The Aftermaths of Lowering the School Leaving Age – Effects on Roma Youth

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In 2013, the Hungarian government cut the school leaving age from 18 to 16. We study the heterogeneous impact of this unique reform on school attendance and labor market status using census data on the universe of 17-year-olds from 2011 and a 10 percent random sample from 2016. The analysis of dropout is supplemented with administrative data on prior test performance and social background. Coarsened exact matching helps compare young people of identical gender and ethnicity, living in similar neighborhoods, and exposed to similar labor market conditions. We find that school attendance fell most, by more than 30 percentage points, among Roma boys living with unskilled parents in unemployed families and depressed neighborhoods. After controlling for ethnicity and location, the correlations with the level of local unemployment, expected with and without graduation, fade away. Post-reform enrolment rates were also unrelated to the preceding five-year changes in local unemployment. The results warn that in a country fragmented along ethnic dimensions, struck by severe inequalities, and lacking efficient institutions to support school-to-work transition, lowering the school leaving age implies further growing inequality.

1 Introduction

Whether the school leaving age is too high has been debated in several countries, including Germany, Norway, Switzerland (Skirbekk 2005), and the UK where proponents of an increase from 16 to 19 versus a decrease to only 14 were standing on two sides of the front near the millennium. The core of the argument for keeping the age limit low could best be summarised in the wording of Chris Woodhead, former chief of *Ofsted*: "I'm against arguments that the leaving age should be extended to 19. (…) Such proposals have more to do with massaging unemployment figures than the needs of the economy. Those young people who have not made much progress in the class should have the opportunity to follow an apprentice in the workplace. They are more likely to make more progress in that kind of environment than through repeated humiliation at school." (Woodhead 2002).[1]

While this argument is widely accepted, we do not know *actual* decreases in the school leaving age in the OECD, except for Hungary (and the partial exception of Saarland, Germany, 2001).[2] Announced in late 2011 and put in effect in 2013, the Hungarian reform opened an exit door for students eager to leave and schools willing to discard difficult pupils. We exploit this unique natural

[1] This research was supported by the National Research, Development and Innovation Office (project K124975).
[2] Saarland shifted the closing exam of secondary level studies from the end of the 13th to the 12th schoolyear. Brunello et al (2009) looked at earlier changes of the leaving age in 12 European countries (1962-1975), and found only increases.

experiment to study the *short-run social implications* of lowering the school leaving age: the heterogeneous impact on school attendance and the labor market status of early school leavers.[3] We pay special attention to outcomes in the most vulnerable groups like the Roma minority, those living in low-status neighborhoods, and unskilled and unemployed families.

Our expectations are uncertain. Direct empirical evidence on cutting the school leaving age does not exist - its likely implications can only be inferred from the research on early school leaving and 'reversing' the evidence on increases in the mandatory age limit.

Pre-graduation school leaving implies a loss of human capital unless school attendance has zero contribution to the cognitive and non-cognitive skills of the least motivated students at the edge of dropout. Advantages from the signaling effect of completed studies are lost. Unemployment after leaving school without qualification (a likely outcome) may have a scarring effect (Arulampalam et al. 2001, Csillag 2020). Early school leaving is often associated with delinquency as a cause (Lochner and Moretti 2004, Machin, Marie and Vucic, 2011, Dragone et al. 2021) or an effect (Ward, Williams and van Ours 2020). School dropout is correlated with teenage pregnancy (Rosenberg et al. 2015, Adamecz-Völgyi and Scharle 2020), substance use (Comiskey 2003, Aloise-Young and Chavez 2002), and mental health (Esch et al. 2014)

The literature suggests that increases in *compulsory education* moderate early school leaving. Brunello et al. (2009) find that longer compulsory schooling affects educational attainment, especially among students belonging to the lowest quantiles of the ability distribution. They also find a positive effect on wages at the lower tiers of the labor market. Anderson (2012) detects an impact of the school leaving age on juvenile crime. Lochner and Moretti (2004) found that US states that raised high school graduation rates by increasing minimum school leaving age experienced significant declines in incarceration rates. Machin, Marie, and Vucic (2011) found that the exogenous increase in education induced by the 1947 school reform in the UK produced a significant reduction in property crimes.

Several papers (Anderson 2012, Adamecz-Völgyi and Scharle 2020, Machin, Marie and Vucic, 2011) find that *incapacitation* is an essential driver of the short-run outcomes. Longer compulsory schooling forces many would-be dropouts to spend more time in school and less in the street-corner society and with partners. Adamecz-Völgyi and Scharle (2020), for instance, find that raising the

[3] For an overview of the lon-run individual, social and fiscal implications of early school leaving, including a detailed review of notable pieces of research Brunello and De Paola (2004), Oreopoulos (2006), and EFILWC (2012), among others.

leaving age in Hungary, 1998 decreased inceptions during the school year but not during the summer and winter vacations.

In studying how education affects employment and wages, the length of compulsory education is often used as an instrument (IV) for the actual length of education (Angrist and Krueger 1991, Acemoglu and Angrist 2001, Del Bono and Galindo-Rueda 2004, Oreopoulos 2006). In this paper, we look at the direct short-run effect of lowering the leaving age (compliance with the instrument, in other words).

Admittedly, the causal effect of a changing age limit on early school leaving is easiest to identify using longitudinal data containing exact birth dates and applying a regression discontinuity design for students close to a cut-off point. Separating the effect of shorter compulsory education and parallel reforms and market developments is difficult even in that case.[4]

While such longitudinal administrative data are available in Hungary, they can tell little about the heterogeneity of the effect. We opt for utilizing a wealth of survey-type data from the 2011 Census, the 2016 Microcensus, and several waves of the National Assessment of Basic Competencies (NABC), which includes a detailed background questionnaire. The censuses cover ethnicity, family composition, local labor market conditions, and neighborhood characteristics, thus allowing a deeper study of the social consequences. The NABC also provides information on the family and its living conditions (but not on ethnicity and the neighborhood). Separating the impacts of policy change and labor market conditions is less straightforward in this case but not impossible. We rely on regional variation in labor market conditions (across local labor markets, skill levels, and over time) to assess their influence on participation in education and dropout's economic activity.

Empirically, we compare 17-year-olds in terms of school attendance and labor market status in 2011 and 2016, before and after the government decreased the leaving age from 18 to 16.[5] In 2011, all 17-year-old teenagers had to go to school, while in 2016, all of them were free to leave education right after their 16th birthday.

[4] As Oreopoulos (op.cit., p154) notes: "To estimate consistently the LATE of compulsory schooling, the timing of the law changes must not be correlated with any other policy changes or regional characteristics that also relate to the outcome variables."

[5] A person is 17-year-old if she is between her 17th and 18th birthdays. The new regulation covered the 16 and 18-year-olds depending on their month of birth, and their age at starting school. Apart from a miniscule minority (those starting school before age 6), the 17-year-olds were uniformly affected.

As we will see, despite an age limit of 18 between 1998 and 2012, many students left the school before graduation.[6] The enrolment rate at age 17 stood at 96.4 percent when the reform was announced. By October 2016, three years after the reform, school attendance fell by 5.2 percentage points among 17-year-olds without completed secondary level attainment. The response was strongly heterogeneous. For Roma boys in unskilled and unemployed families living in a neighborhood with high (>10 percent) Roma share the estimated decline exceeded 33 percentage points compared to zero for non-Roma boys living with two high-educated and working parents in a 'whites only' neighborhood. Few dropouts followed an apprentice in the workplace: participation in part-time education and employment grew by 0.1 and 1.7 percentage points, respectively, while the NEET rate rose by 3.1 points.[7]

As usual in a (repeated) cross-section analysis, the results can be biased by selection on unobservables, and endogeneity.

We use the National Assessment of Basic Competencies (NABC) to study how previous school performance and several proxies of the household's living conditions (both unobserved in the censuses) predicted selection to early school leaving in 2011 and 2016. We find that after the reform, the 8th grade (age 14-15) test performance had a stronger impact on drop-out, and the influence of living standards also had a more substantial effect holding school performance constant. We cannot import a selection correction term into the censuses, but we will rely on the NABC results in the phase of interpretation.

Endogeneity arises primarily because of a correlation between neighborhood characteristics (especially the population share of Roma people) and unemployment, two variables of vital importance for our analysis. We try to separate their effects by instrumenting the Roma share and find no significant link between unemployment levels and changes, on the one hand, and early school leaving, on the other. Enrolment fell dramatically among Roma youth, and the Roma population share also had a negative effect.

Our results are inconsistent with what might be called a 'textbook labor supply scenario'. For myopic low-achievers, who regard education as a nuisance that promises no return in the foreseeable future, leaving school expands the time budget they can devote to usefully looking activities like gainful employment and pure leisure. The benchmark labor supply model predicts a rise in both employment and leisure in analogous cases (like a shortening of commuting time, for

[6] Mártonfi (ed. 2011) presents an interview-based overview on the causes of drop-out, and the lack of sanctions.
[7] NEET is the abbreviation of Not in Education, Employment or Training.

instance), while a concommittant rise in job finding rates and wages assign a higher value to employment. In this scenario, good or improving labor market conditions (as was the case in Hungary 2011-2016) imply more early exits from education, but they also promise a successful transition to work.

The positive correlation between teenage and parental unemployment pulls and pushes teenage students' decisions in a different direction. Many low-income families cannot easily bear the costs of education, and painfully miss the foregone earnings of their nearly adult children. If local unemployment is high or rising, more families need an additional wage earner. Lower benefits (as in Hungary 2011-2016) further aggravate the income loss from unemployment and add pressure on the family's teenage schoolchildren to earn income. This 'family income scenario' establishes a negative relationship between school attendance and the level and growth of unemployment. Improving labor market conditions imply fewer early exits from education and a weaker push to take up employment.

Last but not least, we have reasons to believe that in 2016 schools had a weaker motivation to withhold low-performers than in 2011. The reform package to which lowering the leaving age was a part openly encouraged schools to let the laggards "enter the labor market" and promised assistance to them in doing so. (See Section 3). The finding that Roma children in unskilled and unemployed families had the highest probability of leaving early is consistent with this scenario, too, since these children are the most likely to lag, be left behind, and become a target of discrimination.

Apart from the educational and employment policy reforms and a significant tightening of the unskilled labor market, we see no other candidates to explain why enrolment at age 17 fell markedly in general and shrank dramatically in the poorest social groups and localities. Further growth of substance use could have contributed to an increase of early exit, but the school-based surveys of ESPAD Group (2020) indicated slight *decreases* in alcohol consumption, heavy episodic drinking, the use of cannabis and other illicit drugs, and sedatives in Hungary between 2011 and 2015 (a trend that continued until the latest observations in 2019).

Section 2 discusses data and estimation issues. Section 3 introduces the local context. Section 4 presents descriptive statistics and the results of OLS regressions. Section 5 adds evidence on selection to dropout based on administrative data and addresses endogeneity using an IV specification. Section 6 discusses the exposure of Roma youth in more detail, and Section 7 concludes. We refer to the appendix tables and figures as Table A1.1-Table An.n.

2 Data and estimation

This section briefly introduces the data sources and the key variables used in the analysis and discusses some data problems and estimation issues.

Data sources and key variables

The census data covered the universe of the Hungarian population observed in 2011 and a 10 percent random sample interviewed in the 2016 Microcensus. Both surveys related to October and asked the same questions. The data cover each member of the observed household and yield information on the dwelling and neighborhood they live in. A big administrative panel that includes data from the National Assessment of Basic Competencies or NABC (Admin3), the quarterly Labor Force Survey (LFS), the annual Wage Survey (WS), a geographical dataset (GEO), and a municipality level register (TSTAR) complement the census-based data. See Appendix 1 on each of these data sets.

Students are those attending an educational institution, typically a secondary school, on a full-time basis. Those participating in education in other forms are labeled as *trainees*. See Appendix 2 on the Hungarian educational system composed of an 8-grades primary school, vocational training schools, and secondary schools concluding in *érettségi* (closing exam, Abitur), a precondition of applying for further studies.

School leavers are those who have left full-time education before graduation at the secondary level.

Parents' educational attainment and labor market status are known from the Census, the Microcensus, and NABC.

We classified someone as *Roma* if she indicated Roma ethnicity in the first or second place in the Census or the Microcensus. Note that Hungary's Roma minority is sizeable, have abandoned travelling ages ago, their vast majority speak Hungarian as a mother tongue, had a relatively high male employment probability under state socialism (above 75 percent in the early 1980s, see Kertesi and Kézdi 1999) but lost their jobs on a massive scale during the post-socialist transition (Kertesi and Kézdi 2011). Their number is growing due to the above-average fertility of low-educated Roma. They account for 5.7 and 7.4 percent of our samples of 2011 and 2016, respectively.[8]

[8] Surveys relying on a Roma definition based on external judgement rather than self-reported affiliation arrive at higher estimates. Kemény et al. (2004), for instance, report that 11 per cent of the cohort born in 1993 were of Roma origin. Their

Neighborhood. The living place is recorded at the level of census tracts (CTs) – small areas with about 200 inhabitants on average. We computed a series of indicators to capture the character of CTs using Census data on the share of the unskilled and Roma populations, adobe houses with and without grounding, dwellings equipped with running water and WC, accessibility, separation from the core of the settlement, and characterization of the neighborhood as run down by the interviewer.

