that the 1994 and 2003 comparisons are based on separate Roma and national surveys. Neither the HLFS nor the Roma surveys cover all micro-regions, and the different surveys cover different regions. The 1993 and

2007 comparisons are made from within single surveys and thus do not suffer from such a problem. We therefore re-estimated the decompositions with micro-regional fixed effects for these latter 2 years. However, not all the observations could be used even in those 2 years: the decompositions with regional fixed effects use observations only in micro-regions with both Roma and non-Roma respondents. We restricted the analysis to micro-regions with at least two Roma respondents and two non-Roma respondents. The results are almost identical to those presented in Table 5: the geographic composition effects increase 1 percentage point in most cases, and everything else remains the same. The detailed results are in Tables A5–A7.

The second robustness check involved restricting the Roma and the non-Roma subsamples to the common support of the right-hand-side variables. The two subsamples may not have common support if, for example, there are no higher educated Roma in the sample. (In fact, there are, if only a few.) On one hand, this may not undermine the validity of our previous analysis; the non-Roma coefficient on higher education may still serve as a valid benchmark. On the other hand, in such a case, there would be no Roma coefficient on higher education, which would make the coefficient term less meaningful. It turns out that, strictly speaking, the support is common in each survey year; all right-hand-side variables are non-missing for both the Roma and the non-Roma subsamples all the time. At the same time, many combinations are missing for either the Roma or the non-Roma.

To be on the safe side, we re-estimated all the models with rather strict restrictions on the common support. We first estimated the propensity score of being Roma by a probit model with the right-hand-side variables of our baseline model and used the propensity score for the sample restrictions. We then calculated the 5th and the 95th percentiles of the propensity score separately in the Roma and the non-Roma subsamples. Finally, we re-estimated all regressions on restricted samples by excluding all respondents whose propensity score was either below the 5th percentile or above the 95th percentile of either the Roma or the non-Roma distribution. In this way, we excluded all those who had characteristics that made them extremely Roma-like or extremely non-Roma like. Naturally, this procedure made the Roma sample and the non-Roma sample much more similar. The decomposition results and the regression coefficients are in Tables A8–A12. Not surprisingly, the employment gap is smaller in the restricted samples than the overall gap, especially in the more recent surveys. Most of the reduction is related to a reduction in the composition term, which is again not surprising. However, the relative importance of the right hand-side variables within the composition term is unchanged. Education differences remain the most important factors, the number of children matters as well for the female gap and the geographic differences remain relatively unimportant.

To summarize the results, one-third to one-half of the employment gap can be explained by ethnic differences in age, household composition, education and geographic location. Educational differences explain the majority of the composition

effects for men, and although their importance is similar for women, the number of children plays an important role for women as well. While the Roma live in more rural and remote areas of Hungary characterized by fewer employment opportunities, that in itself contributes little to their low employment once education is controlled for.

6. Wage differentials

Although the focus of this article is the employment gap, we consider the wage gap in this section. As we noted in the data section, wage comparisons are feasible in two of the four survey years: in 1993 (the ethnic sample of the HLFS) and in 2007 (the HLCS). Recall that these two surveys are not fully representative of the Roma vs. non-Roma differences of Hungary; the first survey is biased against the most disadvantaged families, whereas the second survey is biased towards middle-aged individuals with more children. More importantly, even if the samples themselves were representative, measuring and decomposing the wage gap would be problematic because of severe selection into employment. Formal Roma employment is rare, even among men, and those who work and earn a wage are a highly selected sample.

In principle, we could address the selection problem by estimating Heckman-type sample selection models. Unfortunately, though, such a procedure is not feasible in our case for two reasons. First, it is hard to find credible instruments that would cause employment to be low and not affect wages. The number of children may, in principle, serve as such an instrument for women but not for men, as it has little effect on male employment (see the results of the employment probability models in Tables A1–A4). Second, the fact that employment is rare among the Roma reduces the employed subsamples to such an extent that even when instruments may work in principle, they tend to produce insignificant and unstable second-stage results in practice.

Instead of correcting for the potential bias because of selection into employment, we decompose wage differences as they are, conditional on being employed. When interpreting the results, therefore, one should keep in mind that they are probably affected by severe selection bias. Table 6 shows the wage gap and its decomposition as measured without any correction for sample selection (the regression estimates are in Tables A13 and A14). The gap is measured as the difference between log hourly wages, that is, the average log hourly wage of Roma minus that of the non-Roma. The decompositions are analogous to the employment gap decompositions, with log wage on the left-hand-side. The wage regressions do not include the household composition variables (household size and number of children). This choice reflects the assumption that they have no effect on wage offers and thus should not be included in a wage regression.

Table 6. Decomposition of the ethnic wage gap in Hungary, conditional on being employed. Results from Oaxaca–Blinder decompositions of ordinary least squares regression estimates on employed individuals. Left-hand-side variable: log hourly earnings after tax

	Men		Women	
	1993	**2007**	**1993**	**2007**
Composition				
Age (SE)	−0.02 (0.002)	−0.01 (0.004)	−0.02 (0.002)	−0.00 (0.007)
Education (SE)	−0.10 (0.006)	−0.18 (0.011)	−0.08 (0.005)	−0.27 (0.013)
Geography (SE)	−0.06 (0.005)	−0.05 (0.009)	−0.07 (0.006)	−0.05 (0.008)
Sum of compositional components (SE)	−0.18 (0.008)	−0.24 (0.014)	−0.17 (0.007)	−0.32 (0.017)
Coefficients				
Sum of coefficient components (SE)	−0.09 (0.047)	−0.03 (0.036)	−0.09 (0.059)	−0.11 (0.042)
Overall wage gap (difference in log hourly wages)	−0.27	−0.28	−0.26	−0.43
Fraction explained by compositional differences	0.66	0.87	0.66	0.74

Notes: The Oaxaca–Blinder decompositions are based on linear regression models using non-Roma coefficients for the compositional terms (and Roma means for the coefficient terms). The standard errors, in parentheses, are based on heteroskedasticity-robust covariance matrix estimates of the coefficients. For data, see notes to Table 1.

The wage gap is around 0.3 for employed men both in 1993 and 2007, and it is 0.3 in 1993 and 0.4 in 2007 for employed women. The estimates of the composition term parameters are all significant at the 1 percent level. Composition differences explain two-thirds of the wage gap in 1993 and even more in 2007. Age differences are slightly negative, reflecting the fact that the Roma are younger and that younger cohorts tend to earn less. Differences in the educational composition of the Roma vs. non-Roma workforce are again the most important elements in the composition term; they account for one-third to one-half of the overall gap. Differences in geography seem to play a somewhat more important role than in the case of the employment gap, but they are still much less important than education.

7. Trends in the ethnic differences in education

The previous sections demonstrated the importance of the education gap between Roma and non-Roma in their employment and wage differences. In this section, we look at the education gap in more detail. A thorough analysis of the education gap, which would focus on its causes and provide more details, is beyond the scope of this article. Instead, we look at the evolution of the educational attainment of the Roma vs. the non-Roma without trying to explain their causes. The historical trends are illustrated in Figure 2. The graphs show degrees completed for the adult population, by year of birth, separately for Romanies and the entire population.

