IN FOCUS

LABOUR MARKET AND HEALTH

Edited by
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INTRODUCTION

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The chapters of *In Focus* examine the relationship between health status, access to health care and the labor market situation (economic activity, employment, earnings, labour market conditions) in Hungary. This relationship is complex: health status affects individual productivity and expected earnings on the one hand, and work-related disutility on the other. Thus, in line with classical labour economic theory, health shocks have a measurable effect on an individual's labour market position. (In fact, not only adult health shocks but also the health status in early childhood has a consequential impact, see, e.g. the summary of *Almond et al.,* 2018). In the other direction, the labour market situation and working conditions have direct (e.g. through accidents at work) and indirect (e.g. through the access to health care) effects on health. The regulatory environment, the level of welfare benefits, and the quality of the health care system all influence both directions of this relationship.

An extensive international literature exists on the topic (see, for example, the summary articles of *Barnay,* 2016*, Currie–Madrian,* 1999*, Prinz et al.,* 2018), and the novelty of the studies of *In Focus* lies in the related analyses on Hungary. These are largely based on a uniquely rich administrative database compiled by the Databank of the Centre for Economic and Regional Studies [CERS (KRTK)], which contains anonymized labour market and health data on a random sample of half of the Hungarian population (*Sebők,* 2019). The Admin3 database (supplemented with other administrative data) provides an opportunity to examine questions that could not be properly answered previously for Hungary. The chapters of *In Focus* are not intended to explore every detail of the complex relationship between health and the labour market, but they do provide insight into some elements of the two-way relationship and also emphasize the role of the regulatory environment.

Chapter 1 of *In Focus* examines the extent to which the worse health status of the Hungarian population may explain the lower employment compared to the European average, and also provides a descriptive analysis of the relationship between health status and employment in Hungary. The studies in Chapter 2 explore labour-market-related, regional, and socioeconomic inequalities in mortality and morbidity (and myocardial infarction as a special case), informal payments, and private health care use, and some of their possible causes.

The further chapters of *In Focus* discuss the two-way relationship between work and health in different life situations. Chapter 3 deals with the health of the employed population. Subchapters 3.1 and 3.2 examine the differences in

health expenditure by labour income and by the ownership of the firm of the employee (domestic/foreign). Subchapter 3.3 analyses the most direct indicator of the impact of the workplace conditions on health, the frequency of accidents at work across industries, types of companies and occupational groups. Related to this, a box illustrates how differences in accident probabilities can be used to estimate the statistical value of life. Another box provides an additional example of the health impact of workplace conditions by showing that the smoking ban in hospitality venues has measurably improved the health of newborns of pregnant women employed there. Subchapter 3.4 deals with the incentive effects of the tightening of the sickness benefit system during the previous years. In addition, separate boxes address two specific topics: the impact of developments of the health care system on workers, and the health of migrants. The two studies of Chapter 4 analyse the health status of health care workers and the out-migration of physicians from Hungary.

The topic of Chapter 5 is the impact of unemployment on health. Subchapter 5.1 examines the health consequences of economic crises and job losses; 5.2 deals specifically with the long-term health effects of economic shocks following the transition in Central and Eastern Europe, and a separate box analyses the health expenditure of public works employees. Of the studies in Chapter 6, Subchapter 6.1 presents the two-way relationship between health care use and old-age retirement, while Subchapter 6.2 investigates the labour market implications of the increase in demand for end-of-life palliative care.

The first study in Chapter 7 discusses the employment of people with disabilities in Hungary in a European comparison (a box covers related measurement problems) and then reviews the demand-side policy instruments to increase employment (detailing the impact of the rehabilitation contribution in a separate box). The second study analyses the supply side and in particular the effects of changes in the regulation of disability and rehabilitation benefits.

The topic of Chapter 8 is the young age group. The administrative data in Hungary do not yet make it possible to measure the effects of childhood health shocks on subsequent labour market performance, but the related international literature is presented in a box. Based on Hungarian data, Subchapter 8.1 shows how children's time spent in hospital affects their later school performance – which in turn is likely to influence their subsequent success in the labour market. Subchapter 8.2 illustrates the impact of young people's labour market conditions on health by estimating the relationship between settlement-level labour market conditions and adolescent pregnancies.

The manuscript was finalised during the second wave of the coronavirus pandemic in Hungary, so we could not yet undertake a full analysis of its health, labour market, economic and educational consequences. The first study in Chapter 9 provides a general overview of the health-economic trade-offs in decision-making that have arisen during the pandemic and briefly evaluates

the public policy measures applied in Hungary during the first half of the year. The second study, based on the latest available data, reviews the effects on the labour market so far, also addressing heterogeneity across social groups.

We hope that the studies of *In Focus* provide interesting results from a policy point of view and point to a number of questions on which further research might be conducted in the future.

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1 HEALTH AND LABOUR FORCE STATUS IN HUNGARY AND EUROPE

ANIKÓ BÍRÓ, RÉKA BRANYICZKI & ZSÓFIA KOLLÁNYI

In this subchapter, we provide an overview on how the population health in Hungary compares to the European Union average and how strong the relation is between labour force status and health in Hungary and in other European countries. We base the analysis both on survey and administrative data. The topics discussed in this subchapter are covered in more details in later subchapters of the volume.

Health status in Hungary in a European comparison

The average health status of the Hungarian population is not good in a European comparison. In terms of life expectancy at birth, only Latvian, Lithuanian, Bulgarian and Romanian men are in a worse state than Hungarian men, and only Romanian and Bulgarian women than Hungarian women. Hungarian men lag 8.5 years behind Italy, the EU member state with the highest LE, while Hungarian women lag 6.5 years behind the best performing Spanish women.[1] The situation is somewhat better in terms of healthy life expectancy: Hungarian men are ahead of one third of the European countries, and women are in the middle of the range. However, on average, Hungarian men can expect good health only until the age of 60, and Hungarian women until the age of 62, both before the retirement age, as opposed to, for example, the Irish, Maltese and Swedish populations, where on average both men and women can enjoy good health till the age of 70 or even more.

> Differences in total and healthy life expectancy between countries draw attention to the methodological characteristics of the measure of healthy life years. This indicator is based on subjective self-assessment and can therefore be influenced by a number of external factors, such as the health status of reference groups, or knowledge about health itself. This may explain the quite large differences between countries in terms of the "non-healthy" life years, which is only 7–8 in Sweden and Bulgaria, and more than 22 in Austria. These differences may be rooted in objective differences in health status but can also be caused by differences in the perception and evaluation of health.

The population-level health status indicators (such as average life expectancy for all males and females), however, mask the inequal distribution of health status across different groups in a society, although there are significant differences between European countries in this respect. In Hungary, as in all Visegrad countries, there are enormous differences between the health status of different social groups, while in the Scandinavian or Mediterranean countries

1 Life expectancy at birth data are based on the Eurostat [demo_mlexpec] data set, healthy life expectancy data are based on the Eurostat [hlth_hlye] data set. Both refer to 2018 (downloaded: July 2020).