Unemployment. We can measure the probability of being ILO-OECD and/or registered unemployed at the level of CTs in 2011, and observe the registry unemployment rate of municipalities and NUTS4 microregions ('*járás*') in 2011 and 2016. We prefer the NUTS4 level indicators for two reasons. First, a '*járás*' fits best to what might be called a local labor market. The average *járás* has about sixty thousand inhabitants. Close to 75 percent of their labor force is employed locally, except for districts belonging to the Budapest agglomeration and the connecting Fejér county, where the respective shares only slightly exceed 50 percent.[9] Second, this is the level where we can break down the unemployment probabilities by educational attainment. Unemployment by education is observed in the municipality-level TSTAR database, but the composition of the population is not. At the *járás* level, we could obtain the population figures by pooling LFS waves around the Census and the Microcensus, respectively.

Dealing with data problems

In the first weeks of the 2011 Census, students interviewed in dormitories were not asked about their families and housing conditions. (The aim was to avoid double-counting). The protocol changed in later stages of the survey but the missing information was only partly regained. As a result, in 2011, for some 17-year-olds, permanent address is only known at the municipality level, and household-level variables are missing. In Appendix 3, we study the direction of bias from dropping students in dormitories.

Second, respondents were free to decline the question on ethnicity (and religion) in both surveys. Answering other questions was mandatory. Non-response amounted to 11.8 percent in 2011 but only 0.7 percent in 2016. We deal with this problem by predicting the probability that a respondent with specific characteristics was Roma. We considered a non-respondent non-Roma if (i) the

share at age 18, in the year of the Census, must have been slightly lower due to Roma's higher infant and childhood mortality (Matrix 2014) but definitely higher than the 5.8 percent share measured in the Census.

[9] Authors' calculation from 2011 Census. Hungary had 174 NUTS4 regions (járás), 3300 municipalities, and 45,500 CTs in 2011.

respondent lived in a CT with no (self-reported) Roma inhabitants. (ii) the prediction fell short of 50 percent. See Appendix 4 for the estimation.

Third, the Microcensus covers a 10 percent random sample of households. The size difference implies that only a part of the CTs made it to the 2016 sample. We checked the probability that a CT was observed in both 2011 and 2016. Appendix 5 shows that these CTs did not significantly differ from the rest in their 2011 enrolment rates.

Estimation issues

We estimate probabilistic regressions and binary choice models explaining the probability of school attendance and labor force participation (conditional on not attending school) for the 17-year-olds observed in 2011 and 2016.

To improve comparability, we match respondents of the Microcensus to their counterparts in the Census using coarsened exact matching (Blackwell et al., 2010). The matching is based on gender, ethnicity, and coarsened values of settlement size, settlement-level unemployment rate, and the CT-level Roma population share (as of 2011 in the latter case). The results estimated for the matched and unmatched samples are qualitatively identical. We do not pool the Census and the Microcensus (and regard the reform as a 'treatment') since we expect the determinants of an early exit to be different in 2011 and 2016. For descriptive statistics on the matched and unmatched cases, see Appendix 6. The equations have been estimated with linear and non-linear regressions. As the results do not differ, we opt for presenting the linear versions.[10]

3 The local context

This section briefly discusses reforms and labor market developments predictably influencing the choice between continuing or leaving school.

Educational, welfare, and employment policy reforms between 2011 and 2016

Education. Lowering the leaving age was part of a broader reform package to supply the economy with blue-collar workers rather than college and university graduates and students graduating in academic and vocational secondary schools. The government decided to increase the share of apprentice-based vocational training from 25 to 50 per cent of all secondary-level slots; shortened the duration of vocational training from four to three years; cut the number of classes devoted to general training by 19 percent in vocational training schools and 13 percent in vocational secondary

[10] This decision is also motivated by the requirement of weighting the observations in 2016.

schools (Varga 2018); allowed the training schools to employ teachers without qualification, and subordinated them to the Ministry of the Economy instead of the Ministry of Education.

Welfare. The educational reforms coincided with a series of measures to broaden the gap between wages and benefits. As shown in Table 1, the net value of essential transfers substantially fell between the Census and the Microcensus. The only exception was GYED, an insurance-based, earnings-related, high-amount benefit available to parents who spent at least one year in employment within two years before giving birth to their baby.[11]

Table 1: The value of the most important cash transfers relative to the net average wage

	Family allowance[a] if the 17-year-old child is		Child care allowance		Unemployment		PW[f]
	in school	out of school	GYED[b]	GYES[c]	benefit[d]	assistance[e]	wage
2011	17.3	17.3	59.5	21.9	42.3	17.8	42.9
2016	13.6	0.0	67.8	18.2	11.6	13.1	29.6

Source: Fazekas at al. (eds, 2019), Tables 11.1 and 11.2 and Cseres-Gergely and Molnár (2014).
a) A flat-rate transfer available for the families raising children aged 0-18 in 2011 and school children aged 0-16 since 2016. The families of students aged 0-20 in full-time secondary or tertiary education are also eligible.. The families of children out of school and older than 16 were not eligible in 2016.
b) An earnings-related benefit for mothers employed for at least 12 months within a two-year-long period before giving birth to their child.
c) A flat-rate allowance paid until the child reached age 3 (age 10 in some cases). GYES cannot be combined with GYED.
d) An insurance-based, earnings-related benefit paid for a maximum of nine months in 2011 but only three months in 2016. The figures show the total amount of the benefit in 9 months after a job loss, assuming 9 and 3 months of benefit duration, and average amount. This figure is compared to the annual net wage in 9 months. The average monthly amounts amounted to 52.7 and 43 percent of the net average wage in 2011 and 2016, respectively.
e) A flat-rate, means-tested benefit for the registered unemployed.
f) PW (public works) is a widespread program for the unemployed. See more in the text. The figures show the fixed monthly salary of full-time PW participants with primary school attainment relative to the monthly net average wage. Note that in 2016, skilled PW participants received a higher compensation (38 percent of the net average wage).

Decreased benefits hit the families of early school leavers rather than themselves. A 17-year-old person with no previous work experience and living in a low-income family can receive UA on a means-tested basis or join a public works project. (These projects were open for school leavers in 2016 but not in 2011 – see later). Adults living on welfare were affected on a much broader scale. On top of the cuts of UI, UA, PW wages, and the universal childcare benefit (GYES), they also experienced a significant cut in the flat-rate, per-child family allowance, especially if their children stopped attending school after age 16.[12]

[11] GYED is a typically middle-class transfer. Out of one hundred high-educated (college or university) parents receiving childcare at the end of 2016, 60 received GYED as opposed to 11 among parents with primary school attainment. (Authors' calculation using the LFS).

[12] Furthermore, the payment can be suspended in case a student missed more than 50 hours. Hermann (2018) studied the impact of this rule on various outcomes in primary and secondary schools, and found no effect (drop-out rates and test performance) or weak effect (grade repetition and absenteeism in secodary school).

These changes affected the families of early school leavers disproportionally. As shown in Table 2, in 2011, 65.1 percent of the school leavers' families had no wage earner, compared to only 17.1 percent of the students' families. The benefit cuts potentially affected 84 per cent of the school leavers' families as opposed to 38 percent of the students' families. In 2016, the respective figures amounted to 79 and 31 percent, respectively.[13]

Table 2: Parents in the families of 17-year-olds attending/not attending school (percent)

	2011		2016	
Number and employment of cohabitating parents	In school	Out of school	In school	Out of school
Two working parents	47.3	11.8	51.5	14.4
Two parents, one working	21.1	20.1	20.6	32.0
Two non-working parents	11.1	54.6	7.1	35.3
One working parent	14.5	4.4	17.1	6.7
One non-working parent	6.0	9.1	3.8	11.6
Total	100.0	100.0	100.0	100.0
No of observations	112,189	3822	6557	657

Source: Census 2011, Mikrocensus 2016. Persons living in families with at least one parent.

Public works. PW is a large-scale "workfare" program for the long-term unemployed introduced by Viktor Orbán's first government in May 2000 and maintained by the socialist administrations in office between 2002 and 2010. PW typically provide simple jobs in street cleaning, road and park maintenance, forestry and (less frequently) social services. The second Fidesz government (2010-2014) expanded the scheme and put it in the center of its unemployment support policies. The rules of participation, the sanctions against non-compliers and the level of remuneration changed drastically.[14] The number of participants reached its maximum at 213 thousand in 2015 (3.5 percent of aggregate, and 5 percent of unskilled employment. The program was gradually opened for school leavers: the number of 17-year-old first-time entrants grew from nearly zero in 2011 to 1434 in 2016 (Molnár 2020).[15]

Changes in the labor market for unskilled youth

The government's expectation that entering employment would be a desirable and feasible option for early school leavers was not unfounded. The labor market prospects and wages of low-educated

[13] Perhaps surprisingly, less school leavers than students lived in single-parent families in 2011 as well as 2016. Note that the share of school leaver's two-parents families with only one wage earner was higher while the share of those with no wage earner was lower in 2016 than 2011.

[14] Since 2011 a registered unemployed can be called to do public works on short notice, at any time and for any duration. Declining a call may imply exclusion from UA benefits for three years, irrespective of the type of job that was offered and educational level of the person. The remuneration, formerly equal to the minimum wage, was set at 75 percent of the minimum wage.

[15] In this and the subsequent paragraphs we benefit from a comprehensive overview of the Hungarian youth labor market by Fazekas et al. (eds., 2020).

people (those with primary school attainment or less) markedly improved after the financial and economic crisis, in both absolute and relative terms.

After a long-lasting decline, the employment rate of young workers with only primary school attainment (and out of school) reached a historical low of 25 percent in 2013. Since then, the rate was on the rise until the Covid-19 pandemic, with market-based employment reaching 40 percent. Adding PW participants, we observe a growth from less than 30 percent to 50 percent. (Figure 1, left panel).

Figure 1: The employment rate of young people with primary school attainment

Source: Author's calculation using the LFS. The data relate to persons aged 15-35 out of full-time education
a) Persons aged 15-35 and out of full-time education = 1.0
b) The employment rate of people aged 15-35, out of full-time education, and having vocational or secondary educational background = 1.0. The employment rates of those with vocational and secondary attainment are weighted with 0.58 and 0.42, respectively. The weights reflect the shares of the two types of schools the drop-outs attended in their last month spent in full-time education.

The right panel shows these evolutions in relative terms. The reference level is a weighted average of the employment rates of young people having vocational or secondary education, with the weights reflecting the shares of the two types of schools that dropouts attended in their last month in education in 2011-2016. (We use the Admin3 data to calculate the proportions). The relative employment rates of young people with primary school backgrounds rose by 15-20 percentage points, depending on whether we do or do not treat PW participation as formal employment.

Table 3 shows relative employment rates at the dates of the Census and the Microcensus, and adds data on relative wages. In 2016, market-based relative employment stood at 40 percent, practically equal to its 2011 level, while relative earnings grew substantially, from 76 to 86 percent of the reference group's wage. The case is just the opposite if PW is counted as standard work: relative employment grew significantly, from 46 to 58 percent, while wages stayed on level.

Table 3: Relative employment and relative wages near the dates of the Census and the Microcensus

	Relative employment[a]		Relative wage[b]	
	Without PW	With PW	Without PW	With PW
2011	41.2	46.1	76.1	72.8
2016	40.0	57.5	85.8	72.3

Source: Authors calculation using the LFS and the WS. Since the WS is conducted in May, we considered the waves 2011 q2 and 2016 q2 in the LFS.
a) The employment rate of people aged 15-35, out of full-time education, and having vocational or secondary education = 1.0 The employment rates of those with vocational and secondary attainment were weighted with 0.58 and 0.42, respectively. The weights reflect the shares of the two types of school the 17 year-old drop-outs attended in their last month spent in full-time education.
b) The gross monthly earnings of workers aged 15-35 having vocational or secondary education = 1.0 The average wages of those with vocational and secondary attainment were weighted with 0.58 and 0.42, respectively.

The growth of employment may have been affected by subsidies of different kind.

Wage subsidies. In 2012, the government introduced job retention subsidies for workers younger than 25 or older than 55, GYES and GYED recipients returning to work, workers in unskilled jobs, and newly hired long-term unemployed. The subsidy amounted to Ft 27,000 for school leavers in their first job. To put this figure in perspective, we estimate that it amounted to 57 percent of the total tax burden on 2/3 of the net average wage in 2012. Estimates by Svraka (2018) suggest that the subsidy had a remarkable effect on young people already at work.

Youth Guarantee. Hungary joined the EU's Youth Guarantee Program in 2015. The program provided wage and travel-to-work subsidies and contributions to training to NEET persons younger than 25 living in high-unemployment NUTS2 regions. The number of entrants amounted to about 25 thousand in 2015 and 2016. Estimates by Krekó et al. (2020) suggest that school leavers with only primary school attainment had an average chance to make it to the program. Krekó et al. (2021) found that the program had a modest positive effect, but it failed to target the most vulnerable groups. They came to similar conclusions by studying a 90 days job trial program for young people.

Bridge Program. In 2012, the government launched a program explicitly targeting young people not continuing their studies after primary school or dropping out of vocational or secondary education. The program called *Híd* (Bridge) provides general and vocational training. As shown in Appendix 7, the program reached 6.5 percent of the 17-year-olds out of school, and as Varga et al. (2017, Table C2.6.1.) show, the drop-out rate was 63.6 percent in 2016.

The data, taken together, suggest that the outright loss from not completing secondary school was significantly smaller in 2016 than in 2011, on the national level. Dynamics might also matter: the same level is most probably perceived differently after five years of decline than amid a promising

trend. Improving employment prospects and higher wages presumably affected the decision to stop versus continue one's studies.