The nationwide primary school completion rate has been above 97 percent for all cohorts born after 1950 (primary school lasts 8 years in Hungary). The Roma approached that rate slowly, with men born after 1960 reaching 80 percent. Women reached the same rate 20 years later. To meet the increasing demand for skilled blue-collar workers, vocational training expanded dramatically in Hungary, especially among men. The ratio of vocational training degrees among men reached a national average of 40 percent for the 1950 cohort. Romani men took part in the expansion as well, albeit with a delay and at a smaller scale; the relevant ratio for them peaked at 20 percent 20 years later. Cohorts born after the mid-1970s experienced a downward trend in the national average of vocational training as demand for blue-collar workers dropped sharply from the late 1980s. The mirror image of that decrease shows in the more valuable secondary education rates. Starting from around 1990, when cohorts born in the mid-1970s finished primary school, the national average rates of secondary schooling started to increase. Roma education rates did not follow this pattern for either the decrease in vocational training or the increase in secondary education. More than 50 percent of the cohort born in 1980 obtained secondary school degrees in Hungary, but this was not the case for the Roma, whose secondary school completion rate stayed below 5 percent. Higher education figures are not shown on the graphs, but the Roma figures would be near zero.

The last cohorts shown in Figure 2 were born in 1980. The HLCS provides the most recent snapshot. Recall that the survey follows the cohort of eighth graders from 2006 (we looked at their parents' employment and wages in the previous sections). The last survey was completed in the winter of 2009/2010, by which time those who had continued with their regular studies should be in grade 12. Figure 3, reprinted from Kertesi and Kézdi (2010), shows the fraction of the 2006 cohort of eighth graders in vocational training school and secondary school through the survey years. The figure denotes survey years by the grade at which continuously developing students should be. For example, grade 10 denotes the winter of 2007/2008. The figure shows the fraction of the cohort in vocational or secondary school even if they were in lower grades because of grade retention.

According to the national figures, 71 percent of students are in secondary school in the year when they should be in grade 12, and an additional 21 percent are in vocational school. The Roma figures are significantly lower and show a decline by

Figure 2. Trends in Romani educational attainment compared with national trends (Left panel: Roma figures. Right panel: national figures)

Primary

Vocational

Secondary
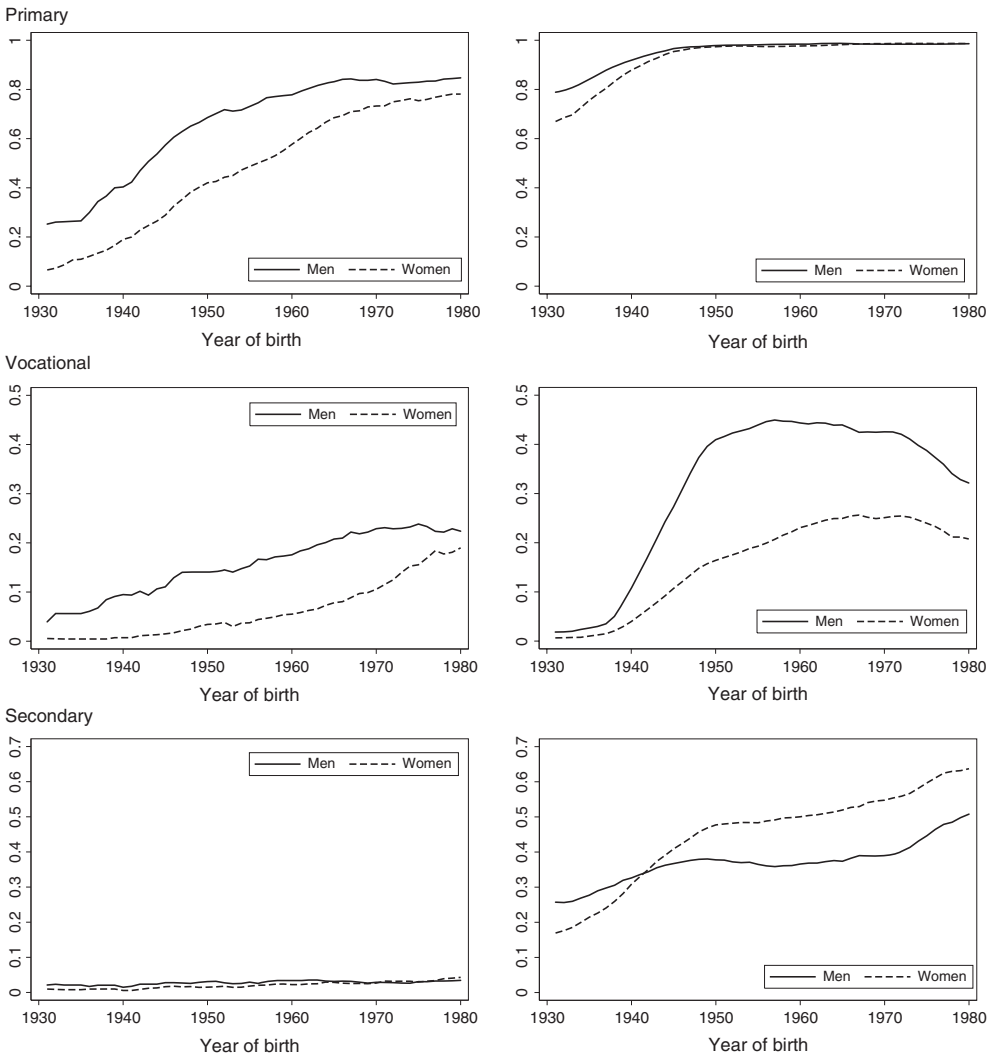
Sources: *Romanies*: Hungarian Romani Surveys of 1994 and 2003 and Hungarian Labor Force Surveys of 1994/1 and 2003/1. The educational attainment rates of the 1930–1940 cohorts were computed from the 1994 surveys; those of the 1941–1970 cohorts were computed as an average of the 1994 and 2003 surveys; those of the 1971–1980 cohorts were computed from the 2003 surveys. The figures show a smoothed series by taking ±5-year moving averages (appropriately adjusted at the endpoints).

Figure 3. Fraction of the cohort of eighth graders in 2006 in secondary and vocational school for 4 years after graduation from grade 8 (in percent); Roma and national figures
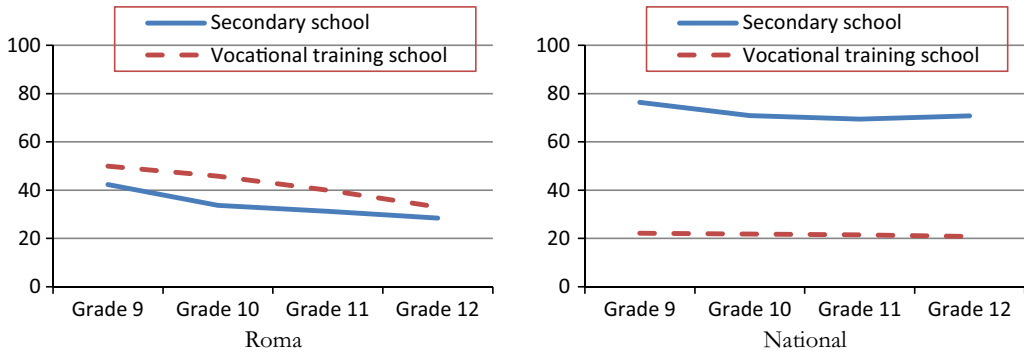
Note: The horizontal axes denote survey years by the grade in which continuously developing students should be enrolled, but the fraction shows the total vocational and secondary school enrollment in the survey year, including students in lower grades because of grade retention.

Source: Hungarian Life Course Survey, first four waves.

grade. In the year when they should be in grade 12, 28 percent of the Roma students are in secondary school, and 33 percent are in vocational schools.