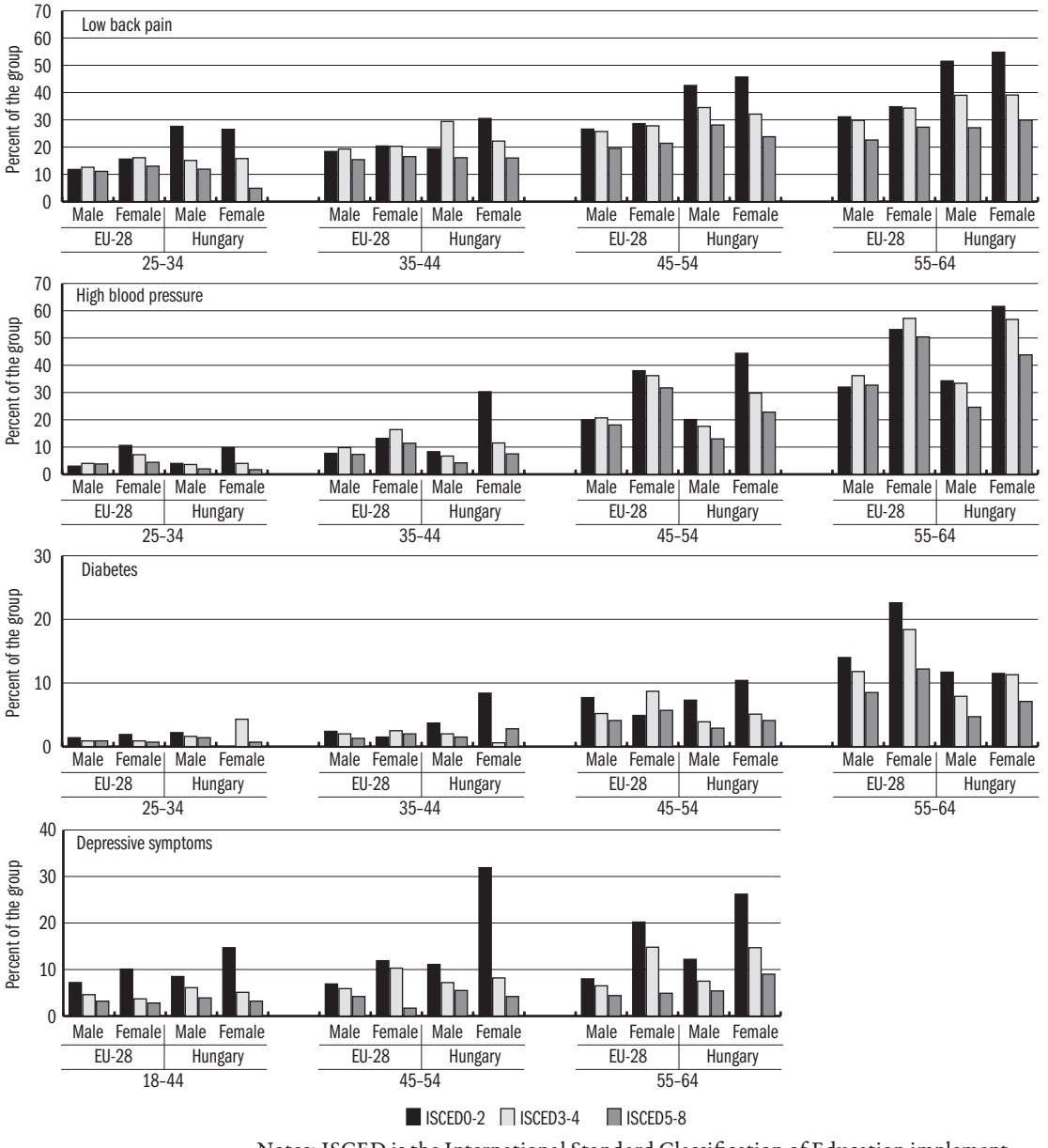
these differences are particularly low (*Orosz–Kollányi*, 2016). This means that Hungary's disadvantage in terms of average health status presented above does not stem from an overall poorer health of everyone in the society, but specifically from the severe disadvantages of those with lower socioeconomic status (SES). While Hungarian men with tertiary education as the highest level of educational attainment are, for example, only 4–5 years behind Swedish or Italian men with the same educational attainment; in the case of poorly educated Hungarian men (with lower-secondary education at most) this disadvantage is twofold, 11–12 years. Accordingly, in Hungary, the difference between those with low and high educational attainment is much larger. In Italy, a man with tertiary education can expect 4, in Sweden, 4.5 years longer life than a man with lower-secondary education at most: in Hungary, this difference is 11 years.[2]

Below, we present the incidence of three chronic physical health problems (low back pain, diabetes, hypertension) and one mental condition (depressive symptoms) by education and age, based on data from the 2014 wave of the European Health Interview Survey (EHIS) for the adult population. Diabetes and hypertension are the most common non-communicable diseases, and are major risk factors for or closely related to leading causes of death; low back pain, on the other hand, does not appear directly in mortality data, but can significantly impair quality of life and one's labor supply. All these measures are based on self-reported indicators. In the case of physical illnesses, respondents were asked directly if they have the illness/symptoms in question, while in the case of depressive symptoms, they were asked various indirect questions regarding their mood and well-being. This makes a significant difference between the two types of indicators: a person to be able to report a pronounced chronic illness either has to have a medical diagnosis, or has to have sufficient information and knowledge regarding both their own health and the condition in question. Because those with higher socioeconomic status are typically in a better position in terms of both access to health care and knowledge about health (*White et al*, 2009), we can assume that regarding diabetes and high blood pressure the indicator is more accurate among those with higher social status, and underestimates the frequency of actual illness in those with lower SES. In the case of low back pain and depressive symptoms, we should expect less of such a distortion.

Figure 1.1 clearly shows that for both sexes, in all three educational groups and in all age groups, almost without exception, these diseases are more common in Hungary than in the EU28 average. This means not only that more people fall ill, but also that these diseases appear in Hungary at a typically younger age. For example, in the EU28, prevalence of high blood pressure in men in all three education groups reaches a frequency of 30% only among those aged 55–64 years, while in Hungary a 30% prevalence appears ten years earlier, in the age group of 45–54 years.

2 The data are from Eurostat's "Life expectancy by age, sex and educational attainment level" [demo_mlexpecedu] data set and refer to 2017.

Figure 1.1: Prevalence of certain physical conditions and depressive symptoms by country group, sex, age group and educational attainment level, 2014



Notes: ISCED is the International Standard Classification of Education implemented by Eurostat. ISCED0–2 level refers to those with lower-secondary education at most (eg. vocational training with no high school diploma); ISCED3–4 level refers to those with upper-secondary and post-secondary non-tertiary education; while ISCED 3–5 level refers to different levels of tertiary education.

Data sources: *Eurostat* [hlth_ehis_cd1e] and [hlth_ehis_mh1e] datasets; aggregated data from *European Health Interview Survey*.