5 Descriptive statistics and OLS results

Descriptive statistics

In 2016, slightly more 17-year-olds had completed secondary school than in 2011 due to the shortening of vocational training (Table 4).

Table 4: Activity of the 17-year-olds in 2011 and 2016

	Boys		Girls		Both genders	
	2011	2016	2011	2016	2011	2016
			All 17-year-olds			
Graduated at the secondary level	0.4	4.5	0.3	2.4	0.4	3.5
Student – home[a]	88.4	80.1	86.7	81.9	87.6	81.0
Student – dormitory[b]	8.3	6.7	8.8	7.5	8.6	7.1
Student, all	96.7	86.8	95.5	89.4	96.2	88.1
Trainee	0.9	1.0	1.1	1.3	1.0	1.1
Employed[c]	0.2	2.4	0.1	1.3	0.2	1.9
Unemployed[d]	0.2	2.4	0.3	1.1	0.2	1.8
Inactive	1.5	2.9	2.9	4.5	2.2	3.7
NEET[e]	1.7	5.3	3.2	5.6	2.4	5.5
Total (of white rows)	100.0	100.0	100.0	100.0	100.0	100.0
Number of observations	61,307	4,557	58,705	4,134	120,012	8,691
			Excluding graduates			
Student – home	88.9	83.9	86.8	83.9	87.9	83.9
Student – dormitory	8.3	7.0	8.8	7.7	8.5	7.3
Student, all	97.2	90.9	95.6	91.6	96.4	91.2
Trainee	0.9	1.0	1.1	1.3	1.0	1.1
Employed	0.2	2.5	0.1	1.3	0.2	1.9
Unemployed	0.2	2.5	0.3	1.1	0.2	1.8
Inactive	1.5	3.0	2.9	4.6	2.2	3.8
NEET	1.7	5.5	3.2	5.8	2.4	5.6
Total (of white rows)	100.0	100.0	100.0	100.0	100.0	100.0
Number of observations	61,071	4,351	58,528	4,034	119,599	8,385

Source: Census 2011, Microcensus 2016
a) Students interviewed at home, or in a dormitory but asked about their families
b) Students interviewed in a dormitory and not asked about their families
c) Based on he ILO-OECD definition. Working students and trainees are excluded
d) Based on he ILO-OECD definition.
e) Not in education, employment or training

School attendance among those not finishing secondary school fell from 96.4 to 91.2 percent, breaking a rising long-run trend of participation in education. (See Appendix 8 based on LFS data between 1992 and 2019). The decline was more substantial for boys than girls. Dropouts' participation in out-of-school education was markedly lower in 2016 than in 2011. Employment

rose by 1.7 percentage points while the NEET rate increased by 3.2 points. Within the widely used but moderately informative category of NEET, the share of job seekers jumped from 8 to 32.1 percent. Labor force participation among the dropouts grew markedly from 8 to 32 percent. Nearly half of those entering the market remained unemployed in 2016, suggesting that the school leavers met hard demand-side constraints.

School attendance: OLS results

The regression estimates presented in this section relate to 17-year-olds with no completed secondary level attainment, those living in families (with at least one cohabitating parent) with their CT-level variables relating to their permanent address rather than the CT of the dormitory where they temporarily resign.

The explanatory variables include dummies for gender, disabilities obstructing everyday life, a dummy for mothers raising one or more children, the educational level of the highest-educated parent, the number and employment status of cohabitating parents, Roma ethnicity interacted with the CT-level Roma population share, and microregion level indicators of the level and change of unemployment with primary school background (relevant for dropouts) and secondary school attainment (relevant for those who graduate). An indicator of the gain from graduation under naïve expectations is calculated as:

$$[1] \qquad G_{it} = \frac{1 - U_{it}^{S}}{1 - U_{it}^{P}} - 1$$

If the unemployment probabilities of people with primary (U^P) and secondary educational attainment (U^S) are equal, then G=0.[16] Lower U^S implies G>0 and vice versa, as shown in Formula [1], where i refers to microregions, and t for time. Since U^P and G are strongly correlated (because U^P responds more to regional shocks than U^S) we use them interchangeably.

Table 5 presents the estimates for 2011 and 2016. The minor advantage of girls slightly increased, and the disadvantage of young people with disabilities grew further. Girls raising children had a more minor but still substantial disadvantage in 2016[17]

[16] Here again, we calculate the counterfactual unemployment probability U^S as a weighted average of the levels with vocational and secondary educational attainments.
[17] Roma girls accounted for 41 and 29 percent of all 17-year-old mothers in 2011 and 2016, respectively, defying the stereotype that teenage pregnancy is a predominantly „Roma issue".

Table 5: The probability of school attendance – Linear probability models

Dependent: Full-time student	2011		2016	
Female	0.002***	(2.2)	0.018***	(3.2)
Disability obstructing everyday life	-0.011***	(4.2)	-0.035***	(2.7)
Mother of one or more children	-0.722***	(63.3)	-0.625***	(17.2)
Highest-educated cohabitating parent				
Primary or lower[a]	0		0	
Vocational	0.024***	(12.1)	0.166***	(10.2)
Secondary	0.030***	(17.9)	0.196***	(12.6)
College, university	0.030***	(18.3)	0.193***	(12.3)
Cohabitating parents and employment				
Two parents, both work	0		0	
Two parents, one works	-0.012***	(10.3)	-0.037***	(4.8)
Two parents, none works	-0.059***	(22.2)	-0.087***	(5.2)
One parent, works	-0.005***	(5.2)	0.012**	(2.1)
One parent, does not work	-0.010***	(4.6)	-0.046**	(2.2)
Ethnicity and neighborhood				
Non-Roma, CT Roma share 0%	0		0	
Non-Roma, CT Roma share 1-5%	0.001	(0.7)	-0.008	(1.5)
Non-Roma, CT Roma share 5-10%	-0.010***	(4.4)	-0.021	(1.5)
Non-Roma, CT Roma share >10%	-0.032***	(10.8)	-0.096***	(5.5)
Roma, CT Roma share =0[b]	..	..	-0.013	(0.4)
Roma, CT Roma share 1-5%	-0.038***	(6.1)	-0.124***	(3.5)
Roma, CT Roma share 5-10%	-0.074***	(5.2)	-0.129*	(1.9)
Roma, CT Roma share >10%	-0.090***	(16.7)	-0.175***	(5.9)
Unskilled unemployment probability[c]	-0.005	(1.0)	0.052	(1.5)
Constant	0.973		0.796	
aR2	0.283		0.277	
Number of observations	97,379		7,290	

Source: Census 2011, Microcensus 2016.
Sample: Matched sample of 17-year-olds without completed secondary education. On matching see Appendix 5- Significant at *10, **5, and ***1 percent level
a) CT= census tract. The Roma share refers to 2011. Roma: estimate for those declining the question on ethnicity
b) In 2016, a Roma person could live in a CT, where the Roma share was zero in 2011.
c) NUTS-4 level variable with the number of unskilled registered unemployed in the numerator and an LFS-based unskilled population estimate in the denominator. Unskilled stands for people with at most completed primary school attainment
d) The expected NUTS-4 level gain is $(1-U^s)/(1-U^p) - 1$, where U^s is the weighted unemployment probability with vocational (weigth=0.58) and secondary (weight=0.42) educational attainment.

In 2011, parents' education had a weak effect. The probability of enrolment was lower by 2-3 percentage points with the children of unskilled families (where the highest level of education was primary school) compared to other categories. By 2016, the gap increased to 17-20 percentage points.

Enrolment fell in two groups of families distinguished by parent's employment status. The disadvantage increased from 1 to 4.6 percentage points with those single-parent families, where the family head (typically the mother) did not work. A growth of similar magnitude is observed (from 5.9 to 8.7 points) in two-parent families with no wage earner and a smaller one with two-parent families with only one wage earner (from 1.2 to 3.7 points).

The last block of the table presents the estimates for Roma ethnicity interacted with Roma density of the immediate neighborhood (CT). The reference category is non-Roma youth living in "only whites" CTs. Non-Roma living in CTs with relatively high Roma density (above 5 and 10 percent share) had a disadvantage of 1-3 percentage points in 2011, which jumped to 9.6 points in the latter category by 2016. Roma's disadvantage increased with the Roma share in 2011 (3.8, 7.4, and 9 points in the three groups of Roma-inhabited CTs). In 2016, the respective estimates amounted to 12.4, 12.9, and 17.5 percentage points.

After controlling for personal, family-level, and neighborhood characteristics, the variations in unskilled unemployment and the gain from graduation do not seem to influence school attendance. (Table 5 presents the coefficient of the unskilled unemployment probability, but the estimated effects are similarly insignificant for the gain from graduation and the changes of both indicators). These results may reflect endogeneity bias addressed in the next section.

In 2016, the prediction for a non-Roma boy living with two high-educated and working parents in a 'whites only' neighborhood was still 99.4 percent. For a Roma boy living with unskilled and non-working parents in a CT with a Roma share exceeding 10 percent, the estimate was 53.9 percent (down from 82.4 percent in 2011). This figure might seem incredibly low, but it is consistent with what the raw data shown for Roma youth in general (see Section 7).

6. Dealing with endogeneity and selection

Endogeneity

Our primary concern is that high Roma share and high local unemployment are correlated outcomes in impoverished localities – a problem we try to overcome by instrumenting the 2011 Roma share. As an IV, we have chosen the change of the NUTS4 level unemployment/population ratio between 1993 (the worst year of the transition with a country-wide mean of 11.5 percent) and 2001 (a ratio of 6.4 percent). Differences in the extent and speed of the post-transition recovery contributed to the concentration of Roma people in the least prosperous localities. Roma families are the least likely to move out from depressed areas as the sales price they can reach for their often low-quality dwellings is insufficient to cover accommodation costs at a better place. Furthermore, low real estate prices and abandoned buildings attract many of them to depressed, high-unemployment areas. In Appendix 9, we show that Roma people moving between settlements in 1993-2001 ended up in worse localities (in terms of employment probability) than their non-Roma counterparts.

Table 6: Results on the effect of unemployment and ethnicity from OLS and IV school attendance regressions

U indicator and model	Roma	2011 Roma share	U indicator	Roma	2016 Roma share	U indicator
			Uncontrolled equations			
U^P, OLS	-0.131***	-0.212***	-0.028***	-0.248***	-0.337***	-0.069*
	(22.2)	(18.0)	(6.1)	(9.3)	(5.9)	(1.8)
Gain, OLS	-0.131***	-0.216***	-0.009***	-0.249***	-0.345***	-0.022
	(22.1)	(18.4)	(4.1)	(9.3)	(6.0)	(0.7)
U^P, IV	-0.143***	-0.166***	-0.035***	-0.058***	-1.188***	0.138*
	(10.0)	(3.3)	(4.1)	(4.3)	(4.3)	(1.7)
Gain, IV	-0.119***	-0.262***	-0.007***	-0.077***	-1.102***	0.103**
	(11.0)	(7.6)	(2.6)	(5.2)	(5.2)	(2.0)
dU^U, OLS	..	..	..	-0.249***	-0.349***	0.014
				(9.3)	(6.1)	(1.2)
dG, OLS	..	..	..	-0.249***	-0.346***	0.018
				(9.3)	(6.1)	(0.9)
dU^U, IV	..	..	..	-0.120***	-0.891***	0.016
				(2.6)	(5.9)	(1.4)
dG, IV	..	..	..	-0.108**	-0.945***	-0.015
				(2.2)	(5.6)	(0.6)
			Controlled for person and family variables			
U^U, OLS	-.0.068	-0.088**	-0.007	-0.128***	-0.100**	0.017
	(12,7)	(8.3)	(1.6)	(5.2)	(2.0)	(0.5)
G, OLS	-.0.067	-0.088***	-0.003	-0.129***	-0.102**	0.025
	(12.7)	(8.4)	(1.6)	(5.2)	(2.0)	(0,8)
U^U, IV	-0.135***	0.200***	-0.040***	-0.098	-0.271	0.051
	(9.7)	(3.6)	(4.9)	(1.6)	(0.9)	(0.7)
G, IV	-0.109***	0.087**	-0.010***	-0.103**	-0.248	0.045
	(5.6)	(2.3)	(3.8)	(5.6)	(1.0)	(1.0)
dU^U, OLS				-0.128***	-0.098*	0.013
				(5.2)	(2.0)	(1.2)
dG, OLS				-0.128***	-0.099*	-0.007
				(5.2)	(2.0)	(0.4)
dU^U, IV				-0.123***	-0.125	0.013
				(3.1)	(0.7)	(1.2)
dG, IV				-0.114***	-0.176	-0.010
				(2.7)	(0.9)	(0.5)

Data: Cases from the matched sample of Census and Microcensus respondents. Uncontrolled stands for equation with the displayed variables on the right-hand side. The controlled equations furthermode include the personal and family variables shown in Table 5.

The IV conditions arguably hold. There is a strong (r=0.6) correlation between the post-transition change of unemployment and 2011 Roma shares but the former is unlikely to affect school

attendance in 2011 and 2016 after controlling for parents' current employment status, educational level, and current local unemployment.

We simplify the model using a continuous Roma share variable (otherwise, we would need eight IVs) and use Roma ethnicity and the Roma share additively. This leads to a minor imprecision because the ethnic gap in school attendance varies with the Roma share.[18]

The IV has practically no effect on the person and family controls; therefore, we only present the coefficients on ethnicity, the CT-level Roma share, and various unemployment measures. The first-stage F-tests are shown in Appendix 10.

In the OLS regressions uncontrolled for personal and family characteristics, the coefficients on unskilled unemployment (U^p) and gain from graduation (G) are negative but only weakly or not significant in 2016. In the controlled equations, they are never significant.