Not shown on the figure are the ethnic differences in grade retention. Overall, more than 85 percent of the secondary school students are in twelfth grade 4 years after eighth grade, but only 65 percent of the Roma secondary school students are in twelfth grade. The corresponding figures in vocational schools are 75 and 60 percent, respectively (Tables 3 and 4 in Kertesi and Kézdi, 2010).

These figures allow for a simple back-of-the envelope calculation for the expected completion of vocational and secondary school. Assume that all of those who are in twelfth grade will finish secondary school or vocational school but that only half of those who are grade retainers will do so. Then, from those who are represented in the HLCS sample, we can expect 66 percent overall to complete secondary school but a rate of only 23 percent among the Roma. The expected vocational school completion rates are 20 percent overall and 27 percent among the Roma. Recall, however, that not all members of the relevant birth cohort are represented by the HLCS because not all of them reach eighth grade. Although more than 95 percent of a birth cohort finishes eighth grade, the same figure among the Roma is around 90 percent (see footnote 6). Taking all these together, we can expect the secondary school completion rate to be 63 percent at the national level and 21 percent among the Roma. We expect the vocational school completion rates to be 19 percent at the national level and 24 percent among the Roma. The expected fraction of the birth cohort with neither secondary nor vocational degrees is 18 percent at the national level and 55 percent among the Roma (the corresponding figures for

the 1980 birth cohort were 20 and 80 percent, respectively; see Figure 2). Naturally, the non-Roma figures are more advantageous than the national ones. With the 11 percent Roma fraction in the cohort, we can expect the non-Roma secondary school completion rate to be close to 70 percent, the vocational school completion rate to be 18 percent and the fraction of those with neither to be 12 percent.

These figures suggest a significant increase in secondary and vocational school completion among the Roma in the most recent years. As a result, we can expect some improvement in the relative employment prospects of the Roma in Hungary for the youngest cohorts, but the improvement is likely to remain modest for the entire Roma population.

8. Conclusions

This paper analysed the extent and causes of the low formal employment rate of the Roma in Hungary, using the most reliable survey data. The employment of the Roma dropped dramatically in the first years of the post-communist transition, widened further afterward and remained largely unaffected by macroeconomic conditions following the transition. While estimated levels are different in the different surveys, all surveys indicate that the absolute employment gap is roughly the same for men and women. About one-third of the gap is explained by the lower education of the Roma. The number of children is also a very important factor in the female employment gap, but their geographic location, despite producing different values from those associated with the location of non-Romanies, explains little once education is controlled for. The increase in the employment gap is driven by the increasing role of education in employment prospects, which hurts the Roma because of their low level of education.

The role of education is all the more significant because our very simple measures do not control for the quality or content of education. We have shown that the gap in education is likely to remain large because the increase in the participation of Roma in secondary and vocational schools has left more than half of the Roma behind. As a result, we can expect some improvement in the relative employment prospects of the Roma in Hungary for the youngest cohorts, but this improvement is likely to remain modest for the entire Roma population.

The policy implications of the results are clear. The dramatically wide employment gap points to a severe break in Hungarian society. Besides obvious effects on current poverty, the employment gap may have severe consequences on the informal economy and political instability. A low employment rate is likely to have a strong negative causal effect on the development of children, which is likely to reproduce poverty (see, e.g. Kertesi and Kézdi, 2007; Oeropoulos *et al.*, 2008). Social policy should respond to these challenges. In the short run, if the employment prospects cannot be increased significantly, the effects of non-employment should be addressed. In the long run, the goal is to prevent the re-emergence of the employment gap for future generations by reducing the education gap.

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Appendix

Table A1. Detailed results of the baseline linear probability models for employment, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	−0.095	−0.094	−0.113	−0.26
	[1.53]	[6.82]**	[2.02]*	[18.68]**
Age 26–35	0.059	0.022	−0.036	−0.143
	[1.03]	[2.25]*	[0.64]	[11.22]**
Age 46–55	0.03	−0.056	−0.124	−0.179
	[0.40]	[4.85]**	[2.02]*	[15.21]**

Table A1. (cont) Detailed results of the baseline linear probability models for employment, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 56–64	−0.324	−0.438	−0.273	−0.642
	[5.31]**	[31.52]**	[4.70]**	[53.42]**
Household size	−0.006	0.008	−0.003	0.008
	[0.29]	[1.65]	[0.18]	[1.78]
Children 0–18 years old	0.006	0.034	−0.033	−0.082
	[0.22]	[5.45]**	[1.50]	[11.76]**
Children 19+ years old	−0.072	0.065	0.137	0.03
	[0.60]	[5.55]**	[1.49]	[2.44]*
Education in grades 0–7	−0.072	−0.152	−0.147	−0.075
	[1.56]	[8.92]**	[4.04]**	[6.44]**
Vocational education	0.323	0.114	0.04	0.12
	[5.58]**	[10.14]**	[0.49]	[9.08]**
Secondary education	0.454	0.143	0.149	0.162
	[5.52]**	[12.23]**	[1.76]	[15.68]**
Higher education	0.371	0.24	0.578	0.26
	[4.33]**	[18.75]**	[9.69]**	[18.87]**
Central region	−0.144	0.005	−0.178	0.002
	[0.96]	[0.27]	[1.47]	[0.12]
Mid-Western region	−0.098	0.003	0.03	0.023
	[1.16]	[0.26]	[0.37]	[1.81]
Western region	0.014	0.023	−0.001	0.025
	[0.31]	[2.61]**	[0.02]	[2.79]**
Southwestern region	0.053	−0.013	−0.111	0.016
	[0.36]	[0.76]	[0.82]	[0.86]
Northern region	0.144	−0.014	−0.075	0.017
	[1.25]	[0.96]	[0.68]	[1.15]
Eastern region	0.195	0.031	0.178	0.051
	[1.94]	[1.95]	[1.62]	[2.93]**
Residence in Budapest	0.068	−0.048	−0.076	0.038
	[0.70]	[3.22]**	[0.76]	[2.53]*
Residence in city	0.071	−0.015	−0.12	0.041
	[0.74]	[0.98]	[1.30]	[2.62]**
Residence in town	0.11	−0.036	−0.029	−0.002
	[1.22]	[2.65]**	[0.33]	[0.12]

Table A1. (cont) Detailed results of the baseline linear probability models for employment, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Remote village	−0.04	−0.028	−0.154	−0.038
	[0.68]	[1.76]	[3.62]**	[2.39]*
Local unemployment rate	−0.057	−0.006	−0.043	−0.003
	[1.93]	[1.01]	[1.49]	[0.40]
Local unemployment rate squared	0.141	−0.001	0.158	−0.013
	[1.49]	[0.06]	[1.75]	[0.58]
Constant	0.798	0.7	0.774	0.724
	[3.22]**	[14.64]**	[3.11]**	[14.49]**
Observations	734	16,026	760	17,548
R^2	0.26	0.25	0.26	0.27

Notes: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A2. Detailed results of the baseline linear probability models for employment, 1994

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	−0.098	−0.131	−0.135	−0.223
	[3.39]**	[9.59]**	[5.84]**	[17.25]**
Age 26–35	−0.043	0.022	−0.063	−0.144
	[1.55]	[2.29]*	[2.58]**	[12.58]**
Age 46–55	−0.121	−0.068	−0.094	−0.169
	[3.25]**	[6.09]**	[2.91]**	[15.04]**
Age 56–64	−0.189	−0.442	−0.188	−0.637
	[4.08]**	[33.66]**	[8.56]**	[56.13]**
Household size	−0.004	0.007	−0.001	0.002
	[0.65]	[1.69]	[0.24]	[0.57]
Children 0–18 years old	−0.029	0.011	−0.026	−0.074
	[2.77]**	[1.94]	[3.38]**	[12.86]**