At the same time, significant social inequalities can be detected in Hungary, for example, in relation to diabetes and low back pain. Among lowly-educated men, the proportion of those living with diabetes in the age group of 55–64 is almost twice as high as among those with tertiary education in the same age group, while there is no such difference detectable in the EU28 average: the prevalence of diabetes in these two educational groups is almost the same. The pattern of low back pain in the EU28 average is very similar in all education groups, with some gender differences; in Hungary, this complaint appears in a much younger age, and is more widespread among the uneducated (30% of 25–34 year old, female and male, report low back pain, while this proportion is only 5–10% among graduates in this age group). However, in terms of high blood pressure no such difference can be detected in the youngest examined age group in Hungary either.

The pattern of depressive symptoms among those under 45 and those aged 55–64 is similar in the two country groups, except that differences in education and gender are much more pronounced in Hungary. At the same time, the outstanding values of low-skilled Hungarian women in general, and especially in the age groups of 45–54 years deserve closer attention. In this group, the incidence of depressive symptoms is three times as prevalent as either among EU28 women with similar educational attainment, or as among low-skilled Hungarian men. When speaking of health status, we mostly think of physical rather than mental health, which is sadly consistent both with the perception and attitudes of the Hungarian population towards mental illness (*Sztancsik*, 2017) and with the quality of the Hungarian health care system's capacity to treat mental illness (*Turnpenny et al*, 2017). However, as can be clearly seen on *Figure 1.1,* and as will be outlined later in this subchapter, mental health is a crucial element of the complex system surrounding health status, both in terms of the socioeconomic determinants and the socioeconomic effects of health.

Employment and health among older adults in a European comparison

The SHARE[3] (*Survey of Health, Ageing and Retirement in Europe*) is a rich data source about the health and labour market participation of people above age 50. SHARE provides internationally harmonized, multidisciplinary panel data about the health, employment, and socio-economic status of the European Union's member states' population above age 50, which are collected bi-annually and are available free of charge. We compare the health of working and non-working older adults using SHARE data.

Hungary joined the SHARE project in 2011 (wave 4) and the next data collection took place in 2017 (wave 7), when from the 3000 original respondents approximately 1500 once again participated.[4] As the Hungarian sample

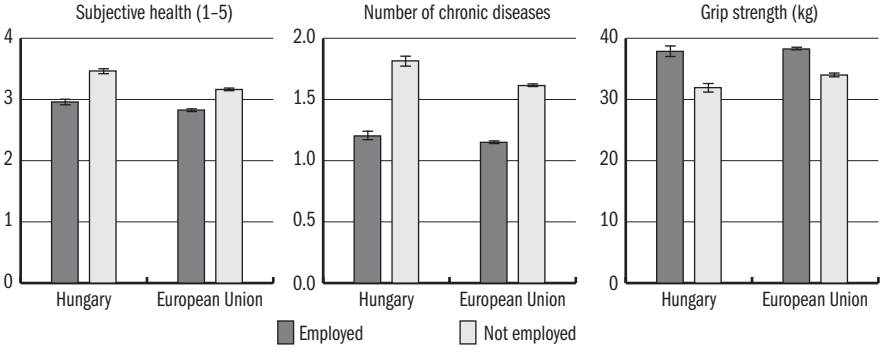
3 We use data from SHARE waves 1, 2, 3, 4, 5, 6 and 7, see *Börsch-Supan et al* (2013) for methodological details. The SHARE data collection has been primarily funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARE-LIFE: CIT4-CT-2006-028812) and FP7 (SHARE-PREP: N°211909, SHARE-LEAP: N°227822, SHARE M4: N°261982). Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064, HHSN271201300071C) and from various national funding sources is gratefully acknowledged (see www.share-project.org).

4 Countries covered by wave 7 of SHARE: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Netherlands, Croatia, Ireland, Poland, Latvia, Lithuania, Luxembourg, Hungary, Malta, Germany, Italy, Portugal, Romania, Spain, Switzerland, Sweden, Slovakia, Slovenia. (Israel also participated, however it is not included in our analysis as it is outside Europe.)

from 2017 only includes panel respondents from 2011, we cover the population above age 57; there are 453 respondents who are active-aged, that is below 65, 267 women and 186 men. In the following paragraphs we compare the health of the older but active-aged group between age 57 and 64, based on their employment status. Employed people were defined as those who reported to be working (as an employee or self-employed), while the category 'not employed' included old-age pensioners, the unemployed and homemakers. The long-term sick and the disabled were not included in our analysis. Our Hungarian sample contains 170 employed individuals and 230 individuals who are not employed.[5]

The SHARE database includes several health-related indicators: self-reported general health of respondents, number of chronic diseases, and occurrence of various diseases. Results from a grip strength test are also available, which are related to the general physical condition of older adults. *Figures 1.2* and *1.3* show the average value of these indicators among the old yet active-aged population in Hungary and in the other European countries, separately for the employed and not employed groups. We see that older adults who are employed are healthier on average both in Europe and in Hungary. We also observe that Hungarians' health tends to be worse than the European average, especially among the non-employed.

Figure 1.2: Subjective health, number of chronic diseases and grip strength by employment status



Note: Average self-reported subjective health ranging from 1 (excellent) to 5 (poor), average number of chronic diseases, and average grip strength (kilogram) among the population aged 57–64. For each indicator, the 95 percent confidence interval of the mean is presented.
Source: *SHARE* Wave 7.

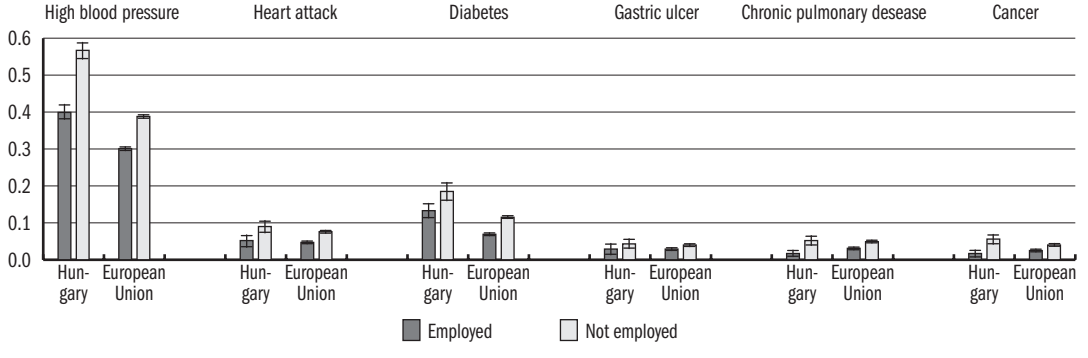
Figure 1.2 indicates that in Hungary the older middle aged who are employed perceive their health as good on average, while subjective health is only between good and fair among the non-employed. The European averages are higher by only a one-tenth of a category in the case of the employed and ap-

5 In a similar study *Bíró et al.* (2019) analyzed women aged 50–59. Here the reported indicators are similar but the results are based on the more recent data of 2017 and refer to the older age group of 57–64, including both men and women.

proximately by a third of a category among the non-employed. In Hungary, the non-employed suffer from close to two chronic diseases on average, while the employed fight only around one disease. The European average is similar to the Hungarian for the employed group, but it is significantly lower among the non-employed. The grip strength test shows that – in line with our expectations – the grip is weaker of the non-employed. We also see that the gap between the Hungarian and European working elderly is negligible, while our lag from the European average is significant, when comparing the non-working groups.