In the uncontrolled IV models, the coefficients of both U^p and G are negative in 2011, but positive and weakly significant in 2016. The signs were similar in 2016, but none of the estimates were significant. Likewise, in the controlled IV models, the effects of U^p and G are negative and significant in 2011, but positive and insignificant in 2016.

The *changes* of U^p and G do not seem to exert remarkable influence on school attendance: both the OLS and the IV estimates are close to zero and insignificant.

Compared to the disadvantage of Roma youth estimated with the uncontrolled model (about -0.25 percentage points) the estimates are lower in the controlled OLS and the IV regressions (a range of 6 to 12 points). The relative effect of the Roma share appears to be strong in the uncontrolled IV equation, but it fades away after the inclusion of person and family attributes.

Selection to dropping out – Supplementary evidence from administrative data

In this section, we turn to retrospective data on school performance and family background to learn more about the determinants of dropping out. In the Admin3 panel, we can identify those out of school at age 17 in 2011 or 2016 and find them at age 14-15 when they participated in the NABC survey of 8th graders.

Students write two tests, of which we use the mathematics scores. (Using the literacy scores or a combination of the two makes no difference). The NABC furthermore contains a large set of

[18] The gaps in the three Roma-inhabited CT categories were 3.9, 6.4, and 5.8 in 2011, and 11.6, 10.8, and 7.9 in 2016.

background variables, which come from school and student questionnaires. Appendix 8 provides a list of the control variables and summary statistics, respectively. Our estimation sample consists of those who (i) wrote the tests and filled in the background questionnaire (ii) lived in a family (iii) answered the questions on parents' educational level and employment. As Table 7 shows, those out of school at age 17 had a slightly (about 2.5 percent) lower probability of making it to the sample.

Table 7: 8th grade competence survey (NABC) participation of those in and out of school at age 17 in 2011 and 2016 - Percent and number of observations

Participation in the 8th grade NABC[a]	Full-time student in October 2011		2016	
	Yes	No	Yes	No
Exempt	0.1	0.1	0.0	0.1
	20	2	4	2
Only test	11.8	14.6	11.9	12.9
	5044	258	4280	407
Test and questionnaire	88.2	85.3	88.1	87.0
	37789	1510	31665	2725
Total	100.0	100.0	100.0	100.0
	42853	1770	35949	3132
Estimation sample/total	87.0	84.4	86.9	84.6
	37291	1494	31239	2651

Source: Admin3. 50 percent random sample of 17-year-olds in 2011 and 2016, also observed as 8th graders in the NABC
a) NABC: National Assesment of Basic Competences

Note that in the Office of Education statistics the enrolment figures are lower than in the censuses (91.5 percent in the Microcensus and 84.8 percent in the Admin3 database in 2016). Several factors explain the difference. First, cases missing from the public education register for technical reasons appear as non-participation. Second, the administrative data do not cover students studying abroad but appearing in the censuses as resident household members. Third, parents and grandparents interviewed in the censuses may be misinformed about the official status of their children.

We estimate how school performance and family background at age 14-15 predicted the probability that a student had stopped attending school by age 17. Table 8 presents the OLS and IV results, in which the NUTS4-level Roma share is instrumented with the 1993-2001 change of the NUTS4-level unemployment probability.

Starting with the OLS, the equation for the 1994 birth cohort (aged 17 in 2011) predicts the outcome very imprecisely, as shown by an R- squared of 0.01 and many insignificant and close-to-zero parameters. It seems that before the lowering of the school leaving age dropout was dominated by factors unobserved in the NABC.

The results for the 1999 cohort (aged 17 in 2016) are more telling. On the one hand, they hint at more robust selection by school performance. The effect of the test score more than quadrupled and

became highly significant.[19] The mathematics test score had a mean of 16.0, with a standard deviation of 1.9 in 2011 (16.2 and 2.0 in 2016). The effects of a one standard deviation difference were 0.4 and 1.8 percentage points in the two cohorts, while those of the d9/d1 ratios were 0.9 and 4.8 points.

Students who had repeated one or more grades or planned to stop at the vocational qualification level were much more likely to leave school by age 17 in (and only in) the 1999 cohort. Consistent with what we found in the censuses, the influence of family background became powerful. The children of low-educated parents and unemployed families living in homes with no books and internet and those receiving financial support were less likely to finish their secondary-level studies even after controlling for school performance.

Like in the census-based analysis, the NABC-based OLS equations find no connection between local unskilled unemployment and the probability of drop-out. In the IV specification, the unemployment effect is negative and significant, while the impact of the (*járás* level) Roma share is positive and significant.. The marginal effects are relatively weak: they fall short of 1 percent in the case of unemployment and 2 percent in the Roma share in response to a one standard deviation difference.

The 2016 OLS prediction is 93.1 percent for a boy (i) who wrote an average test in a standard 8 grades primary school, did not repeat grade, and planned to complete secondary school (ii) lived with two tertiary-educated and working parents in a home equipped with internet and more than 50 books, and was not eligible for in-school or family support. For a boy with identical school performance and aspirations (items *i*), living with unskilled and non-working parents, with no books and internet at home, and eligible for poverty-alleviating support, the prediction was 68.8 percent.

Table 8. 8th grade test results, family background, and school attendance at age 17

Dependent: attends school at age 17	1994 cohort (aged 17 in 2011)		1999 cohort (aged 17 in 2016)	
	OLS	IV	OLS	IV
Age at test	-0.002 (0.7)	-0.001 (0.5)	-0.003 (0.6)	-0.002 (0.3)
Female	0.001 (0.5)	0.001 (0.6)	-0.009*** (3.2)	-0.009*** (3.0)
Repeated class at least once	-0.000 (0.1)	0.000 (0.0)	-0.039*** (3.1)	-0.039*** (3.1)
Attends 6 or 8-year-	0.006**	0.007**	0.007***	0.007***

[19] The mathematics test score had a mean of 16.0, with a standard deviation of 1.9 in 2011. The respective moments were 16.2 and 2.0 in 2016.

academic school	(2.2)	(2.2)	(3.1)	(3.1)
Standardized math. test score/100	0.002*** (3.3)	0.002*** (3.6)	0.009*** (10.7)	0.009*** (11.1)
Aspiration: at most vocational attainment	-0.006 (1.3)	-0.006 (1.3)	-0.142*** (18.4)	-0.143*** (18.4)
Aspiration: college or university diploma	0.016*** (6.1)	0.015*** (5.9)	0.021*** (7.2)	0.021*** (7.1)
Highest-educated parent: vocational	0.015*** (3.1)	0.018*** (3.4)	0.108*** (11.6)	0.112*** (12.0)
Highest-educated parent: sec. or high	0.017*** (3.3)	0.020*** (3.6)	0.108*** (11.4)	0.113*** (11.9)
Highest-educated parent: unknown	0.013** (2.1)	0.016** (2.6)	0.102*** (9.1)	0.108*** (9.5)
One employed parent	0.002 (0.6)	0.004 (1.1)	0.037*** (4.9)	0.039*** (5.2)
Two employed parents	0.006 (1.4)	0.008* (1.9)	0.044*** (6.1)	0.047*** (6.4)
Less than 50 books at home	-0.002 (0.7)	-0.003 (0.9)	-0.021*** (5.4)	-0.023*** (5.8)
No internet at home	0.001 (0.3)	-0.000 (0.0)	-0.040*** (5.4)	-0.042*** (5.6)
Free or subsidized meal, free textbooks	-0.007*** (3.1)	-0.008*** (3.3)	-0.008*** (2.7)	-0.009*** (3.1)
Family allowance – Yes[a]	0.010*** (3.3)	0.008*** (2.7)	-0.022*** (5.2)	-0.026*** (6.1)
Family allowance - Unkonwn	-0.003 (0.5)	-0.002 (0.5)	-0.009 (1.5)	-0.009 (1.4)
NUTS4 Roma share	0.026 (0.8)	0.269*** (3.7)	-0.033 (0.6)	0.524*** (4.9)
NUTS4 unskilled unemployment prob.	0.008 (1.0)	-0.022* (1.8)	-0.002 (0.1)	-0.123*** (3.8)
Constant	0.931*** (21.0)	0.916 (20.5)	0.679*** (9.5)	0.808*** (9.2)
First-stage F-test, Prob>F	.. ..	863.2*** (0.000)	.. ..	890.0*** (0.000)
R^2	0.01	0.01	0.14	0.14
N	38,785		33,890	
Mean of the dep. var.	0.039		0.078	

* p<0.1; ** p<0.05; *** p<0.01

Linear probability models. Robust standard errors, t-values in parentheses. The coefficients of the year-of-test dummies are omitted. Sample: Members of the 1994 and 1999 birth cohorts writing 8th grade NABC tests (typically at age 14-15), and filling in the background questionnaire. The school attendance status is observed in 2011 or 2016. 735 and 572 cases (1.9 and 1.7 percent) were dropped in 2011 and 2016, respectively, because of missing values. Data: Admin3. Reference categories: aspiration = secondary school attainment; the highest-educated parent has primary school attainment; no employed parent; no family allowance. The allowance (*gyermeknevelési támogatás*) is available for families raising three or more children, with the youngest child being 3-8 years old and the oldest one under 18. Employment outside the home is allowed for a maximum of 30 hours per week.

In the NABC, we cannot identify Roma students and the immediate neighborhood. Apart from this, we detect very similar patterns in the census-based and administrative data. A lesson from the

NABC is that the 2016 dropouts were worse performers in school, coming from more impoverished families. The meager employment records of the 2016 dropouts may have been affected by these attributes, which remain unobserved in the censuses.

7. Activity after leaving school

Table 9 presents estimates of the labor force participation of dropouts, counting out of-school training as participation.

Table 9: Activity of dropouts in 2011 and 2016 – Probabilistic regressions

Dependent variable: employed, trainee, or actively looking for a job =1

	2011	2016
Disabilities obstructing everyday life	0.027	-0.286***
	(0.8)	(4.7)
Highest-educated parent: vocational	0.094***	0.074
	(4.9)	(1.5)
Highest-educated parent: secondary	0.158***	0.064
	(4.5)	(0.8)
Highest-educated parent: tertiary	0.294***	-0.174
	(5.3)	(1.3)
No employed parent	-0.152***	-0.109*
	(5.9)	(1.9)
Roma boy	0.026	-0.009
	(0.8)	(0.2)
Non-Roma girl	-0.097***	-0.286***
	(3.5)	(5.6)
Roma girl	-0.168***	-0.216***
	(6.2)	(3.2)
CT Roma population share	-0.198***	-0.115
	(4.9)	(1.1)
Constant	0.499	0.332
	(4.2)	(5.9)
R^2	0.090	0.123
N	3215	676

Significant at *) 0.1, **) 0.05, ***) 0.01 level
Data: Census 2011 and Microcensus 2016
Reference categories: highest-educated parent: primary school attainment; non-Roma boy.

As we work with much smaller samples than before, we simplify the equations at several points. We only distinguish between unemployed families and ones with at least one wage earner. The parameters for single-parent families were zero in all tested specifications and dropped. We skipped the local unemployment indicator to avoid the reflection problem (Manski 1993). We interacted gender and Roma ethnicity because labor force participation is generally lower with females and particularly low with Roma women. We let the female-ethnicity dummies absorb the effect of teenage childbearing.

We find that in 2016, the contrasts between dropouts from families with different parental education and employment, and neighborhoods with high or low Roma share, were not as sharp as in 2011. We find no difference at all between Roma and non-Roma boys in either 2011 or 2016. By contrast, gender differentials were more substantial after than before the reform. Non-Roma and Roma girls' disadvantages amounted to about 10 and 17 percentage points in 2011 and 29 and 22 points in 2016. These estimates capture the effect of teenage childbearing. After controlling for that, the gender gap fell to zero and 6 points in 2011, and 16 and 17 points in 2016. The gender differentials and a huge disadvantage of those challenged by disabilities are the most prominent features of the post-reform year.[20]

8. More on the exposure of Roma youth and their neighborhoods

The results presented so far suggest that lowering the school leaving age severely affected Roma youth. In Table 10, we return to the full samples of the Census and the Microcensus and repeat the descriptive statistics on activity (Table 4), this time breaking down the data by gender end ethnicity.

The first row shows that more Roma boys and girls have graduated before reaching 18 because more of them attend vocational training schools, where education was cut from 4 to 3 years.

Among those who have not graduated, Roma educational participation was significantly lower already in 2011 and fell more by 2016, by 28.3 versus 8.3 percentage points with boys and 15.2 versus 5.2 points with girls. In 2016, 43 percent of the 17-year-old Roma did not attend school, either because they dropped out or finished a shortened and simplified vocational training school.

Participation in out-of-school training was higher among Roma boys and girls in 2011, mainly because those dropped before the age limit of 18 were offered out-of-school training. Efforts to keep the dropouts within the educational and training system apparently weakened after the age limit was lowered to 16.

The expectation that early school leavers will go to work was partly met: the employment ratio of Roma boys and girls jumped from 0.9 to 12.8 percent and 0.2 to 5.1 percent, respectively. However, the same happened to unemployment, which jumped from 1.2 to 11.1 percent (boys), and from 1.8 to 7.1 percent (girls). Growth in the non-Roma population was negligible. The NEET rate increased

[20] We add that the majority of those 17-year-olds who had completed their secondary-level studies before October 2016 were still on their way to employment: 33.1 percent was employed, 31.4 percent continued their studies full-time, 23.5 percent was unemployed, and 12 percent was inactive.

from 10.1 to 24.7 percent (Roma boys), and from 22.6 to 29.6 percent (Roma girls). Compared to these magnitudes, the changes in the non-Roma population were insignificant.