Table A2. (cont) Detailed results of the baseline linear probability models for employment, 1994

	Roma men	Non-Roma men	Roma women	Non-Roma women
Children 19+ years old	−0.121	0.040	0.104	0.031
	[1.17]	[3.37]**	[1.09]	[2.63]**
Education in grades 0–7	−0.119	−0.158	−0.067	−0.094
	[5.23]**	[10.13]**	[3.86]**	[9.45]**
Vocational education	0.116	0.131	0.160	0.147
	[3.98]**	[12.96]**	[4.47]**	[12.83]**
Secondary education	0.137	0.178	0.194	0.169
	[2.02]*	[15.60]**	[2.85]**	[17.34]**
Higher education	0.484	0.272	0.402	0.270
	[4.15]**	[20.88]**	[2.07]*	[20.20]**
Central region	0.076	−0.025	0.086	−0.006
	[1.34]	[1.50]	[1.93]	[0.39]
Mid-Western region	−0.007	0.031	0.040	0.030
	[0.17]	[2.50]*	[1.25]	[2.47]*
Western region	−0.004	0.039	−0.001	0.026
	[0.16]	[4.79]**	[0.03]	[3.12]**
Southwestern region	−0.013	−0.004	0.016	0.013
	[0.19]	[0.27]	[0.28]	[0.77]
Northern region	0.077	0.005	−0.079	0.011
	[1.34]	[0.40]	[1.76]	[0.80]
Eastern region	0.027	0.044	−0.008	0.041
	[0.41]	[2.96]**	[0.15]	[2.65]**
Residence in Budapest	0.078	−0.035	0.014	0.015
	[1.61]	[2.42]*	[0.34]	[1.08]
Residence in city	−0.037	−0.035	−0.007	0.012
	[0.83]	[2.30]*	[0.19]	[0.81]
Residence in town	−0.064	−0.039	−0.088	−0.011
	[1.49]	[2.89]**	[2.43]*	[0.85]
Remote village	−0.037	−0.047	−0.006	−0.052
	[1.18]	[3.16]**	[0.24]	[3.72]**
Local unemployment rate	−0.021	−0.015	0.018	−0.003
	[1.36]	[2.58]**	[1.42]	[0.56]
Local unemployment rate squared	0.053	0.026	−0.056	−0.009
	[1.08]	[1.30]	[1.36]	[0.45]

Table A2. (cont) Detailed results of the baseline linear probability models for employment, 1994

	Roma men	Non-Roma men	Roma women	Non-Roma women
Constant	0.656	0.738	0.212	0.732
	[4.86]**	[16.69]**	[1.95]	[16.32]**
Observations	2,016	16,467	2,164	17,946
R^2	0.11	0.24	0.10	0.29

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A3. Detailed results of the baseline linear probability models for employment, 2003

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	−0.044	−0.068	−0.109	−0.172
	[1.37]	[6.31]**	[4.12]**	[15.70]**
Age 26–35	0.08	0.035	−0.055	−0.147
	[2.51]*	[4.75]**	[1.98]*	[16.07]**
Age 46–55	−0.042	−0.100	−0.006	−0.14
	[1.11]	[11.54]**	[0.16]	[15.55]**
Age 56–64	−0.166	−0.413	−0.157	−0.609
	[3.65]**	[37.16]**	[4.67]**	[61.36]**
Household size	−0.007	0.005	0.018	0.012
	[0.82]	[1.69]	[2.54]*	[3.99]**
Children 0–18 years old	0.01	0.004	−0.049	−0.107
	[0.83]	[0.87]	[5.00]**	[24.50]**
Children 19+ years old	0.164	0.043	0.021	0.03
	[2.83]**	[4.75]**	[0.48]	[3.34]**
Education in grades 0–7	−0.154	−0.275	−0.117	−0.16
	[5.82]**	[15.29]**	[6.30]**	[12.72]**
Vocational education	0.065	0.200	0.166	0.134
	[1.95]	[22.85]**	[4.20]**	[14.53]**
Secondary education	0.149	0.248	0.16	0.217
	[2.22]*	[26.23]**	[2.30]*	[26.32]**

Table A3. (cont) Detailed results of the baseline linear probability models for employment, 2003

	Roma men	Non-Roma men	Roma women	Non-Roma women
Higher education	0.042	0.321	0.05	0.329
	[0.20]	[30.54]**	[0.22]	[32.17]**
Central region	0.302	0.048	0.204	0.005
	[3.79]**	[3.92]**	[3.23]**	[0.37]
Mid-Western region	0.111	0.036	0.033	0.033
	[3.24]**	[3.92]**	[1.23]	[3.42]**
Western region	−0.012	0.038	−0.053	0.026
	[0.34]	[5.72]**	[2.07]*	[3.80]**
Southwestern region	0.228	0.022	0.084	0.035
	[2.82]**	[1.43]	[1.41]	[2.19]*
Northern region	0.228	0.079	0.243	0.092
	[4.03]**	[7.03]**	[4.46]**	[7.88]**
Eastern region	0.179	0.06	0.176	0.066
	[2.86]**	[4.91]**	[3.35]**	[5.09]**
Residence in Budapest	0.053	0.011	0.031	0.023
	[1.07]	[0.92]	[0.87]	[1.97]*
Residence in city	−0.073	−0.011	0.037	0.026
	[1.58]	[0.96]	[1.07]	[2.18]*
Residence in town	−0.138	−0.004	−0.009	−0.002
	[2.93]**	[0.33]	[0.26]	[0.20]
Remote village	−0.076	−0.055	−0.048	−0.028
	[2.31]*	[5.32]**	[2.25]*	[2.78]**
Local unemployment rate	0.009	−0.007	−0.01	−0.003
	[0.52]	[1.92]	[0.75]	[0.86]
Local unemployment rate squared	0.000	0.002	0.047	−0.004
	[0.01]	[0.12]	[0.85]	[0.27]
Constant	0.212	0.597	0.238	0.637
	[2.43]*	[26.00]**	[3.19]**	[27.58]**
Observations	1,404	26,389	1,469	28,125
R^2	0.20	0.25	0.20	0.29

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

**Table A4. Detailed results of the baseline linear probability models
for employment, 2007**

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	.	.	.	.
	[.]	[.]	[.]	[.]
Age 26–35	0.11	0.008	0.054	−0.037
	[0.99]	[0.21]	[0.94]	[1.16]
Age 46–55	−0.044	−0.07	−0.043	−0.099
	[0.79]	[5.57]**	[0.93]	[7.70]**
Age 56–64	−0.162	−0.321	−0.112	−0.351
	[1.37]	[11.37]**	[2.03]*	[10.10]**
Household size	0.027	−0.003	−0.002	0.003
	[1.23]	[0.27]	[0.12]	[0.46]
Children 0–18 years old	−0.003	−0.013	−0.036	−0.1
	[0.11]	[1.25]	[1.90]	[10.14]**
Children 19+ years old	0.061	0.013	−0.052	−0.011
	[0.78]	[0.92]	[0.82]	[0.80]
Education in grades 0–7	−0.182	−0.349	−0.158	−0.243
	[2.87]**	[5.28]**	[5.15]**	[5.57]**
Vocational education	0.199	0.153	0.043	0.148
	[3.19]**	[7.17]**	[0.63]	[7.51]**
Secondary education	0.023	0.204	0.372	0.269
	[0.12]	[9.18]**	[3.22]**	[14.31]**
Higher education	0.636	0.246		0.404
	[7.93]**	[10.61]**		[22.38]**
Central region	0.066	−0.005	−0.087	−0.01
	[0.38]	[0.25]	[0.54]	[0.46]
Mid-Western region	−0.01	0.014	0.032	0.034
	[0.11]	[0.87]	[0.42]	[2.05]*
Western region	−0.006	0.038	0.036	0.02
	[0.12]	[2.70]**	[0.86]	[1.50]
Southwestern region	−0.032	−0.012	0.087	0.061
	[0.19]	[0.44]	[0.56]	[2.11]*
Northern region	−0.034	−0.012	−0.064	0.084
	[0.27]	[0.53]	[0.60]	[3.76]**