According to *Figure 1.3* a strikingly high share (57%) of the non-working older middle-aged population suffer from high blood pressure in Hungary (compared to the European average of 39%), and in this case the difference is also notable between the non-working groups in Hungary and Europe (40% vs. 30%). The prevalence of heart attack, diabetes and chronic lung disease is higher among the non-employed than among the employed, though the difference is significant only on the larger European sample and not in Hungary. Except for chronic lung disease and cancer, which are exceedingly rare (and significantly rarer) among the working group, in Hungary as well (*Figure 1.3*).

Figure 1.3: Prevalence of diseases by employment status



Note: The average rate of prevalence of diseases among the population aged 57–64. The 95 percent confidence interval of the mean is presented.
Source: *SHARE* Wave 7.

Based on the earlier SHARE sample from 2011, *Kézdi–Divényi* (2012) found that the employability of individuals with the best health and cognitive skills in the 50–59 age group in Hungary is similar to the European average, while the employability of those in a worse condition is lagging behind. They showed that the gap between the Hungarian and German employment rate decreases once we control for cognitive skills and health next to demographic indicators. Partly reproducing these linear models (where the dependent variable is employment of the individual) on the same data, we found that the 20 percentage points difference between the employment of women aged 50–59 in

Hungary and Germany would decrease to 12 percentage points if both the demographic composition and the health of the population were to correspond to the German average (*Bíró et al*, 2018). Using the more recent data from 2017 and studying both men and women of age 57–64, we again find that the Hungarian employment is 20 percentage points lower than the German, and in this case the difference would be 15 percentage points if the two groups' demographics and health status were to be similar (*Table 1.1*).

Table 1.1: Differences in employment rates between countries, controlling for age, qualification, and the distribution of health, among individuals aged 57–64

	(1)	(2)	(3)
Hungary	−0.200***	−0.165***	−0.152***
	(0.0258)	(0.0254)	(0.0249)
Country dummies (reference: Germany)	yes	yes	yes
Sex and age variables	yes	yes	yes
Educational attainment	–	yes	yes
Indicators of health status	–	–	yes
Number of observations	17,003	17,003	17,003

Note: Robust standard errors in parentheses.
Age variables: age in years and age squared, educational attainment based on ISCED, indicators of health status: number of chronic diseases, grip strength, subjective health.
*** $p < 0{,}01$, ** $p < 0{,}05$, * $p < 0{,}1$.
Source: Authors' compilation based on data from *SHARE* Wave 7.

Employment and health based on administrative data from Hungary

We analyse the relationship between labour force status and health in Hungary, using the administrative dataset (Admin3) of the Centre for Economic and Regional Studies (CERS). The Admin3 includes labour and health related indicators for a 50 percentage element of the Hungarian population. The data was processed by the Databank of CERS and is available for research purposes.[6] We use monthly data between years 2009–2016 and restrict the sample to people aged 20–60. We capture the health status with the help of quarterly indicators of the consumption of drug categories (did the individual purchase any drugs in the given category), where the categories are defined based on the *Anatomical Therapeutical Category* (*ATC*) system. We focus on seven drug categories, capturing various physical and mental health problems: 1) antidiabetics (ATC A10); 2) antihypertensives (ATC C02-09); 3) antibiotics (ATC J01); 4) musculo-skeletal system (ATC M); 5) psycholeptics (including tranquillizers, ATC N05); 6) psychoanaleptics (including antidepressants, ATC N06); 7) drugs for obstructive airway diseases (ATC R03). We also analyse three-year mortality rate. Using linear regressions, we net out gender specific age effects and calendar year effects.

6 A brief overview of the data is provided in the Appendix, a longer description is given by *Sebők* (2019).

It is important to note the following. Firstly, drug consumption has limitations in capturing health status due to differences in health behaviours, in access to care and the imperfections of drug consumption as a health measure.[7] Secondly, our analysis is of descriptive and not causal nature because there are two-way causal relations. Labour force status affects health, while health might also have an impact on labour force status. Further subchapters of this volume provide results related to the mechanisms underlying our findings.

Employment and health

We first analyse, what is the relation between employment and the consumption of the selected drug categories.[8]

The results reported in *Table 1.2* indicate that the relation between employment and health is stronger for mental health than for physical health. Looking at the physical health indicators, diabetes and obstructive airway diseases as indicated by drug consumption imply 6–9 percentage points lower employment rate. We do not see such differences in the case of the consumption of antihypertensives, drugs of the musculo-skeletal system and antibiotics. As for antibiotics, the observed relation is the opposite, the employment rate is 9 percentage points among those who take antibiotics, which might be because those who are employed are more willing to visit a physician so as to maintain their working capacities (and thus take antibiotics).

Table 1.2: Employment rate by drug consumption and three-year mortality (net out gender, age and calendar year effects, percentage)

	Employment rate		Consumption rate in the sample
	consumes	does not consume	
By consumption of antidiabetics (ATC A10)	45.0	51.2	3.1
By consumption of antihypertensives (ATC C02–09)	53.5	50.5	17.0
By consumption of antibiotics (ATC J01)	58.6	50.1	10.9
By consumption of musculo-skeletal system drugs (ATC M)	49.9	51.1	8.3
By consumption of psycholeptics (ATC N05)	20.7	52.0	3.2
By consumption of psychoanaleptics (ATC N06)	35.2	51.5	3.4
By consumption of obstructive airway diseases drugs (ATC R03)	42.6	51.2	2.4
	Employment rate		Three-year mortality rate in the sample
	deceased (3 years)	alive (3 years)	
By three-year mortality	20.6	51.7	1.40

Source: Own calculations based on Admin3 data (2009–2016).

7 For instance, the diagnosis of diabetes varies across groups within the society. Also, the consumption of antidiabetics is not a perfect indicator of diabetes, since antidiabetics can be prescribed for other diseases, as well (such as PCOS).

8 We measure employment with a binary indicator which equals 1 in the case of any kind of employment (including self-employment), conditional on non-zero recorded earnings in the given quarter of the year.