Table 10: Activity of 17-year-old non-Roma and Roma boys and girls in 2011 and 2016

	2011		2016	
	Non-Roma	Roma	Non-Roma	Roma
Boys				
Graduated at the secondary level	0.4	0.7	4.5	4.9
Student – home[a]	89.0	78.2	82.2	53.9
Student – dormitory[b]	8.5	6.0	7.0	2.7
Student, all	97.5	84.9	89.2	56.6
Trainee	0.7	4.1	1.0	1.2
Employed[c]	0.2	0.9	1.6	12.8
Unemployed[d]	0.1	1.2	1.7	11.1
Inactive	1.1	8.9	2.0	13.6
NEET[e]	1.2	10.1	3.7	24.7
Total (of white rows)	100.0	100.0	100.0	100.0
Number of observations	57,817	3,490	4,219	338
Girls				
Graduated at the secondary level	0.3	0.5	2.2	5.4
Student – home[a]	87.9	66.4	83.9	53.0
Student – dormitory[b]	9.0	6.0	7.8	4.2
Student, all	96.9	72.4	91.7	57.2
Trainee	0.9	4.4	1.2	2.7
Employed[c]	0.1	0.2	1.0	5.1
Unemployed[d]	0.2	1.8	0.7	7.1
Inactive	1.8	20.8	3.2	22.5
NEET[e]	2.0	22.6	3.9	29.6
Total (of white rows)	100.0	100.0	100.0	100.0
Number of observations	55,287	3,418	3,875	269

Source: Census 2011, Microcensus 2016
a) Students interviewed at home, or in a dormitory but asked about their families
b) Students interviewed in a dormitory and not asked about their families
c) Based on the ILO-OECD definition. Working students and trainees are excluded
d) Based on the ILO-OECD definition.
e) Not in education, employment or training

While labor force participation increased among Roma youth out of education and training, nearly half of those boys and more than half of those girls who entered the labor market were searching but not finding employment at the time of the Microcensus.

In the paper, we use the Roma population share as a key indicator to characterise the immediate neighborhood (CTs). In Appendix 12, we show that CTs with a high Roma population share (>10%), which accommodate 70 percent of the 17-year-old Roma, are in a disadvantaged position in almost every aspect of neighborhood quality. They are struck by high unemployment, have less available jobs around, are far from schools, doctors, cultural and community institutions, meeting places, and a series of other „amenities". This remains true if we control for settlement size and population

density. In lack of retrospective data, we do not know how and when this „equilibrium" came into being. Even so, we find important to show that speaking about „high Roma share" is tantamount to speaking about depressed, segmented, and often isolated neighborhoods.

9. Discussion and conclusions

A macro-oriented observer may not find the aftermaths of lowering the school leaving age particularly annoying. With an enrolment rate of over 90 percent among the 17-year-olds, Hungary remained in the upper half of the OECD countries' ranking (OECD Statistics 2021) even after cutting the length of compulsory education. The NEET rate stood at 4 percent in 2016, a level fitting the European standards. In the UK, for instance, the rate for the age group 16-17 was 3.7 percent, in 2016, according UK Government (2021).

By contrast, the picture on the Roma minority *is* annoying by any standards. With more than 40 percent leaving the educational system without graduation and more than 25 percent being out of training and employment, Roma youth is exposed to a high risk of recurrent unemployment and poverty – much higher than before the educational and welfare reforms.

The patterns of change do not support the "textbook labor supply scenario", in which low-performing students respond to improving labor market conditions and the freedom to leave choosing work instead of endless suffering in school. Early exit did not concentrate in localities, where unemployment fell or remained low. In 2016, roughly half of the Roma and non-Roma dropouts entering the labor market remained unemployed, and inactivity also increased.

The results yield more support to a "family income scenario" in that the children of unskilled and unemployed families were more likely to quit education before graduation. However, we found no evidence that high/rising unemployment markedly contributed to this outcome.

Failure to find such an effect implies that we cannot distinguish between the "family income scenario" and the educational system's increased (and openly encouraged) inclination to discard laggards. The implications of these two scenarios are observationally equivalent unless local unemployment affects the children of unemployed and employed families differently.[21]

Two findings improve the odds of an "exclusion scenario". (i) Roma origin has a substantial net contribution to pre-graduation exit, holding personal and family characteristics constant (b) Roma

[21] We experimented with interacting an unemployed family dummy with the level and change of unemployment, and found no significant interaction effect in the controlled equations.

dropouts search for jobs much more intensely than their non-Roma counterparts. In 2016, the job seeker/NEET ratio was 11.9 percent for non-Roma boys and 44.9 percent for Roma boys. The respective ratios were 17.9 and 24 percent for girls. In a "family income" scenario, such an outcome would hint at a massive misperception (on the part of Roma and only Roma families) of the school-leaving child's labor market prospects.

Responding to school failure (and to the difficulties of dealing with hard-to-teach students) by exclusion has a long tradition in Hungary (Nagy 2009). The school system was and still is one of the most segregated ones in Europe. As shown in Jenkins et al. (2008), analyzing PISA 2006, the impact of family background on test scores was nowhere as strong within the OECD as in Hungary. The percentage of variance in student performance explained by socio-economic background was highest in Hungary in the PISA 2009 sample. (OECD 2010, Vol. II, Figure 3.2). Hungary had the highest ratio of *between schools* to *total* variance in student performance (OECD 2007).

Furthermore, using TIMSS and PIRLS data, Csapó et al. (2009) demonstrated that a large part of what seemed to be within-school variance, at first sight, came from between-class and between-premises variance. The practice of routing disadvantaged children to segregated schools and classes affected the Roma minority disproportionately. Havas and Liskó (2005) estimated that while there was a twofold increase in the share of Roma children in primary schools between 1980 and 2003, the number of 100 percent Roma classes grew by a factor of eight. They found the percentage of Roma children to be 30 percent in regular classes, 15 percent in special classes for high-achievers, and 70 percent in special classes for low-achievers.

The educational reform of 2011-2013 openly broke up with previous efforts of integrating difficult pupils, despite some promising results (Kézdi and Surányi 2009). The vision of an economy hungry for unskilled and semi-skilled blue collars, and the promise of driving early school leavers to jobs, undoubtedly reduced the pressure on schools to cope with their hard-to-teach students.

Comparing pre-reform and post-reform cohorts, Hermann (2020) found that while enrolment at age 16-18 fell substantially, the fraction graduating by age 19 did not fall. In other words, the pre-reform and post-reform dropouts had roughly equal chances to graduate, but the post-reform school leavers left education at a younger age. Similarly, observations by Hajdu et al. (2014) and Kézdi (2021) suggested that Roma students' probability of graduating was lower even after controlling for their 8th-grade test scores, 10th-grade achievement, and 11th-grade expectations of completing the closing exam. As we put forward in the Introduction, failure to attend school at age 16-17 is a problem, even so, menacing with a series of individually and socially harmful consequences.

Is there any lesson from the Hungarian experience for a broader audience? We think that the risk of falling enrolment and growing unemployment is present in all countries, especially those fragmented along ethnic dimensions, struck by severe inequalities, and lacking efficient institutions to support school-to-work transition. In such countries, lowering the school leaving age is a perilous adventure.

References

Acemoglu, Daron and Joshua Angrist (2001): How Large are the Social Returns to Education? Evidence from Compulsory Schooling Laws. NBER WP 7444. DOI 10.3386/w7444

Adamecz-Völgyi, Anna, Ágota Scharle (2020): Books or babies? The incapacitation effect of schooling on minority women. Journal of Population Economics volume 33, 1219–1261

Aloise-Young, Patricia A. and Ernest L. Chavez (2002): Not all school dropouts are the same: Ethnic differences in the relation between reason for leaving school and adolescent substance use. Psychology in the Schools, Volume 39, Issue 5, September 2002, Pages: 489-604

Anderson, D. Mark (2010): In School and Out of Trouble? The Minimum Dropout Age and Juvenile Crime, Review of Economics and Statistics 96(2). DOI:10.2139/ssrn.1544003

Angrist, Joshua, Alan B. Krueger (1991): Does Compulsory School Attendance Affect Schooling and Earnings? The Quarterly Journal of Economics, Volume 106, Issue 4, November 1991, Pages 979–1014, https://doi.org/10.2307/2937954

Arulampalam, Wiji, Paul Gregg and Mary Gregory (2001): Introduction: Unemployment Scarring. The Economic Journal. Vol. 111, No. 475, Features (Nov., 2001), pp. F577-F584 (8 pages)

Blackwell, Matthew, Stefano Iacus, Gary King and Giuseppe Porro (2010): cem: Coarsened Exact Matching in Stata, February 22, 2010 https://gking.harvard.edu/files/gking/files/cem-stata.pdf

Brunello, Giorgio and Maria De Paola (2004): The costs of early school leaving in Europe. IZA Journal of Labor Policy 3(1). December 2014. DOI:10.1186/2193-9004-3-22

Brunello, Giorgio, Margherita Fort, and Guglielmo Weber (2009): Changes in Compulsory Schooling, Education and the Distribution of Wages in Europe, The Economic Journal, Volume 119, Issue 536, 1 March 2009, Pages 516–539, https://doi.org/10.1111/j.1468-0297.2008.02244.x

Comiskey, Catherine M. (2003) Young People, Drug Use and Early School Leaving: estimating the prevalence, assessing the impact and assisting policy and planning, Drugs: Education, Prevention and Policy, 10:2, 159-168, DOI: 10.1080/01973760290011824A

Csapó, B., Molnár, Gy., & Kinyó, L. (2009). A magyar oktatási rendszer szelektivitása a nemzetközi vizsgálatok tükrében [Analysis of the Selectiveness of the Hungarian Educational System in International Comparison]. Iskolakultúra, 4, 3–13.

Cseres-Gergely, Zsombor and György Molnár (2014): Közmunka, segélyezés, elsődleges és másodlagos munkaerőpiac https://www.tarki.hu/adatbank-h/kutjel/pdf/b331.pdf

Csillag, Márton (2020) Unemployment Among Labour Market Entrants. In: The Hungarian Labour Market 2019. Institute of Economics, Centre for Economic and Regional Studies, Budapest, pp. 95-98.

Del Bono, Emilia & Galindo-Rueda, Fernando, 2004. "Do a Few Months of Compulsory Schooling Matter? The Education and Labour Market Impact of School Leaving Rules," IZA Discussion Papers 1233, Institute of Labor Economics (IZA).

Dragone, Davide, Giuseppe Migali, Eugenio Zucchelli (2021): High School Dropout and the Intergenerational Transmission of Crime, IZA DP No. 14129

EFILWC (2012): NEETs young people not in employment, education or training: characteristics, costs and policy responses in Europe, European Foundation for the Improvement of Living and Working Conditions, Dublin, Ireland.

Esch, P., Bocquet, V., Pull, C. et al. The downward spiral of mental disorders and educational attainment: a systematic review on early school leaving. BMC Psychiatry 14, 237 (2014). https://doi.org/10.1186/s12888-014-0237-4

ESPAD Group (2020): ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs, EMCDDA Joint Publications, Publications Office of the European Union, Luxembourg

Fazekas, Károly, Márton Csillag, Zoltán Hermann, Ágota Scharle (eds 2019): The Hungarian Labour Market. Statistical Data. https://kti.krtk.hu/wp-content/uploads/2020/09/lmyb2019_stat.pdf

Hajdu Tamás–Kertesi Gábor–Kézdi Gábor (2014): Roma fiatalok a középiskolában Beszámoló a Tárki Életpálya-felmérésének 2006 és 2012 közötti hullámaiból. Megjelent: Kolosi Tamás–Tóth-István György (szerk.): Társadalmi Riport. Tárki, 265–302. o.

Havas, G., & Liskó I. (2006). Óvodától a szakmáig [From kindergarten to vocational education]. Budapest: Oktatáskutató Intézet – Új Mandátum.

Hermann Zoltán (2018): A családi pótlék iskolába járáshoz kötésének hatása az iskolába járásra és az iskolai teljesítményre, MTA TK Gyerekesély Műhelytanulmányok 2018/1, MTA TK, Budapest

Hermann Zoltán (2020): The impact of decreasing compulsory school-leaving age on dropping out of school. In: Fazekas, K; Csillag, M; Hermann, Z; Scharle, Á (szerk.) The Hungarian Labour Market – Review and Analysis 2019. Budapest, Magyarország : Institute of Economics, Centre for Economic and Regional Studies, pp. 70-77.

Jenkins, S.P., Micklewright, J., & Schnepf, S.V. (2008). Social Segregation in Secondary Schools: How Does England Compare with Other Countries? Oxford Review of Education, 34(1), 21–38.

Kemény István – Janky Béla – Lengyel Gabriella A MAGYARORSZÁGI CIGÁNYSÁG 1971–2003, Gondolat – MTA Etnikai-nemzeti Kisebbségkutató Intézet, Budapest, 2004

Kende, Ágnes (2021): COMPARATIVE OVERVIEW OF THE CAPACITY OF THE EDUCATION SYSTEMS OF THE CEE COUNTRIES TO PROVIDE INCLUSIVE EDUCATION FOR ROMA PUPILS Agnes Kende Hungary, Poland, Romania, Serbia, and Slovakia. CEU Center for Policy Studies, Discussion Papers 2021/3.