Table A4. (cont) Detailed results of the baseline linear probability models for employment, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
Eastern region	0.175	0.027	0.136	0.103
	[1.32]	[1.17]	[1.15]	[4.46]**
Residence in Budapest	0.166	−0.012	−0.056	−0.006
	[1.69]	[0.50]	[0.70]	[0.24]
Residence in city	0.067	0.02	−0.045	0.027
	[0.72]	[0.84]	[0.57]	[1.19]
Residence in town	−0.083	−0.02	−0.152	−0.016
	[0.97]	[0.94]	[2.06]*	[0.79]
Remote village	−0.006	−0.009	−0.028	−0.037
	[0.09]	[0.31]	[0.58]	[1.41]
Local unemployment rate	−0.007	−0.009	−0.01	−0.002
	[0.29]	[1.32]	[0.55]	[0.31]
Local unemployment rate squared	−0.017	−0.032	0.025	−0.003
	[0.22]	[1.17]	[0.40]	[0.12]
Constant	0.118	0.851	0.495	0.674
	[0.33]	[6.24]**	[1.83]	[6.15]**
Observations	566	5,994	700	7,617
R^2	0.17	0.14	0.15	0.21

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A5. Decomposition of the ethnic employment gap in Hungary. Results from Oaxaca–Blinder decompositions of ordinary least squares regression estimates. Left-hand-side variable: employed. Micro-regional fixed effects included

	Men		Women	
	1993	2007	1993	2007
Composition				
Age (SE)	+0.02 (0.002)	+0.02 (0.002)	+0.01 (0.002)	+0.00 (0.004)
Household size, children (SE)	+0.01 (0.002)	−0.01 (0.007)	−0.04 (0.003)	−0.10 (0.007)
Education (SE)	−0.09 (0.005)	−0.17 (0.013)	−0.09 (0.004)	−0.24 (0.013)
Geography (SE)	−0.04 (0.003)	−0.07 (0.007)	−0.03 (0.003)	−0.04 (0.007)

Table A5. (cont) Decomposition of the ethnic employment gap in Hungary. Results from Oaxaca–Blinder decompositions of ordinary least squares regression estimates. Left-hand-side variable: employed. Micro-regional fixed effects included

	Men		Women	
	1993	2007	1993	2007
Sum of compositional components (SE)	−0.10 (0.006)	−0.23 (0.014)	−0.14 (0.006)	−0.37 (0.014)
Coefficients				
Sum of coefficient components (SE)	−0.18 (0.020)	−0.24 (0.028)	−0.15 (0.018)	−0.13 (0.024)
Overall employment gap	−0.28	−0.47	−0.29	−0.50
Fraction explained by compositional differences	0.31	0.47	0.47	0.76

Notes: The Oaxaca–Blinder decompositions are based on linear probability models using non-Roma (or national) coefficients for the composition terms (and Roma means for the coefficient terms). The standard errors, in parentheses, are based on heteroskedasticity-robust covariance matrix estimates of the coefficients. The samples include respondents in micro-regions with at least two Roma and two non-Roma individuals in the sample. For data, see notes to Table 1.

Table A6. Detailed results of the linear probability models for employment with micro-regional fixed effects, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	−0.101	−0.102	−0.135	−0.26
	[1.59]	[6.45]**	[2.40]*	[16.34]**
Age 26–35	0.015	0.019	−0.021	−0.15
	[0.23]	[1.65]	[0.35]	[10.38]**
Age 46–55	−0.009	−0.057	−0.111	−0.179
	[0.11]	[4.37]**	[1.79]	[13.43]**
Age 56–64	−0.339	−0.432	−0.22	−0.648
	[4.60]**	[27.44]**	[3.41]**	[47.54]**
Household size	−0.008	0.007	0.002	0.01
	[0.35]	[1.32]	[0.11]	[2.03]*
Children 0–18 years old	0.021	0.037	−0.031	−0.081
	[0.75]	[5.09]**	[1.33]	[10.16]**
Children 19+ years old	−0.04	0.075	0.159	0.027
	[0.31]	[5.66]**	[1.60]	[1.98]*

Table A6. (cont) Detailed results of the linear probability models for employment with micro-regional fixed effects, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Education in grades 0–7	−0.097	−0.151	−0.174	−0.071
	[1.96]	[7.84]**	[4.17]**	[5.28]**
Vocational education	0.275	0.114	0.031	0.118
	[4.34]**	[8.73]**	[0.42]	[7.71]**
Secondary education	0.438	0.149	0.166	0.16
	[5.12]**	[10.98]**	[1.95]	[13.56]**
Higher education	0.068	0.244	0.607	0.257
	[0.74]	[16.68]**	[7.64]**	[16.67]**
Residence in Budapest	−0.508	0.58	−0.987	0.147
	[4.86]**	[6.39]**	[12.13]**	[0.91]
Residence in city	−0.252	0.033	0.239	0.035
	[1.66]	[1.62]	[1.89]	[1.74]
Residence in town	0.003	0.022	0.008	0.015
	[0.05]	[1.73]	[0.17]	[1.18]
Remote village	−0.161	−0.017	−0.112	−0.062
	[1.96]	[0.82]	[2.03]*	[2.97]**
Micro-regional fixed effects	Yes	Yes	Yes	Yes
Observations	730	12,485	752	13,710
R^2	0.43	0.42	0.25	0.28

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A7. Detailed results of the linear probability models for employment with micro-regional fixed effects, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	.	.	.	.
	[.]	[.]	[.]	[.]
Age 26–35	0.143	0.021	0.025	−0.053
	[1.08]	[0.53]	[0.45]	[1.50]
Age 46–55	−0.141	−0.064	−0.033	−0.104
	[2.72]**	[4.67]**	[0.64]	[7.22]**
Age 56–64	−0.195	−0.311	−0.091	−0.349
	[1.89]	[10.37]**	[1.21]	[9.37]**