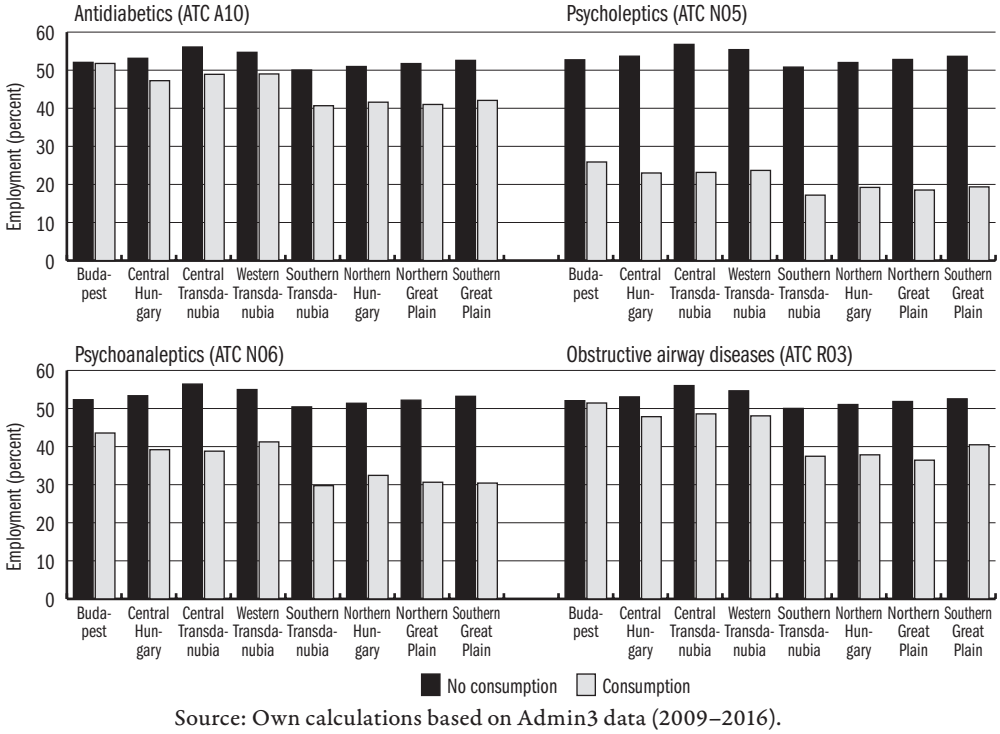
We also see that employment rate is more than 30 percentage points lower among those who died within three years; thus those whose health is the worst.

Heterogeneity by regions

Next, we analyse, if there are regional differences in the relation between employment and drug consumption. We focus on the consumption of those four categories of drugs for which we observed non-negligible differences by employment on the country level.

The results of *Figure 1.4* show that the differences in employment by drug consumption are much higher in Eastern Hungary than in North-West and Central Hungary. The patterns are strikingly different between Budapest and the Eastern regions. Among the healthy individuals (those who do not consume a specific drug), the differences in employment rates among regions are around 1–4 percentage points. On the other hand, among the sick individuals (those who do consume a specific drug), these differences are much higher, comparing Budapest and the Northern Great Plain, the differences are between 7–15 percentage points.

Figure 1.4: Employment rate by drug consumption and regions



Source: Own calculations based on Admin3 data (2009–2016).

Conclusions

In this subchapter, we found, based on European comparisons, that the health of the population of Hungary lags behind the European Union average especially among the less educated and those who are not working. We also found that among the 57–64 year old individuals, the lower employment rate as compared to Germany can be explained only to a small extent by worse health status, while among the 50–59 year-old individuals (based on earlier data), the role of worse health status was much higher in explaining employment differences.

Using administrative data from Hungary, we showed that among those who have physical diseases or mental illnesses (as captured by drug consumption), the rate of employment is substantially lower. These differences are stronger in the case of mental diseases than physical diseases. Finally, we found that in the poorer regions of Hungary, there are stronger differences in employment by health status (as captured by drug consumption).

Overall, it is essential to improve the health of the individuals who are in a worse socio-economic status, in order to decrease the health gap compared to Western Europe, and also to increase the rate of employment.

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2 INCOME, LABOR MARKET AND REGIONAL INEQUALITIES

2.1 INEQUALITY OF MORTALITY AND MORBIDITY BY INCOME

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Individuals of lower socio-economic status (less educated, lower-income individuals) have higher mortality rates and lower life expectancy than individuals of higher socio-economic status. Since mortality data has been collected for a long time in all countries, this robust relationship can be observed in data from many different countries.[1] This relationship is usually strong, though changes in its strength over time are informative about social processes and the situation of various groups. Life expectancy is one of the most important social indicators.

In this subchapter we use the comprehensive national individual-level mortality registers of the Hungarian Central Statistical Office (HCSO), the "admin3" administrative database of the Centre for Economic and Regional Studies (CERS), and settlement-level and microregion-level administrative data on population characteristics and income to examine inequalities in Hungary during the 2011–2016 period in mortality rates, life expectancy, and morbidity. We focus on life expectancy and morbidity inequalities among individuals aged 45 or older (middle-aged and older). Hungary is a high-income country[2] and as such it has successfully decreased mortality and morbidity among younger age groups, which remain problems in lower-income countries.

We are not the first ones to examine these questions. A series of demographic studies has examined the evolution of mortality and differences by socio-economic status (typically proxying with level of education) in the 2000s.[3] We contribute to this literature in several ways. First, we measure inequality using average income, a measure that is relatively universal in space and time. Second, we demonstrate that a large share of inequality by income can be attributed to avoidable (amenable and preventable) causes. This highlights that appropriately targeted health policy interventions could potentially decrease socio-economic inequality in mortality. Third, we show that there are substantial inequalities in income in a number of important health indicators that describe health behavior, access to care, and healthcare use. These differences are strongly associated with life expectancy inequality.

1 See for example *Chetty et al.* (2016), *Marmot* (2005), *Mackenbach et al.* (2018, 2019).

2 See: World Bank.

3 *Bálint–Németh* (2018), *Klinger* (2001), (2003) *Kovács–Bálint* (2014), (2018).

Mortality and life expectancy

Our study is based on the national mortality register of the HCSO. The mortality register contains the gender, age, settlement and cause of death for

each death in Hungary. Based on the cause of death and the age of the deceased, we can identify avoidable (amenable and preventable) and unavoidable deaths (*ONS,* 2011).

The source of settlement-level gender- and age-specific population data is the TSTAR database of the HCSO. We approximate the average income of each settlement using data on per capita domestic income. We view this as a proxy of per capita household income of the residents of the settlement. We calculate mortality rates, life expectancy and per capita income averaged over the 2011–2016 period in order to reduce noise in the data. Based on settlement-level average income, we form 20 ventiles, each of them containing approximately 5% of the population of Hungary. This means that the bottom ventile contains the poorest 5% of the population (by settlement-level income) and the top ventile contains the richest 5% of the population (by settlement-level income).

For each ventile, we first calculate the gender- and age-specific mortality rates based on averaged mortality and population data for the 2011–2016 period. Then we calculate life expectancy using a standard procedure (see *Arias et al*., 2019). To examine the role of avoidable (preventable and amenable) deaths in life expectancy differences across income groups, we calculate an adjusted version of life expectancy. In this exercise, we assume that the avoidable mortality rate of each income ventile is equal to the avoidable mortality rate observed in the richest income ventile, whereas the non-avoidable mortality rate is unchanged. We then recalculate life expectancy. Thus the adjusted life expectancy reflects a counterfactual state where we have removed for differences in age-specific avoidable mortality rates. For more details on life expectancy calculations, see *Bíró et al*. (2020). When calculating mortality rates and life expectancy, we focus on individuals 45 and older.