Kertesi, G., & Kézdi, G. (2010). Segregation of Primary Schools in Hungary. A Descriptive Study Using Data from the National Assessment of Basic Competencies of 2006. In K. Fazekas, A. Lovász & Á. Telegdy (Eds.), The Hungarian Labour Market 2010 (99–119). Budapest: IE HAS, Hungarian Employment Foundation.

Kertesi, Gábor and Gábor Kézdi (1999): A cigány népesség Magyarországon. Dokumentáció és adattár. (The Gypsy Population in Hungary. Documentation and Statistics.) Socio-typo, Budapest, 1999

Kertesi, Gábor and Gábor Kézdi (2011): Roma employment in Hungary after the post-communist transition. Economics of Transition, 19(3), 563–610, July 2011 https://doi.org/10.1111/j.1468-0351.2011.00410.

Kézdi, Gábor (2021): A MAGYARORSZÁGI ROMA FIATALOK LEÉRETTSÉGIZÉSÉNEK ESÉLYEIRŐL [On Hungarian Roma youth's chance of graduation], in: Köllő, J. (ed) Kertesi 70. https://kti.krtk.hu/wp-content/uploads/2021/04/Kertesi-G%C3%A1bor_70-%C3%A9ves.pdf, pp 17-30, April 2021

Kézdi, Gábor and Éva Surányi (2009): A Successful School Integration Program. An Evaluation of the Hungarian National Government's School Integration Program, 2005–2007. Roma Education Fund. http://www.romaeducationfund.hu/documents/OOIH_english_kezdi.pdf

Krekó, Judit, Tamás Molnár, Ágota Scharle (2020) Active Labour Market Instruments Targeting Young People and the Youth Guarantee Programme. In: The Hungarian Labour Market 2019. The Hungarian Labour Market . Institute of Economics, Centre for Economic and Regional Studies, Budapest, pp. 105-109.

Krekó, Judit, Márton Csillag, Balázs Munkácsy, Ágota Scharle (2021): Can a short-term job trial programme kick-start young jobseekers' career? Evaluation of the 90-day job trial in Hungary. Budapest Institute for Policy Analysis, February 2021

Lochner , L. and Moretti , E. (2004). The effect of education on crime: evidence from prison inmates, arrests and self-reports, American Economic Review , vol . 94 , pp . 155 – 89 .

Machin, Stephen J. and Marie, Olivier and Vujic, Suncica, The Crime Reducing Effect of Education (May 2011). The Economic Journal, Vol. 121, Issue 552, pp. 463-484, 2011.

Manski, C (1993): Identification of Endogenous Social Effects: The Reflection Problem, Review of Economic Studies, Vol. 60, No. 3, 1993, pp. 531–542.

Mártonfi, György (ed. 2011): A 18 éves korra emelt tankötelezettség teljesülése és (mellék)hatásai. Oktatáskutató és Fejlesztő Intézet, Budapest. https://mek.oszk.hu/12900/12982/12982.pdf

Matrix (2014): Roma Health Report. Health status of the Roma population. Data collection in the Member States of the European Union. European Union, 2014. ISBN 978-92-79-37904-8 DOI 10.2772/3140. https://ec.europa.eu/health/sites/health/files/social_determinants/docs/2014_roma_health_report_en.pdf

Molnár, György (2020): Youth in Public Employment, with Particular Emphasis on Early Secondary School Leavers. In: The Hungarian Labour Market 2019. The Hungarian Labour Market . Institute of Economics, Centre for Economic and Regional Studies, Budapest, pp. 115-120.

Nagy, J. (2009). Renewing primary education. In K. Fazekas, J. Köllő & J. Varga (Eds.), Green Book for the Renewal of Public Education in Hungary (61–80). Budapest: Ecostat.

OECD (2007). PISA 2006 Science competencies for tomorrow's world. Paris: OECD.

OECD (2010). PISA 2009 Results: Overcoming Social Background: Equity in Learning Opportunities and Outcomes (Volume II). Paris: OECD.

OECD Statistics (2021): Enrolment rate by age. https://stats.oecd.org/Index.aspx?DataSetCode=EAG_ENRL_RATE_AGE

Oreopoulos P (2006), Estimating average and local average treatment effects of education when compulsory schooling laws really matter, American Economic Review, 96 (1): 152-175.

Rosenberg M, Pettifor A, Miller WC , et al. (2015): Relationship between school dropout and teen pregnancy among rural South African young women. Int J Epidemiol. 2015;44(3):928-936. doi:10.1093/ije/dyv007

Sebők, Anna (2019) The Panel of Linked Administrative Data of CERS Databank = A KRTK Adatbank Kapcsolt Államigazgatási Paneladatbázisa. Budapest Working Papers On The Labour Market (BWP – 2019/2) . Institute of Economics, Centre for Economic and Regional Studies, Budapest.

Skirbekk, Vegard (2005) The Impact of a Lower School Leaving Age and a Later Retirement on the Financing of the Norwegian Public Pension System. Documents 2005/1. Statistics Norway, February 2005

Svraka, András (2018). The Effect of Labour Cost Reduction on Employment of Vulnerable Groups - Evaluation of the Hungarian Job Protection Act. Munich Personal RePEc Archive Paper No. 88234. https://mpra.ub.uni-muenchen.de/88234/12/mhv.pdf

UK Government (2021): Young people not in education, employment or training (NEET). https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment/datasets/youngpeoplenotineducationemploymentortrainingneettable1

Varga Júlia (2017): A Közoktatás Indikátorrendszere 2017, szerk. Varga Júlia, MTA Közgazdaság- és Regionális Tudományi Kutatóközpont Közgazdaság-tudományi Intézet, Budapest, https://www.mtakti.hu/wp-content/uploads/2018/02/A_kozoktatas_indikatorrendszere_2017.pdf

Varga, Júlia (2018): A készségek és az oktatás követelményrendszere (Skills and education in knowledge-based society), Magyar Tudomány 179(2018)1, 69–76. DOI: 10.1556/2065.179.2018.1.8

Ward, Shannon, Jenny Williams, and Jan C. van Ours (2020): Delinquency,Arrest and Early School Leaving. OXFORD BULLETIN OF ECONOMICS AND STATISTICS, 83, 2 (2021) 0305–9049 doi: 10.1111/obes.12393

Woodhead, Chris (2011): Lower leaving age to 14, says Woodhead, The Guardian, https://www.theguardian.com/education/2002/nov/19/schools.uk5 , Letöltve 2021.01.18.

Appendix 1: Data sources and availability

Census. The Census covers all dwellings in Hungary. A questionnaire is filled in with each person living in (or absent but regularly returning to) the home. The records contain personal, household-level, and dwelling-level information. The reference day of the 2011 census was October 1. See http://www.ksh.hu/nepszamlalas/?lang=en

Microcensus. The Microcensus covered a 10 percent random sample of dwellings in Hungary. A questionnaire was filled in with each person living in (or absent but regularly returning to) the home. The records contain personal, household-level, and dwelling-level information. The reference day of the 2016 Microcensus was October 1. The Central Statistical Office (CSO) attached weights to the observations to ensure representativity. See https://www.ksh.hu/mikrocenzus2016/?lang=en

Labor Force Survey (LFS). The LFS is a quarterly survey conducted since 1992 q1 by the CSO. It covers a random sample of dwellings in Hungary. The number of individuals interviewed ranged between 30 and 50 thousand. The LFS has a rolling panel structure with each cohort staying in the survey for six quarters and then replaced with a new cohort. The surveyed persons are identifiable across waves. The CSO attaches weights to the observations to ensure representativity. https://ec.europa.eu/eurostat/cache/metadata/EN/employ_esqrs_hu.htm

Wage Survey (WS). The WS is an annual LEED survey conducted by the Public Employment Service in 1986-2018 and the Central Statistical Office since 2019. The survey covers all employees and employers in the public sector, all firms employing more than 20 workers, and a random sample of businesses employing 20 or fewer workers. In private firms employing more than 50 workers, the individual data relate to a random sample of the workers. In the case of smaller firms and the public sector, the data cover all employees. The sample covers 100-200 thousand employees, depending on the year. The key variables are gender, age, education, work experience, occupation, wages, firm size, ownership, sector, and location. The cases are weighted to ensure representativity. See more at https://adatbank.krtk.mta.hu/en/nmh-bertarifa-felvetel/

Admin3. A LEED panel built by the CERS Databank, which covers a 50 percent random sample of the population aged 0-74 in January 2003. People are followed until December 2017 on a monthly basis. Data from the Pension Directorate, Tax Authority, Health Insurance Fund, Public Employment Service, and the Office of Education have been merged after hash-coding the original person and firm IDs. The key variables include gender, date of birth, place of residence, health proxies, sick pay, date of retirement, date of death, employment relationship, days in work, amounts earned, 4-digit occupational code, employer ID (hash-coded), sales revenues, exports, fixed assets, depreciation, material costs, wage costs, ownership shares, registration at a labor office, UI and UA benefits., pension, disability payments, child care benefit, school attendance, college/university attendance, type of educational institution, and test scores at grades 6, 8 and 10. The latter data originate in the National Assessment of Basic Competencies (NABC) linked to the Admin3 panel. See details in Sebők (2019) and https://adatbank.krtk.mta.hu/en/admin3-2003-2017/

GEO. Geo is a census tract (CT) level database built by the CERS Databank, the CSO, CEU and three private companies (Geox, Terra and Antares-NAV). The CT-level variables calculated using the 2011 Census are supplemented with a matrix of availability by driving and public transport. Distances are calculated in terms of travelling time and costs, including the shadow price of travelling time. See more at https://adatbank.krtk.mta.hu/en/geo-szamlalokorzeti-adatbazis/

TSTAR. Tstar is a municipality-level register put up by the CSO in 1990. It contains annual data on infrastructure, businesses, public institutions, tax base, unemployment by education, among others. https://adatbank.krtk.mta.hu/en/ksh-teruleti-statisztika-t-star/

Data access

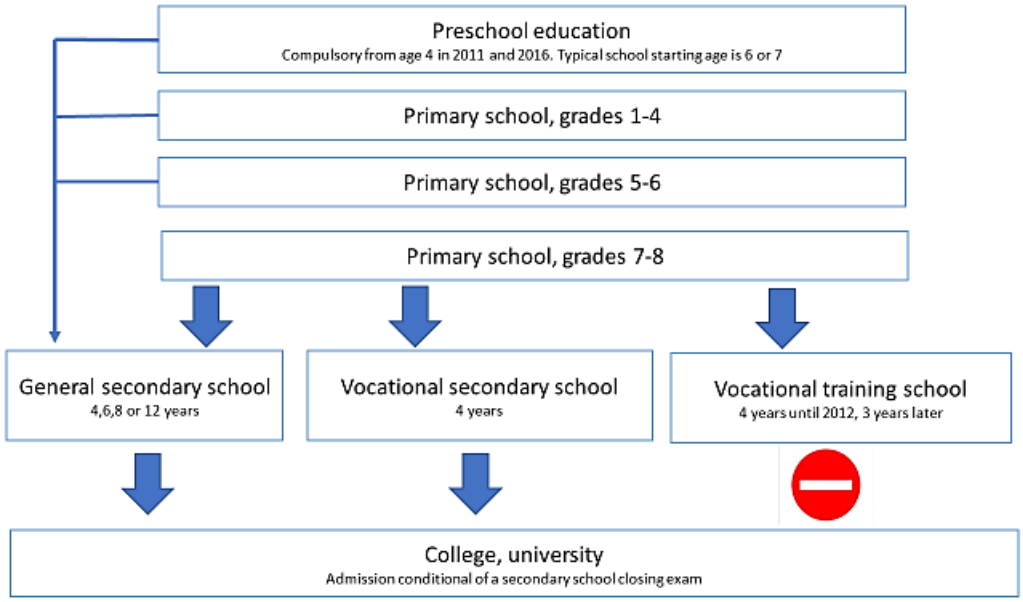
Census and Microcensus. This research was undertaken in a Research Room jointly operated by the CSO and the CERS Databank. On the rules of access see https://adatbank.krtk.mta.hu/en/-kutatoszoba/tudnivalok/ The Room can only be used in person, under camera surveillance, and the results should go through an output checking procedure. The CERS Databank starts Referee Projects and Replication Projects to ensure that the data and Stata codes can be checked. The Databank treats the names of the referees confidential, and helps in finding a local partner to do the required checks. You can initiate a project via adatkeres@krtk.mta.hu. The Stata do-files are available on request.

LFS and Wage Survey. The limited variable set used in this research is made available on the Databanks' server via remote access. Apply for access at adatkeres@krtk.mta.hu

Admin 3 will be available for a broader circle of users from February 1, 2022 via remote access. Until then, a Referee Project can be initiated that makes the part of the data used in this research available via remote access.

TSAR and GEO are unconditionally available.

Appendix 2: The Hungarian educational system



Note that schools (including the 1st grade in primary schools) are free to admit students from outside their school districts, and children are free to apply to schools outside their school district. Schools run by churches are not obliged to accept students living in their district.

Appendix 3: Students in dormitories

As explained in Section 3, some students (interviewed in dormitories) were not asked about their families and place of living in the 2011 Census. The place of permanent living is only known at the municipality level. To assess the direction of bias, the regressions in Table A3.1. estimate the probability of school attendance in 2011 using only municipality-level contextual variables. The estimates are close to each other. Notably, the main effects of Roma affiliation are close to each other. The full effects at rS=1 (a fully segregated settlement, composed of 100 percent Roma and non-Roma CTs) are -0.237 and -0.247. We conclude that the bias from restricting the analysis to youngsters living in families is not strong.