Table A7. (cont) Detailed results of the linear probability models for employment with micro-regional fixed effects, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
Household size	0.004	0.006	−0.021	0.001
	[0.16]	[0.53]	[1.14]	[0.15]
Children 0–18 years old	−0.041	0	−0.063	−0.099
	[1.43]	[0.01]	[2.82]**	[9.04]**
Children 19+ years old	0.07	0.024	−0.107	−0.014
	[0.91]	[1.53]	[1.58]	[0.90]
Education in grades 0–7	−0.148	−0.399	−0.14	−0.226
	[2.12]*	[6.21]**	[3.50]**	[4.39]**
Vocational education	0.142	0.168	0.116	0.161
	[2.30]*	[7.01]**	[1.39]	[7.36]**
Secondary education	0.113	0.227	0.356	0.267
	[0.49]	[9.16]**	[3.09]**	[12.84]**
Higher education	0.607	0.280	.	0.406
	[3.31]**	[11.06]**	[.]	[20.10]**
Residence in Budapest	−0.666	0.117	0.288	−0.278
	[4.48]**	[0.37]	[2.87]**	[6.31]**
Residence in city	−0.108	0.015	0.06	0.066
	[1.04]	[0.62]	[0.60]	[2.33]*
Residence in town	0.015	0.019	0.16	0.023
	[0.26]	[1.05]	[3.24]**	[1.23]
Remote village	−0.059	−0.062	0.028	−0.088
	[0.75]	[1.63]	[0.34]	[2.31]*
Micro-regional fixed effects	Yes	Yes	Yes	Yes
Observations	559	4,934	692	6,244
R^2	0.44	0.18	0.31	0.23

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A8. Decomposition of the ethnic employment gap in Hungary. Results from Oaxaca–Blinder decompositions of ordinary least squares regression estimates. *Left hand-side variable: dummy for employed. The estimation is restricted to common support (by excluding all those who are below the 5th percentile of either the Roma or the non-Roma subsample or above the 95th percentile of either the Roma or the non-Roma subsample)*

	Men				Women			
	1993	**1994**	**2003**	**2007**	**1993**	**1994**	**2003**	**2007**
Composition								
Age (SE)	−0.01	0.00	0.01	0.00	−0.03	−0.02	0.01	0.00
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Household size,	0.00	−0.02	0.00	−0.01	0.00	−0.03	−0.05	−0.03
children (SE)	(0.001)	(0.006)	(0.004)	(0.004)	(0.001)	(0.004)	(0.003)	(0.003)
Education (SE)	−0.04	−0.06	−0.08	−0.05	−0.04	−0.06	−0.08	−0.06
	(0.004)	(0.005)	(0.005)	(0.011)	(0.003)	(0.006)	(0.006)	(0.009)
Geography (SE)	−0.01	−0.02	−0.03	0.00	0.00	−0.02	−0.02	−0.01
	(0.002)	(0.005)	(0.004)	(0.003)	(0.002)	(0.005)	(0.004)	(0.004)
Sum of	−0.06	−0.09	−0.11	−0.06	−0.06	−0.13	−0.14	−0.10
compositional	(0.005)	(0.009)	(0.006)	(0.013)	(0.004)	(0.009)	(0.006)	(0.011)
components (SE)								
Coefficients								
Sum of coefficient	−0.14	−0.21	−0.25	−0.28	−0.14	−0.16	−0.12	−0.17
components (SE)	(0.026)	(0.018)	(0.018)	(0.036)	(0.027)	(0.016)	(0.016)	(0.032)
Overall	−0.20	−0.30	−0.36	−0.34	−0.20	−0.29	−0.26	−0.27
employment gap								
Fraction explained	0.30	0.31	0.31	0.18	0.31	0.45	0.53	0.38
by compositional								
differences								

Notes: The Oaxaca–Blinder decompositions based on linear probability models, using non-Roma (or national) coefficients for the composition terms (and Roma means for the coefficient terms). The propensity score is estimated as a probit with Roma on the left hand-side and with the right hand-side variables of the decomposition regressions. Standard errors in parentheses are based on heteroskedasticity-robust covariance matrix estimates of the coefficients. For data, see notes to Table 1.

Table A9. Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	−0.124	−0.082	−0.02	−0.291
	[1.48]	[4.90]**	[0.22]	[16.85]**
Age 26–35	0.074	0.022	0.055	−0.149
	[1.00]	[1.79]	[0.61]	[9.47]**
Age 46–55	0.035	−0.045	−0.2	−0.229
	[0.33]	[2.41]*	[2.05]*	[12.98]**
Age 56–64	−0.301	−0.432	−0.384	−0.651
	[3.23]**	[20.47]**	[4.53]**	[38.94]**
Household size	−0.022	0	−0.002	0.004
	[0.88]	[0.07]	[0.08]	[0.77]
Children 0–18 years old	0.03	0.042	−0.017	−0.091
	[0.71]	[5.19]**	[0.39]	[10.15]**
Children 19+ years old	0.058	0.053	0.141	0.036
	[0.43]	[2.75]**	[1.16]	[2.07]*
Education in grades 0–7	−0.078	−0.124	−0.032	−0.067
	[0.91]	[5.74]**	[0.47]	[4.38]**
Vocational education	0.329	0.112	−0.067	0.103
	[4.99]**	[7.18]**	[0.75]	[5.87]**
Secondary education	0.501	0.139	0.116	0.159
	[5.57]**	[7.47]**	[1.07]	[9.31]**
Higher education	0.384	0.231	0.52	0.24
	[3.71]**	[12.45]**	[5.81]**	[10.67]**
Central region	−0.001	0.001	−0.174	0.018
	[0.01]	[0.05]	[1.09]	[0.63]
Mid-Western region	−0.066	−0.001	−0.03	0.021
	[0.64]	[0.05]	[0.29]	[1.26]
Western region	0.036	0.025	−0.057	0.025
	[0.55]	[2.21]*	[0.81]	[2.16]*
Southwestern region	−0.053	0.001	−0.21	−0.014
	[0.31]	[0.02]	[1.13]	[0.49]
Northern region	0.244	−0.008	−0.028	−0.002
	[1.61]	[0.36]	[0.20]	[0.11]

Table A9. (cont) Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Eastern region	0.171	0.044	0.242	0.038
	[1.33]	[2.04]*	[1.70]	[1.58]
Residence in Budapest	0.108	−0.041	−0.02	0.038
	[0.86]	[2.01]*	[0.14]	[1.86]
Residence in city	0.049	−0.01	0.084	0.04
	[0.36]	[0.51]	[0.58]	[1.93]
Residence in town	0.146	−0.036	0.044	0.002
	[1.20]	[1.93]	[0.35]	[0.11]
Remote village	0.005	−0.029	−0.126	−0.04
	[0.07]	[1.63]	[1.46]	[2.20]*
Local unemployment rate	−0.067	0	−0.061	−0.007
	[1.79]	[0.01]	[1.34]	[0.92]
Local unemployment rate squared	0.161	−0.021	0.206	0
	[1.33]	[0.82]	[1.35]	[0.00]
Constant	0.92	0.674	0.849	0.812
	[2.97]**	[11.06]**	[2.32]*	[12.49]**
Observations	415	10,301	345	11,379
R^2	0.31	0.23	0.3	0.23

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A10. Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 1994

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	−0.092	−0.214	−0.194	−0.259
	[2.08]*	[8.88]**	[5.29]**	[11.45]**
Age 26–35	−0.014	−0.031	−0.083	−0.144
	[0.35]	[1.57]	[2.11]*	[6.76]**