Figure 2.1.1 shows age-specific mortality rates by income ventile. There are large differences between poorer and richer settlements, among both women and men and in all age groups. At the same time, inequalities are substantially larger among men, both in absolute and relative terms. For example, in the oldest age group (75 and older) the mortality rate of those living in the poorest settlements is 35 percent higher among men than the mortality rate of those living in the richest settlements. The same difference is 18 percent among women. Moreover, for both genders, the income gradient of mortality is larger in younger age groups. In the 45–54 age group, the mortality rate of the poorest and wealthiest settlements differs by a factor of 2.5, in the 55–64 age group it differs by a factor of approximately 2. The difference narrows further in older age groups.

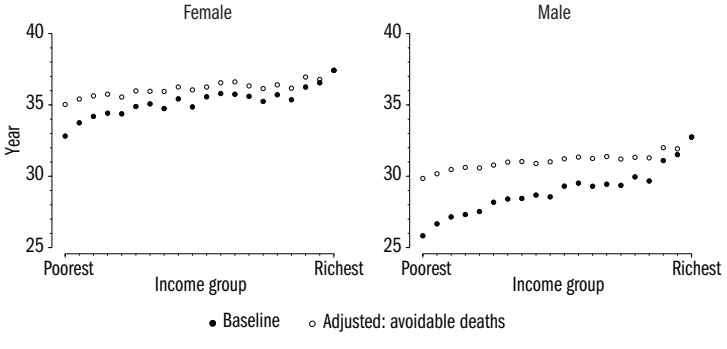
A simple summary of mortality rate inequalities is life expectancy at 45 (*Figure 2.1.2*). Like mortality inequality, life expectancy inequality is also larger among men than among women. Among women, the difference between the

top and bottom income groups is 4.6 years (37.4 years vs 32.8 years) or 14 percent. Among men the difference is 6.9 years (32.7 years vs 25.8 years) or 27 percent. Notably, in the middle of the distribution (between the 5th and the 15th ventiles) life expectancy does not change much: the difference is 0.8 years for women and 1.8 years among men.

Figure 2.1.1: Age-specific mortality rates by settlement-level income

Note: Mortality rates are deaths per 100,000.
Source: Authors' calculation based on *HCSO* mortality register and *TSTAR* database.

Figure 2.1.2: Life expectancy difference at age 45 by settlement-level income



Note: Adjusted life expectancy reflects a counterfactual state where age-specific avoidable death rates in each income ventile are set to the rates observed in the top income ventile. The remaining differences in life expectancy reflect differences in non-avoidable mortality.
Source: *Bíró et al.* (2020).

We examine the role of avoidable deaths with the adjusted life expectancy measure discussed above. If we remove life expectancy differences between the bottom and top income groups caused by avoidable causes of death, the difference decreases from 4.6 years to 2.4 years among women and from 6.9

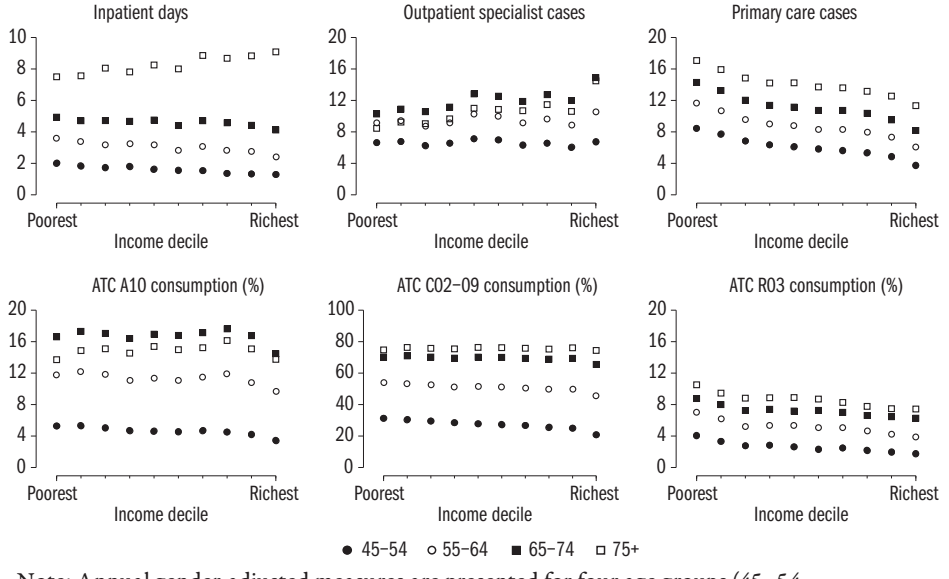
years to 2.9 years among men. This suggests that higher rates of mortality from avoidable causes among lower-income individuals can explain about half of life expectancy differences at age 45. Consequently, health and social policy may have substantial scope to decrease these inequalities.

Healthcare use and morbidity

We examine differences in healthcare use and prevalence of chronic conditions using administrative panel data produced by the CERS Databank ("admin3"). This database contains a quasi-random 50% sample of the Hungarian population.[4] Since this database does not contain settlement-level information, we carry out this analysis at the microregion level. We divide microregions into income deciles using per capita domestic income from the HCSO TSTAR database (each decile contains approximately 10% of the population), and examine inpatient days, outpatient specialist and primary care use, and prescription drug use (focusing on three important groups: insulins and other antidiabetics used to treat diabetes, blood pressure medications, and medications for obstructive pulmonary diseases) by decile.

4 For a short description of the database, see the Appendix of the *In Focus* section. For more details, see *Sebők* (2019).

Figure 2.1.3: Differences in healthcare use and prescription drug consumption by microregion-level income



Note: Annual gender-adjusted measures are presented for four age groups (45–54, 55–64, 65–74, and 75+) averaged over the 2011–2016 period. The bottom panels show the share of individuals who consume at least one prescription in at least three months in the medication group.
ATC groups: A10 – insulins and oral antidiabetics, C02-09: anti-hypertension medications, R03: obstructive pulmonary disease medications.
Source: Authors' calculations based on the admin3 and HCSO TSTAR databases.

The top panels of *Figure 2.1.3* show that primary care use decreases in each age group with increasing income, while outpatient specialist use shows a weakly increasing trend, suggesting that access may play an important role. Inpatient use shows an interesting relationship with income: while between ages 45 and 74 there is a clear negative relationship with the average income of the microregion, above age 75 this relationship is reversed. We observe a similar relationship for blood pressure medications (ATC C02-09 categories): the negative relationship for ages 45 to 64 disappears in the 65–74, and especially the 75+ age group. This may be explained by the finding above that in poorer microregions, mortality is much higher in the 45–64 age groups and the prevalence of chronic diseases (e.g., hypertension) is higher. A similar, though somewhat weaker, relationship can be observed in the consumption of antidiabetic medications (a proxy for the prevalence of diabetes diagnoses). At the same time, consumption of medications for obstructive pulmonary diseases shows a negative relationship with income in all age groups.