Table A3.1. Regression estimates of school attendance for all 17-year-olds and excluding students interviewed in dormitories (2011)

Dependent: full-time student	With students in dormitories	Without students in dormitories
Girl	-0.016***	-0.019***
	(13.8)	(15.5)
Roma	-0.173***	-0.164***
	(22.5)	(20.3)
Roma segregation index (rS)	0.002	0.003
	(0.3)	(0.6)
Roma*rS	-0.064**	-0.083**
	(1.8)	(2.5)
Municipality level unemployment rate (logU)	-0.021***	-0.021***
	(17.1)	(15.9)
Settlement size (logPOP)	0.007*	0.002
	(1.8)	(0.6)
Settlement size squared	-0.000	1.2e-0.6
	(0.7)	(0.01)
Constant	0.883	0.913
aR2	0.075	0.071
Number of observations	107,806	93,251

Source: Census 2011

Appendix 4: Imputing Roma affiliation

As mentioned in Section 3, 11.8 percent of the 17-year-old respondents in 2011 and 0.7 percent in 2016 did not answer the question on ethnicity. We predicted the probability that a non-respondent is Roma by estimating probit equations with the following right-hand side variables: gender, disabilities, mother, educational level of the highest-educated parent, employment status of the parents, CT-level Roma share, and a principal component comprising variables like the CT-level share of adobe houses, no running water, no WC, separation from the core of the settlement, fraction living in a "run-down" environment according to the interviewer, and the number of firms and CT-s available using public transport in a profitable way (average unskilled wages in the accessed firms and CT-s net of the monetary and time costs exceed the income from benefits and expected PW wage). The probits estimated the probability of being Roma rather precisely (pseudo R2 of 0.33 in

2011 and 0.27 in 2016). We considered a non-respondent non-Roma if (i) she/he lived in a CT with no (self-reported) Roma inhabitants. (ii) the prediction fell short of 50 percent.

Appendix 5: Census tracts in the Census and the Microcensus

In the 2016 Microcensus, the CSO deliberately over-represented CTs in small municipalities and/or with a high Roma share. A CT with a one standard deviation higher share of Roma had a 3 percent higher likelíhood to make it to the sample. A CT in a settlement bigger by one standard deviation had a lower likelihood by 3 percent. The resulting bias was corrected by the CSO in the phase of weighting. A CT's probability of making it to the 2016 sample was unrelated to school attendance in 2011. The estimates are available on request.

Appendix 6: Matched and unmatched cases

We matched cases in the Census and the Microcensus exactly by gender and Roma ethnicity, and using coarsened values of settlement size (with the cut points being 500, 5000, 50000, and 250000), municipality-level unemployment rate (0.05, 0.17), and the CT level Roma share (0.01, 0.05, 0.1).

Table A6.1. Mean of the key variables in the entire and matched samples

	2011		2016	
	Matched	Total	Matched	Total
Full-time student	0.967	0.967	0.923	0.923
Girl	0.490	0.489	0.485	0.487
Disabilities	0.065	0.065	0.080	0.080
Mother	0.011	0.011	0.012	0.012
Max edu=primary[a]	0.229	0.241	0.150	0.150
Max edu=vocational	0.270	0.267	0.247	0.246
Max edu=secondary	0.292	0.286	0.329	0.328
Max edu=tertiary	0.210	0.205	0.273	0.275
Two parents, both work	0.462	0.466	0.487	0.488
Two parents, one works	0.211	0.208	0.214	0.214
Two parents, none works	0.141	0.139	0.163	0.162
One parent, works	0.125	0.126	0.093	0,093
One parent, does not work	0.061	0.061	0.044	0.044
Roma	0.056	0.059	0.072	0.073
CT Roma share=0	0.443	0.438	0.435	0.436
CT Roma share 0-5%	0.383	0.384	0.388	0.387
CT Roma share 5-10%	0.067	0.069	0.070	0.069
CT Roma share>10%	0.107	0.109	0.108	0.107
Unskilled NUTS4 unemployment	0.204	0.209	0.121	0.120
- St. Dev.	(0.128)	(0,133)	(0.084)	(0.084)
Gain from graduation	0.183	0.190	0.099	0.099
- St. Dev.	(0.249)	(0.256)	(0.105)	(0.105)
Number of observations	116,011	119,604	7312	7386

a) Educational level of the highest-educated cohabitating parent

Appendix 7: The Bridge program

Parallel with the cutting of the age limit the government launched a program to help children not continuing their studies after primary school or dropping out of vocational or secondary education. The program called *Híd* (Bridge) provides general and vocational training. The initiative soon lost

momentum. In October 2016, 960 16 year-olds and 478 17 year-olds participated nationwide, which compares to 4,570 and 7,256 youth out of school in these age categories, or 10.4 and 6.6 percent, respectively. Annual drop-out rates from the *Bridge* are exorbitant: 36.7 and 63.6 percent in the full-time and part-time programs in 2016, respectively (Varga 2017, table C2.6.1.) Given its minuscule size, the *Bridge* program seems to be of marginal importance.

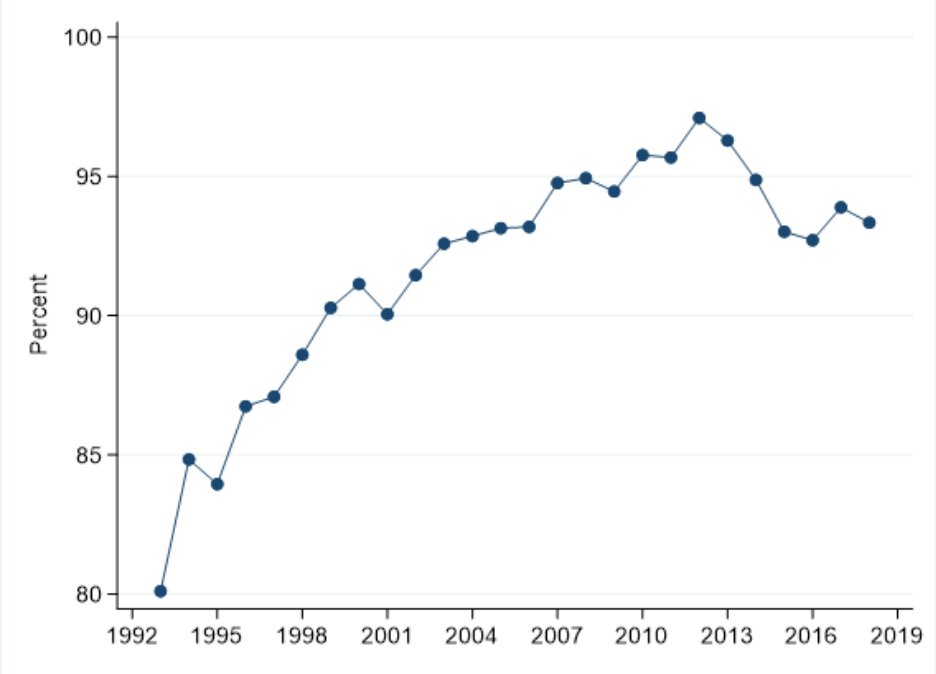
Table A7.1. Size of the Bridge program in October 2016

	Age reached in 2016		
	16	17	18
Bridge program participants[a]	960	478	135
Persons out of full-time education			
Microcensus[b]	3451	7448	11,015
Percent in Bridge	27.8	6.4	1.2
Office of Education[c]	4570	7256	12,299
Percent in Bridge	21.0	6.6	1.1

a) All programs: Bridge Public Education, Bridge Vocational, Bridge II
b) Persons already having secondary school attainment are excluded.
Estimate: sum of the weights provided by the CSO
c) Persons not appearing in the Kirstat register
Data sources: Tables *a4tanu* and *a04t21* of the Kirstat data base, Microcensus, and Admin3.

Appendix 8: School attendance at age 17, 1993-2019

Figure A8.1.: Fraction of 17-year-olds in full-time education 1993-2020



Source: Authors' calculation using the LFS. The annual figures are unweighed averages of the first, second, and fourth quarter values. The measuring of school attendance during the summer vacation changed more than once, making the third quarter values ill-suited for inclusion to long time series.

Appendix 9: Summary statistics of the NABC sample

Table A9.1: 8th grade test results, and selected answers to the background questionnaire
Sample: 17-year-olds in/out of school in 2011 and 2016, who answered the NABC test and the questionaire at the 8th grade[a]

	Full-time student in October			
	2011		2016	
Selected indicators of their 8th grade NABC survey	Yes	No	Yes	No
Mathematics level (scale 1-7)	3.7	3.3	3.9	2.7
	(1.4)	(1.4)	(1.5)	(1.4)
Reading level (scale 1-7)	4.1	3.6	4.1	2.8
	(1.4)	(1.4)	(1.4)	(1.4)
7th grade year-end score (scale 1-5)	4.0	3.6	4.0	3.2
	(0.8)	(0.7)	(0.7)	(0.7)
In-school tutoring for poor-performers (%)	29.2	36.3	28.7	41.2
Repeated class before the 8th grade (%)	6.7	12.1	4.7	13.4
Fifty of less books at home (%)	27.3	37.6	28.5	64.1
Less than two years in kindergarten (%)	3.8	4.8	1.9	5.1
Attends the local school (%)	66.9	70.0	63.0	78.0
Attends a standard course (%)[b]	70.6	75.6	73.3	81.8
Wants to complete vocational training school or less (%)	12.0	20.4	9.5	43.5
Wants to complete college or university (%)	53.0	34.5	53.4	14.5
Standardized family background index[c]	0.01	-0.32	0.08	-1.01
	(1.0)	(1.04)	(0.96)	(1.07)
Free meal in school (%)	4.0	5.6	23.8	59.2
Subsidized meal in school (%)	26.6	23.4	23.8	36.4
Lives in a poor neighborhood (%)[d]	10.0	14.2	12.0	25.7

Source: Admin3 data base, 50 percent random sample of the population
a) NABC: National Assesment of Basic Competences
b) About one-third of the 8th graders attend classes specialized in certain subjects (science, language, arts). These classes typically provide better-than-average tuition.
c) The index is computed by the Office of Education using stepwise linear regressions with test scores on the left hand and various NABC indicators on the right hand. On the basis of the parameters, the indicator considers the number of books (weight=10), parents' level of education (11), computer at home (17), and own books (33). The index is standardized to have zero mean and unit standard deviation.
d) Majority are very poor or poor according to the respondent.

Appendix 10: Roma and non-Roma adults moving between municipalities in 1993-2001

The 2001 Census recorded the year when respondents moved to their current place of living. We first select the respondents, who (i) left their place (municipality) of birth any time between birth and 2001 (ii) moved to their year-2001 place of living between 1993 and 2001. Second, we calculate the year-2001 employment to population ratios of the respondent's place of birth (e^B) and place of living (e^C). Third, we regress $Q=ln(e^C/ e^B)$ on Roma ethnicity, year-of-move dummies, gender, age and education. Q>0 suggests that the current living place is better in terms of employment probability than the place of birth. The estimation is restricted to people aged at least 16 in 1993 to include the movements of secondary-school-age youth. Note that the 2001 census did not allow multiple ethnic affiliations: respondents had to decide if they are Roma or "Hungarian." This practice resulted in a downward-biased estimate of the Roma population.

The negative coefficients in Table A10.1 suggest that Roma people, compared to the non-Roma, tended to move toward low-employment municipalities.

Table A10.1. Roma's direction of between-municipality moves in 1993-2001
Regression estimates

Dependent variable: year-2011 employment to population ratio of the year-2001 place of living relative to the year-2011 employment to population ratio of the place of birth (log)

	Uncontrolled[a]	Controlled
Roma	-0.123***	-0.054***
	(36.0)	(15.9)
F	216.6***	2251.9***
aR2	0.003	0.034
Number of observations (recent movers)	-------- 1,202,012 -------	

a) Only controlled for year-of-move dummies
b) Also controlled for gender, age in 2001, and level of education dummies

Appendix 11: First stage F-tests of the IV models in Table 6

Table A11.1. First stage F-tests of the IV models in Table 6

	Uncontrolled		Controlled	
	2011	2016	2011	2016
U^P, IV	3837.0	270.8	1015.5	77.1
dG, IV	1749.3	269.3	1006.7	77.1
dU^U, IV	..	207.5	..	76.5
dG, IV	..	265.5	..	76.3

All tests are sgnificant at 0.01 level

Appendix 12: Roma share, institutions, and the availability of amenities around census tracts

In the paper, we use the Roma population share as the key indicator of CTs. As shown in Table A12.1., the vast majority (71.1 percent) of the 17-year-old Roma live in CTs with a Roma share above 10 percent (and a mean share of 38.4 percent).[22]

Table A12.1. Roma population share in CTs, and the share and distribution of Roma youth

	Roma population share (all age groups)			
	0	0-5%	5-10%	>10%
All 17-year-olds (headcount)	52,351	45,844	8,280	13,017
Roma share within 17-year-olds (percent)	0	2.4	11.3	38.4
Distribution of 17-year-old Roma (percent)	0.0	15.6	13.3	71.1

Source: Census 2011

In this Appendix, we show that CTs with a high Roma share (>5% and >10%) are in a disadvantaged position in almost every aspect a researcher or a policy-maker can be interested in. They are struck by high unemployment, have less available jobs around, are far from schools, doctors, cultural and

[22] Recall that the number of people regarded as Roma by external judgement is substantially higher than the number of those, who reported Roma ethnicity in the Census. Roma (by external judgement) most probably consitute a majority in the „dense" Roma CTs.

community institutions, meeting places, and a series of other „amenities". This remains true if we control for settlement size and population density.