Table A10. (cont) Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 1994

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 46–55	−0.1	−0.012	−0.084	−0.116
	[1.98]*	[0.39]	[1.82]	[3.78]**
Age 56–64	−0.117	−0.246	−0.138	−0.359
	[1.91]	[5.88]**	[3.83]**	[10.80]**
Household size	−0.016	−0.022	−0.037	−0.011
	[1.11]	[2.47]*	[3.59]**	[1.26]
Children 0–18 years old	−0.019	−0.004	−0.032	−0.078
	[0.95]	[0.36]	[1.97]*	[7.50]**
Children 19+ years old	0.677	0.059	−0.199	−0.148
	[11.14]**	[0.64]	[4.19]**	[1.82]
Education in grades 0–7	−0.196	−0.322	−0.135	−0.321
	[4.14]**	[9.13]**	[3.41]**	[10.26]**
Vocational education	0.08	0.179	0.187	0.106
	[2.22]*	[9.66]**	[4.47]**	[4.95]**
Secondary education	0.324	0.191	0.232	0.125
	[2.69]**	[4.15]**	[2.40]*	[3.17]**
Higher education	0	0.378	0	−0.181
	[.]	[10.60]**	[.]	[1.23]
Central region	0.125	−0.092	0.062	−0.031
	[1.54]	[2.26]*	[0.96]	[0.74]
Mid-Western region	−0.02	0.003	0.003	0.018
	[0.34]	[0.11]	[0.06]	[0.61]
Western region	−0.035	0.05	−0.028	0.032
	[1.01]	[2.68]**	[1.00]	[1.73]
Southwestern region	−0.134	0.018	−0.033	−0.003
	[1.41]	[0.42]	[0.45]	[0.08]
Northern region	0.085	0.049	−0.092	−0.032
	[1.05]	[1.29]	[1.52]	[0.85]
Eastern region	−0.067	0.085	−0.066	0.064
	[0.76]	[2.13]*	[0.97]	[1.52]
Residence in Budapest	0.042	−0.052	−0.006	0.02
	[0.62]	[1.49]	[0.11]	[0.60]

Table A10. (cont) Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 1994

	Roma men	Non-Roma men	Roma women	Non-Roma women
Residence in city	−0.106	−0.042	−0.023	0.005
	[1.63]	[1.16]	[0.45]	[0.15]
Residence in town	−0.126	−0.036	−0.095	−0.022
	[2.02]*	[1.04]	[1.95]	[0.68]
Remote village	−0.016	−0.053	−0.006	−0.038
	[0.36]	[2.07]*	[0.14]	[1.55]
Local unemployment rate	−0.034	−0.016	0.018	−0.009
	[1.53]	[1.35]	[0.98]	[0.73]
Local unemployment rate squared	0.098	0.028	−0.069	−0.003
	[1.36]	[0.73]	[1.11]	[0.08]
Constant	0.837	0.927	0.474	0.891
	[4.28]**	[9.22]**	[2.88]**	[8.66]**
Observations	1,113	4,117	1,119	4,555
R^2	0.10	0.16	0.11	0.13

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A11. Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 2003

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	−0.022	−0.069	−0.167	−0.189
	[0.47]	[4.08]**	[3.80]**	[10.18]**
Age 26–35	0.126	0.037	−0.082	−0.145
	[2.82]**	[2.84]**	[1.90]	[8.84]**
Age 46–55	−0.021	−0.089	−0.025	−0.135
	[0.42]	[4.99]**	[0.49]	[7.57]**
Age 56–64	−0.171	−0.387	−0.191	−0.533
	[2.67]**	[16.41]**	[3.78]**	[29.14]**

Table A11. (cont) Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 2003

	Roma men	Non-Roma men	Roma women	Non-Roma women
Household size	0.009	−0.007	0.017	0.015
	[0.61]	[1.35]	[1.28]	[2.70]**
Children 0–18 years old	0.022	0.006	−0.073	−0.112
	[1.11]	[0.82]	[4.08]**	[15.46]**
Children 19+ years old	0.097	0.046	0.005	0.041
	[1.24]	[2.17]*	[0.08]	[1.79]
Education in grades 0–7	−0.048	−0.253	−0.142	−0.177
	[0.91]	[10.83]**	[3.30]**	[10.35]**
Vocational education	0.067	0.216	0.202	0.138
	[1.41]	[14.32]**	[3.97]**	[8.41]**
Secondary education	−0.052	0.281	0.191	0.256
	[0.50]	[12.47]**	[1.98]*	[10.90]**
Higher education	0	0.368	0	0.31
	[.]	[6.09]**	[.]	[3.29]**
Central region	0.324	0.045	0.215	0.01
	[3.19]**	[1.44]	[2.25]*	[0.31]
Mid-Western region	0.252	−0.012	0.035	0.039
	[3.61]**	[0.54]	[0.53]	[1.79]
Western region	−0.06	0.041	−0.052	0.035
	[1.39]	[2.92]**	[1.54]	[2.51]*
Southwestern region	0.375	−0.023	0.076	0.058
	[3.79]**	[0.68]	[0.95]	[1.79]
Northern region	0.173	0.089	0.126	0.129
	[2.24]*	[4.14]**	[1.70]	[5.66]**
Eastern region	0.173	0.03	0.16	0.087
	[2.02]*	[1.28]	[2.02]*	[3.47]**
Residence in Budapest	0.051	0.01	0.038	0.028
	[0.73]	[0.50]	[0.66]	[1.42]
Residence in city	−0.028	−0.024	0.03	0.04
	[0.42]	[1.22]	[0.54]	[2.04]*
Residence in town	−0.173	−0.01	−0.044	0.006
	[2.50]*	[0.53]	[0.81]	[0.30]

Table A11. (cont) Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 2003

	Roma men	Non-Roma men	Roma women	Non-Roma women
Remote village	−0.11	−0.063	−0.08	−0.03
	[2.48]*	[3.59]**	[2.53]*	[1.83]
Local unemployment rate	0.055	−0.014	−0.014	0
	[2.08]*	[2.01]*	[0.60]	[0.03]
Local unemployment rate squared	−0.157	0.027	0.056	−0.027
	[1.39]	[0.88]	[0.58]	[0.93]
Constant	−0.184	0.702	0.351	0.583
	[1.33]	[15.96]**	[2.79]**	[13.48]**
Observations	728	8,364	696	9,257
R^2	0.2	0.23	0.24	0.22

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A12. Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	0	0	0	0
	[.]	[.]	[.]	[.]
Age 26–35	0.047	0.022	0.03	−0.031
	[0.34]	[0.43]	[0.34]	[0.71]
Age 46–55	0.019	−0.121	−0.023	−0.115
	[0.25]	[4.42]**	[0.33]	[3.84]**
Age 56–64	−0.259	−0.4	−0.102	−0.299
	[1.59]	[6.47]**	[1.08]	[4.63]**
Household size	0.016	0.013	−0.029	0.006
	[0.46]	[0.75]	[0.94]	[0.48]
Children 0–18 years old	0.007	−0.005	−0.067	−0.114
	[0.15]	[0.28]	[1.68]	[6.81]**

Table A12. (cont) Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
Children 19+ years old	0.091	0.06	−0.048	−0.007
	[0.92]	[1.81]	[0.54]	[0.19]
Education in grades 0–7	−0.2	−0.361	−0.247	−0.232
	[1.62]	[4.49]**	[2.76]**	[2.07]*
Vocational education	0.242	0.131	0.055	0.139
	[3.12]**	[4.40]**	[0.67]	[4.81]**
Secondary education	−0.263	0.201	0.403	0.328
	[1.42]	[3.83]**	[1.36]	[6.89]**
Higher education	0	0.361	0	0.814
	[.]	[5.21]**	[.]	[7.72]**
Central region	0.14	0.042	−0.116	0.094
	[0.53]	[0.60]	[0.52]	[1.43]
Mid-Western region	0.051	−0.008	0.042	0.043
	[0.43]	[0.23]	[0.37]	[1.14]
Western region	−0.01	0.065	0.115	0.024
	[0.14]	[2.59]**	[1.59]	[0.93]
Southwestern region	−0.035	−0.095	−0.059	0.104
	[0.16]	[1.35]	[0.26]	[1.57]
Northern region	−0.05	0.072	−0.204	0.202
	[0.33]	[1.27]	[1.40]	[3.87]**
Eastern region	0.182	0.087	0.086	0.186
	[1.08]	[1.66]	[0.51]	[3.23]**
Residence in Budapest	0.21	0.036	−0.079	0.03
	[1.72]	[0.71]	[0.65]	[0.65]
Residence in city	0.057	0.051	−0.08	0.058
	[0.44]	[0.99]	[0.63]	[1.22]
Residence in town	−0.023	−0.006	−0.186	0.026
	[0.22]	[0.12]	[1.77]	[0.65]
Remote village	−0.049	0.018	−0.028	−0.045
	[0.54]	[0.50]	[0.44]	[1.21]
Local unemployment rate	−0.002	−0.021	−0.043	−0.001
	[0.06]	[1.85]	[1.45]	[0.06]
Local unemployment rate squared	−0.044	0.003	0.13	−0.018