Health behaviors and access to care

Finally, we examine several measures of health behaviors, access to care and participation in preventive care to assess the role of these factors in mortality and morbidity inequalities. Our goal is not to uncover causal relationships but to examine the distribution of a large number of indicators by income in a unified framework. We would like to illustrate the scope of health and social policy to decrease inequalities. We examine income-related inequality using the same methods we used for mortality and life expectancy and divide settlements into 20 ventiles. *Table 2.1.1* shows the list and source of the indicators used.

Figure 2.1.4 shows for each indicator the difference between the top and bottom income ventile, standardized by the mean. The two health behavior indicators which exhibit the largest difference are heating with solid fuel only and time spent with sport. The former suggests that air pollution from heating poses a problem for individuals living in poorer settlements. The latter suggests that individuals living in wealthier settlements spend more time with sports than those living in poorer settlements. All other indicators also suggest that individuals in the bottom income ventile are more likely to engage in behaviors that are negatively associated with health (e.g., smoking, consumption of sugary drinks) and less likely to engage in behaviors that are positively associated with health (e.g., consumption of fish and vegetables).

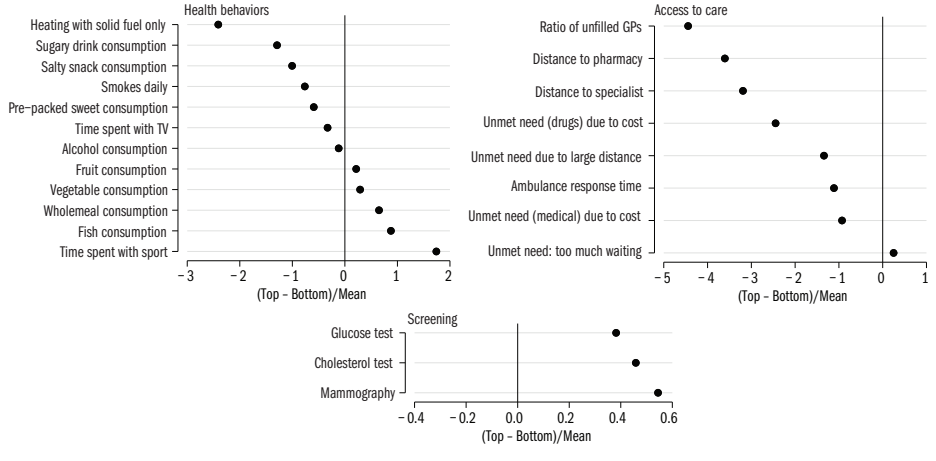
Indicators that characterize healthcare access also show substantial inequality between individuals living in poorer and wealthier settlements. In the settlements in the bottom ventile, unfilled general practices are more widespread, distance to pharmacies and specialist outpatient care units is larger, and wait time for ambulances are longer. Overall, nearly all indicators show that individuals living in poorer settlements have worse access to care.

Table 2.1.1: Indicators of health behavior and healthcare access

Indicator	Note	Data source
Using Solid Fuel	Measured at the household level	2011 Census
Average Daily Amount of Time Spent Watching TV	Measured in minutes among 25 and older	2009/2010 Time Use Survey
Average Daily Amount of Time Spend With Sports	Measured in minutes	2009/2010 Time Use Survey
Consumption of Fish*	Data from 2014 Consumed at least once a week	European Health Interview Survey
Consumption of Prepackaged Sweets*	Data from 2014 Consumed at least daily or almost daily	European Health Interview Survey
Consumption of Sugary Drinks*	Data from 2014 Consumed at least daily or almost daily	European Health Interview Survey
Consumption of Savory Snacks*	Data from 2014 Consumed at least daily or almost daily	European Health Interview Survey
Consumption of Wholemeal*	Data from 2014 Consumed at least daily or almost daily	European Health Interview Survey
Consumption of Vegetables*	Data from 2014 Consumed at least daily or almost daily	European Health Interview Survey
Consumption of Fruits*	Data from 2014 Consumed at least daily or almost daily	European Health Interview Survey
Consumption of Alcohol*	Data from 2014 Medium or high risk category	European Health Interview Survey
Smoking*	Data from 2014 Daily	European Health Interview Survey
Share of General Practices Unfilled	Data from 2016	European Health Interview Survey
Distance from Pharmacy	Data from 2014	T-STAR
Distance from Specialist Clinic	Data from 2014	T-STAR
Ambulance Response Time	Data from 2009 Measured in minutes	*Kemkers et al.,* (2010)
Unmet Need for Medical Care Due to Wait	Data from 2014	European Health Interview Survey
Unmet Need for Medical Care Due to Distance	Data from 2014	European Health Interview Survey
Unmet Need for Medical Care Due to Cost	Data from 2014	European Health Interview Survey
Unmeet Need for Drugs Due to Cost	Data from 2014	European Health Interview Survey
Mammography*	Data from 2014	European Health Interview Survey
Cholesterol Test*	Data from 2014	European Health Interview Survey
Glucose Test*	Data from 2014	European Health Interview Survey

* Data for population aged 25 and above.
For more details, see *Bíró et al.* (2020).

Figure 2.1.4: Inequalities in health behaviors and health care access



Source: *Bíró et al.* (2020).
Values of each indicator by income ventile are presented in *Bíró et al.* (2020).

We examined participation in preventive care using three indicators. For all three indicators, participation in preventive care is higher in the top income ventile. These indicators are co-determined by individual health behaviors and healthcare access.

Summary

This subchapter documented substantial inequalities in mortality rates and life expectancy by income in Hungary. We also showed that about half of this inequality is caused by avoidable causes of death. We found large inequalities in access to care, healthcare use, as well as health behaviors. These inequalities, combined with the role of avoidable deaths suggest that there is substantial scope to decrease these inequalities through health policy interventions. Other subchapters in the *In Focus* section examine further mechanisms that could explain the inequalities reported in this subchapter. Specifically, *Subchapter 2.2* examines morbidity and healthcare spending inequalities by labor market status, *Subchapter K2.1* examines the inequalities in the incidence and treatment of heart failure, and *Subchapter 3.2* examines inequalities by labor income.

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K2.1 Disparities in the occurrence and care of myocardial infarction in the light of labour market correlations*

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There are an average of 15,000 myocardial infarction cases registered annually in Hungary, and the disease causes the death of about 40 percent of the cases, that is, six thousand individuals. According to the data of the National Myocardial Infarction System, approximately a third of patients are under the age of 60; there are 20–25 percent more males among the sufferers than females; and it causes the death of 1.5 times more males than females. Premature mortality due to infarction mostly affects middle-aged males, while females are mostly affected by the disease in an older age (*Jánosi,* 2019). Thus, infarction affects the working-age population substantially, and the local Hungarian disparities in disease occurrence and mortality have serious labour market implications as well.