In lack of retrospective data, we do not know how and when this „equilibrium" came into being. Even so, we find important to show that speaking about „high Roma share" is tantamount to speaking about depressed, segmented, and often isolated neighborhoods. The magnitudes are shown in Table A12.2. Before turning to the figures, we explain some less trivial concepts used in the table.

CT population. The boundaries of CTs were set by the CSO so as inteviewers can approach each dwelling in the district within a limited time frame. Consequently, CT population is a proxy of population density. In rural areas loosely spotted with farms interviewers can meet few people, while in a tower block they can approach many.

Unemployment. We calculate the unemployment rate (unemployed within the economically active) in each CT by the level of education using census data.

Labor market quality. We use GEO, a data set of 45,500 CTs, a matrix of commuting times and costs from one CT to another, and firm-level information on vacant jobs and wages, to estimate vacancy/job seeker ratios for quasi-individuals (with different educational levels) living in a CT. The reference year is 2011. In this paper, travelling by public transport is considered.[23]

We calculate the labor market quality indicator (Q henceforth) for a particular education level (people with primary school attainment in this example) in the following way:

Job seekers. Job seekers (U_i) are unemployed people living in a given CT. Their number is known from the census. We assume that all of them live in the population-weighted geographical center of the CT.

Jobs. We observe j=1,2,…,J employers in the country, which offer three type of jobs k=1,2,3 at wage rates w_{j1}, w_{j2},w_{j3}. The shares of low-educated people in the three types of jobs are γ_{j1}, γ_{j2}, γ_{j3} respectively. These data are observed for firms employing more than 20 workers and budget institutions and estimated for smaller ones.

Alternative income. Unemployed persons can earn benefits (b) and income from public works (w^P). Their income could be supplemented with intake from black work (α_0). The amount of the unemployment assistance benefit is known, and the probability of being called to do public works (φ_0) is observed on the municipality level.

$$(1) \quad y_0 = (1+\alpha_0)[\varphi_0 w^P + (1-\varphi_0)b]$$

Commuting. The commuting cost from CT=0 to firm j is c_{0j}. The cost is composed of the price of a season ticket and foregone earnings during the travel, evaluated using data on education-and-region specific net wages. The job seeker applies to job k in firm j if (2) holds:

$$(2) \quad w_{jk} - c_{0j} > y_0$$

[23] GEO was built by a joint effort of the CSO, the Academy of Sciences, CEU and three business firms. For a description of)the data and their availability see https://adatbank.krtk.mta.hu/en/geo-szamlalokorzeti-adatbazis/

Rivals. This job is available for unemployed people living in other ($i \neq 0$) CTs, if (3) holds:

(3) $w_{jk} - c_{0j} > y_i \;\; \forall\, i > 0$

Define a dummy a_{ijk} equal to 1 if $w_{jk} - y_i - c_{ij} > 0$, and 0 otherwise. The total number of applicants for job *jk* is:

(4) $$A_{jk} = \sum_{i=0}^{I} \sum_{n=1}^{N_i} a_{ijkn}$$

where N_i is the number of unskilled unemployed in CT *i*.

Vacancies. Consider all employers for whom $w_{jk} - y_0 - c_{0j} > 0$ holds, that is, the relevant environment of an unskilled job seeker in CT_0. Denote this set with H. A firm in H has L_{jk} jobs in the three occupations. A part of these jobs is vacant: $V^*_{jk} = v_{jk} L_{jk}$. We approximate v_{jk} on the basis of net employment change in 2010-2011 and/or the number of newly hired workers, where this figure is available, Not all jobs are open for unskilled job seekers. We assume that the likelihood of admission is proportional to the γ_{jk} shares:

(5) $$V_{jk} = \gamma_{jk} V^*_{jk} = \gamma_{jk} v_{jk} L_{jk}$$

The number of profitably accessible vacant jobs in set H is:

(6) $$V^H = \sum_{j \in H} \sum_{k=1}^{3} V_{jk}$$

The estimated number of applicants for these jobs is:

(7) $$A^H = \sum_{j \in H} \sum_{k=1}^{3} A_{jk}$$

We measure the quality of the unskilled labor market surrounding CT_0 as Q^H:

(8) $$Q^H = V^H / A^H$$

Assuming $\alpha = 0.2$, the mean of Q^H for unskilled job seekers is 3.1 percent with a standard deviation of 2.9 percent. The indicator is high if (i) the job seeker can access many jobs, or (ii) can access just a few, but the jobs are inaccessible for others. The indicator varies within municipalities. In the case of Nemesvámos (a small Trans-Danubian village), for instance, Q varies between 3.9 and 6 percent.

Amenities. Lists of institutions and amenities relevant for the well-being of a CT are incomplete, often missing, unreliable, and typically unavailable for 2011. Therefore, we collected selected points of interest (POI) around each CT using current (2020) data in OpenStreetView. As a second step, we selected the closest POI, and used GEO to estimate the time needed to approach it using public

transport, or by walking. Finally, we set a dummy to 1 if the POI was available within 35 minutes (applying 30 or 40 minutes do not change the qualitative results).

Table A12.2. Roma population share, unemployment, labor market quality, and the availability of selected amenities – CT-level regression estimates

				CT Roma share. Reference: 0			
	lntPOP	lnPOP	Bpest	0-5	5-10	>10	Const.
U1	-0.01	0.04	-0.03***	0.05***	0.12***	0.15***	0.22
	(1.1)	(1.3)	(8.5)	(22.0)	(32.2)	(40.1)	
U2	-0.00***	-0.02***	0.002	0.02***	0.05***	0.11***	0.24
	(3.3)	(7.4)	(1.3)	(15.7)	(22.9)	(35.0)	
U3	-.0.00***	.0,01***	.0,04***	0.01***	0.03***	0.07***	0.19
	(4.6)	(3.6)	(3.6)	(10.6)	(13.0)	(20.9)	
Q1	-0.01***	-0.03***	0.00***	-0.00***	-0.01***	-0,01***	0.13
	(32.8)	(5.7)	(12.1)	(8.6)	(7.3)	(15.2)	
Q2	-0.02***	-0.01***	0.00**	-0.02***	-0.04***	-0.07***	0.49
	(28.1)	(3.8)	(2.4)	(12.0)	(10.7)	(21.7)	
Q3	-0.02***	-0.01***	-0.08***	-0.02***	-0.03***	-0.08***	0.72
	(31.5)	(4.0)	(16.6)	(8.9)	(6.6)	(16.6)	
Kindergarten	0.04***	0.09***	0.02***	.0.00	-0.03***	-0.07***	0.07
	(42.3)	(19.3)	(11.0)	(1.3)	(4.5)	(8.4)	
School	0.01***	0.07***	0.01***	-0.00	-0.02***	-0.04***	0.50
	(21.0)	(18.1)	(8.5)	(0.4)	(3.5)	(6.8)	
College	0.09***	0.01*	0.55***	-0.01**	-0.03***	-0.03***	-0.59
	(64.2)	(1.9)	(107.0)	(2.3)	(4.3)	(5.1)	
University	0.14***	0.01	0.36***	-0.03***	-0.04***	-0.03***	-0.91
	(109.6)	(1.4)	(80.3)	(5.9)	(5.7)	(3.6)	
Doctors	0.05***	0.09***	0.07***	-0.02***	-0.07***	-0.13***	-0.03
	(42.8)	(18.4)	(27.2)	(4.5)	(7.9)	(13.4)	
Pharmacy	0.03***	0.07***	0.00	-0.01***	-0.04***	-0.10***	0.28
	(35.3)	(18.3)	(0.6)	(3.1)	(5.6)	(12.3)	
Dentist	0.11***	0.07***	0.17***	-0.04***	-0.13***	-0.18***	-0.66
	(81.4)	(14.2)	(51.6)	(9.1)	(12.5)	(18.8)	
Hospital	0.12***	0.06***	0.10***	-0.03***	-0.08***	-0.08***	-0.69
	(90.1)	(13.7)	(35.6)	(6.0)	(8.3)	(8.5)	
Fire station	0.10***	0.05***	0.12***	-0.0	-0.04***	-0.07***	-0.49
	(71.4)	(10.7)	(36.6)	(0.9)	(4.9)	(7.5)	
Police	0.07***	0.09***	0.01***	-0.01**	-0.05***	-0.10***	-0.20
	(58.3)	(19.3)	(6.4)	(2.2)	(5.3)	(10.3)	
Bookshop	0.14***	0.04***	0.20***	-0.04***	-0.12***	-0.16***	-0.92
	(111.0)	(10.9)	(60.2)	(9.7)	(13.3)	(18.4)	
Library	0.06***	0.08***	0.03***	-0.01***	-0.07***	-0.12***	-0.06
	(52.8)	(16.4)	(12.1)	(3.5)	(7.8)	(12.4)	
Cinema	0.14***	0.01	0.16***	-0.02***	-0.06***	-0.06***	-0.72
	(106.6)	(1.3)	(39.2)	(4.3)	(5.8)	(6.6)	
Community center	0.04***	0.07***	0.05***	-0.02***	-0.05***	-0.08***	0.17
	(38.9)	(15.0)	(22.0)	(3.9)	(6.4)	(9.4)	
Museum	0.04***	0.07***	0.03***	-0.01***	-0.06***	-0.10***	0.16
	(42.3)	(14.7)	(14.9)	(2.8)	(6.8)	(11.4)	

Theatre	0.12***	0.03***	0.17***	-0.04***	-0,10***	-0.15***	-0.64
	(90.0)	(6.9)	(50.1)	(7.9)	(10.2)	(16.3)	
Pub	0.00***	0.05***	0.01***	0.00**	-0.00	-0.02***	0.69
	(9.5)	(15.8)	(10.5)	(2.0)	(0.9)	(4.3)	
Bar	0.11***	0.06***	0.13***	-0.04***	-0.09***	-0.11***	-0.61
	(87.7)	(12.4)	(42.1)	(9.5)	(9,3)	(11.4)	
Restaurant	0.02***	0.06***	0.00***	-0.01***	-0.03***	-0.08***	0.43
	(28.8)	(17.0)	(3.5)	(3.0)	(5.4)	(11.6)	
Fast food	0.04***	0.09***	0.02***	-0.01***	-0.06***	-0.14***	0.08
	(41.5)	(20.2)	(8.3)	(4.5)	(7.6)	(15.3)	
Biergarten	0.07***	-0.01	0.50	-0.01***	-0.05***	-0.05***	-0.33
	(47.7)	(1.7)	(79.2)	(2.9)	(6.6)	(6.5)	
Café	0.05***	0.08***	0.03***	-0.02***	-0.09***	-0.16***	0.01
	(48.1)	(17.5)	(14.0)	(7.2)	(10.5)	(16.4)	
Sports center	0.07***	0.09***	0.02***	-0.01***	-0.07***	-0.11***	-0.22
	(58.2)	(20.0)	(10.3)	(2.8)	(7.8)	(11.7)	
Stadium	0.13***	-0.00	0.30***	-0.00	-0.03***	-0.02**	-0.77
	(100.0)	(0.4)	(64.2)	(0.0)	(3.7)	(2.1)	
Swimming pool	0.09***	0.06***	0.04***	-0.01***	-0.07***	-0.13***	-0.28
	(68.0)	(13.3)	(15.3)	(3.8)	(8.0)	(13.0)	
Park	0.02***	0.07***	0.01***	-0.00*	-0.03***	-0.07***	0.41
	(28.5)	(17.8)	(7.0)	(1.9)	(4.6)	(9.5)	
Playground	0.03***	0.07***	0.02***	-0.01***	-0.05***	-0.09***	0.34
	(31.4)	(17.1)	(11.7)	(3.9)	(7.6)	(11.5)	
Mall	0.14***	0.04***	0.18***	-0.04***	-0.12***	-0.14***	-0.95
	(122.4)	(9.9)	(56.3)	(9.8)	(-13.0)	(17.0)	
Supermarket	0.05***	0.08***	-0.00	-0.01**	-0.05***	-0.09***	0.10
	(44.7)	(19.4)	(1.7)	(2.0)	(6.7)	(10.7)	

U1-U3: CT-level unemployment rate with primary, vocational and secondary education, respectively (2011)
Q1-Q3: an indicator of labor market tightness. See the text. (2011)
lntPOP: log of the municipality's population (2011)
lnPOP: log of the CT's population, a proxy of population density (2011)
Bpest: Budapest
Availability of amenities: the indicator is set to one if the closest amenity is available within 35 minutes using public transport (or walking) and set to zero otherwise.
Data sources: Census 2011, MTA GEO 2011, Open StreetView (2020)

The rows of Table A12.2. summarize regression estimates with different dependent variables on the left hand, and log settlement size, log CT population, a Budapest dummy, and three dummies for CT-s with different Roma shares, on the right-hand side.

The estimates indicate substantially higher unemployment and lower labor marker tightness, at all educational levels, in "dense" Roma CTs. The probability of finding an educational institution with 35 minutes is lower by 3-7 percentage point. For doctors, pharmacies and dentists, the disadvantage amounts to 10-18 percentage points. Police and fire stations are located farther-than-average from the CT. The likelihood to access cultural institutions is lower by 6 to 16 percentage points. For sports centers, swimming pools, parks and playgrounds the estimates are in the range of 9-16 percentage points. Malls and supermarkets are far away. The only amenity, for which availability does not differ from the average (a disadvantage of only 2 percentage points) is the local pub.