Table A12. (cont) Detailed results of the linear probability models for employment estimated on the subsample whose propensity score is within the [5th, 95th] interval of the Roma distribution and the [5th, 95th] interval of the non-Roma distribution, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
[0.33]	[0.06]	[1.25]	[0.39]	
Constant	0.148	0.735	1.107	0.618
	[0.25]	[3.08]**	[2.15]*	[3.05]**
Observations	328	2135	343	2588
R^2	0.15	0.13	0.12	0.13

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A13. Detailed results of the wage regression models. Left-hand-side variable: log hourly wage, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	0.111	−0.19	−0.046	−0.17
	[0.59]	[9.95]**	[0.15]	[7.41]**
Age 26–35	−0.052	−0.065	0.242	−0.066
	[0.39]	[3.43]**	[1.29]	[3.27]**
Age 46–55	−0.134	−0.021	−0.232	0.014
	[0.55]	[0.79]	[1.00]	[0.67]
Age 56–64	0.748	0.007	−0.107	−0.041
	[3.82]**	[0.14]	[0.30]	[0.46]
Education in grades 0–7	−0.46	−0.16	−0.274	−0.066
	[1.81]	[2.33]*	[0.87]	[1.46]
Vocational education	−0.116	0.08	0.422	0.083
	[0.81]	[4.13]**	[1.88]	[3.73]**
Secondary education	0.21	0.163	−0.053	0.211
	[0.77]	[6.76]**	[0.26]	[9.39]**
Higher education	0.149	0.377	0.614	0.479
	[0.26]	[12.00]**	[1.66]	[17.38]**
Central region	0.477	0.035	0.167	0.067
	[1.41]	[0.91]	[0.42]	[1.36]

Table A13. (cont) Detailed results of the wage regression models. Left-hand-side variable: log hourly wage, 1993

	Roma men	Non-Roma men	Roma women	Non-Roma women
Mid-Western region	0.312	0.078	−0.183	0.086
	[1.23]	[2.90]**	[0.72]	[3.52]**
Western region	−0.268	0.023	0.168	0.036
	[1.32]	[1.12]	[0.71]	[1.93]
Southwestern region	0.255	0.017	−0.351	0.009
	[0.79]	[0.45]	[1.29]	[0.22]
Northern region	0.074	0.03	−0.105	−0.016
	[0.22]	[1.00]	[0.44]	[0.50]
Eastern region	−0.533	−0.175	−0.619	−0.155
	[1.43]	[3.90]**	[2.11]*	[4.06]**
Residence in Budapest	−0.017	−0.008	−0.24	−0.058
	[0.05]	[0.30]	[0.95]	[2.28]*
Residence in city	0.083	0.071	−0.524	−0.04
	[0.24]	[2.46]*	[1.71]	[1.38]
Residence in town	−0.029	−0.017	−0.229	−0.051
	[0.09]	[0.63]	[1.07]	[2.03]*
Remote village	−0.389	−0.07	−0.141	−0.019
	[2.45]*	[2.06]*	[0.53]	[0.69]
Local unemployment rate	0.184	−0.045	−0.019	−0.036
	[1.36]	[3.20]**	[0.18]	[2.75]**
Local unemployment rate squared	−0.57	0.125	0.138	0.106
	[1.26]	[2.77]**	[0.37]	[2.35]*
Constant	4.582	6.189	5.857	5.907
	[4.81]**	[56.94]**	[7.15]**	[60.51]**
Observations	150	5,347	95	4,695
R^2	0.33	0.12	0.25	0.16

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.

Table A14. Detailed results of the wage regression models. Left-hand-side variable: log hourly wage, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
Age 16–25	0	0	0	0
	[.]	[.]	[.]	[.]
Age 26–35	0.004	−0.108	0.029	0.127
	[0.02]	[1.70]	[0.14]	[1.78]
Age 46–55	0.014	−0.019	−0.138	0.005
	[0.18]	[0.68]	[1.20]	[0.16]
Age 56–64	0.686	−0.114	−0.353	0.078
	[3.76]**	[1.60]	[3.43]**	[0.87]
Education in grades 0–7	0	−0.464	0	0.212
	[.]	[6.68]**	[.]	[1.04]
Vocational education	0.166	0.164	0.163	0.091
	[1.94]	[5.42]**	[0.72]	[2.32]*
Secondary education	0.116	0.267	0.122	0.312
	[0.72]	[3.60]**	[0.31]	[5.36]**
Higher education	0	0.493	0	0.548
	[.]	[9.16]**	[.]	[1.43]
Central region	0.443	−0.147	0.285	0.009
	[2.59]*	[1.66]	[0.96]	[0.11]
Mid-Western region	0.018	−0.08	0.114	−0.001
	[0.11]	[1.98]*	[1.01]	[0.02]
Western region	−0.013	0.021	−0.047	−0.031
	[0.12]	[0.63]	[0.37]	[1.03]
Southwestern region	−0.311	0.056	−0.13	0.226
	[1.52]	[0.70]	[0.64]	[2.38]*
Northern region	0.102	0.129	−0.252	0.236
	[0.55]	[1.78]	[1.08]	[3.65]**
Eastern region	0.13	−0.049	−0.035	0.142
	[0.59]	[0.84]	[0.30]	[2.50]*
Residence in Budapest	−0.113	−0.02	−0.072	0.096
	[0.62]	[0.43]	[0.89]	[1.56]
Residence in city	0.208	0.093	−0.246	0.135
	[0.90]	[1.76]	[1.83]	[2.41]*
Residence in town	0.042	−0.02	−0.306	0.068
	[0.21]	[0.44]	[1.35]	[1.32]

Table A14. (cont) Detailed results of the wage regression models. Left hand-side variable: log hourly wage, 2007

	Roma men	Non-Roma men	Roma women	Non-Roma women
Remote village	0.121	−0.018	0.098	−0.08
	[0.86]	[0.42]	[0.69]	[1.63]
Local unemployment rate	0.035	−0.041	−0.017	0.001
	[1.06]	[3.29]**	[0.46]	[0.05]
Local unemployment rate squared	−0.253	0.093	0.057	−0.018
	[1.73]	[2.05]*	[0.46]	[0.40]
Constant	5.947	6.353	6.005	5.814
	[23.78]**	[71.07]**	[23.26]**	[56.90]**
Observations	109	1,402	78	1,280
R^2	0.26	0.09	0.19	0.1

Note: Absolute value of robust *t*-statistics in brackets; *significant at 5 percent level; **significant at 1 percent level.