Improving access, decreasing mortality, increasing territorial differences

The development of up-to-date care for myocardial infarction: the development of the cardiac catheter intervention began in the mid-2000s in Hungary, due to which the mortality rate has dropped by 50 percent. Even though care conditions and access have improved, a controversial situation has come about. The occurrence rate of the disease is still high in European standards, and although the majority of lives are saved, the long-term survival rate has slightly decreased (*Uzzoli,* 2020).

The disparities in the occurrence and care of infarction are observable by location, sex, and the different stages of infarction care. Territorial differences are big within the country: the infarction-related mortality rate of females has increased after the 2008/2009 crisis (*Tóth et al.,* 2018). Higher mortality rates are mainly linked to locations that lie further away from hospitals, such as the regions in the northeast and the southeast, or the regions along the southwest border (*Figure K2.1.1*).

The agglomeration of Budapest is also divided, because the mortality rate can be up to five times higher in the northern and southern areas than in the western parts of the agglomeration. Since the mid-2000s, with the widespread application of the cardiac catheter intervention, the mortality rate has dropped by 50 percent across the country, but this was visible mainly in short-term survival rates while long-term survival rates actually decreased.

At the same time, improved access did not go hand-in-hand with a more substantial decrease in the occurrence of the disease; on the contrary, by the mid-2010s, the occurrence rate of infarction in males slightly increased. Additionally, the occurrence rate of the disease slightly increased among younger age groups as well (those between 40–60) (*Uzzoli et al.,* 2019). Only less than 40 percent of patients participate in rehabilitation, even though it would be essential for the restoration of physical activity and the improvement of survival chances (*Mérték,* 2017).

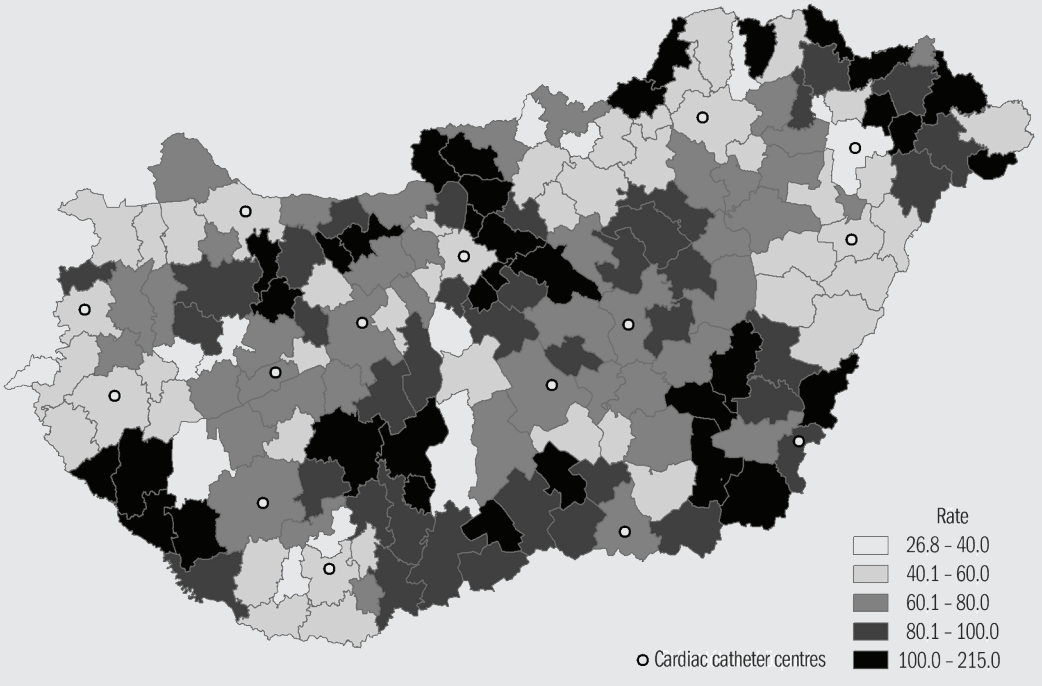
What is the reason behind the fact that an improved access to cardiac catheter interventions did not have an equal effect on all patients? In order to find answers to this question, interviews have been conducted with the key actors of cardiac care (ambulance staff, physicians, nurses, dieteticians, physiotherapists, etc.) and with the patients themselves.

Labour market correlations

The processing of the content of the interviews has contributed numerous factors to the understanding of the correlations between the infarction situation and labour market effects in Hungary. Saving patients under the age of 60 (that is, those of working-age), and then restoring their ability to work,

* The research that forms the basis of this study was conducted with the help of project number K 119574, which was funded by the Hungarian National Research, Development, and Innovation Fund (https://egeszsegugyihozzaferhetoseg.wordpress.com/).

Figure K2.1.1: The standardised mortality rates of acute myocardial infarction in the various districts in 2015 (case/100,000 inhabitants)



Data source: ksh.hu, nefi.hu.

is of national economic interest, as well. There may be a factor of three difference between districts in the occurrence rate of infarction within this age group. The territorial concentration of working-age patients is salient in the border regions of Northeastern and Southeastern Hungary.

According to the unanimous opinion of the healthcare workers and patients who participated in the interviews, the following conditions are relevant, from a labour market perspective, for the occurrence of the disease and the access to cardiac care:

1. Work-related stress: among the risk factors of the disease (such as tobacco use, an unhealthy lifestyle), stress is an essential factor and its root causes can be linked to the workplace to a substantial extent.

"Not only did I fulfill my duties at the workplace, afterwards I had to run to my second job, so that we can make ends meet." (Male patient, 53).

2. Loss of income: frequently, working-age patients do not undertake inpatient rehabilitation (which takes several weeks) so that they can go back to work as soon as possible, decreasing their chances of restoring the quality of life they had prior to the disease.

"Not many are able to carry out a complete lifestyle change, or switch to a different attitude to work, ... because they are worried about their jobs, their livelihoods." (Cardiac nurse with tertiary educational attainment.)

3. Reduction in functional capacity: if the patient does not receive or does not undertake rehabilitation, and does not go through a lifestyle change, the

chances of another infarction and of severe complications are higher. In the short run, these can lead to a reduction of the patient's functional capacity and to a deteriorated labour market status in most cases.

"If it [the rehabilitation] is over, I will start the incapacity process. And then I'll have to look for something. If I won't find the kind of work that they allow, I will still need money... I do not want to neglect myself, at 44, I don't want to spend my life at home." (Female patient, 44.)

A common observation is that the improvement of access to cardiac catheter interventions has brought with it a loss of an individual sense of responsibility. Due to the fast and effective intervention, some patients do not, or barely develop a sense of being ill, which prevents them from following physicians' instructions conscientiously, and is an impediment to a successful cooperation between physician and patient, and to participation in rehabilitation (*Uzzoli et al.* 2019).

Recommendations

Some of the policies that are based on research findings try to draw decision makers' attention to the fact that the further reduction of the occurrence of infarction and of the related mortality has direct, beneficial labour market effects. In the future, working-age patients need to be engaged in rehabilitation programmes at higher rates – possibly through an outpatient structure – as it plays a key role in the prevention of further infarctions, the restoration of working capacity, ensuring a good quality of life, and ultimately, in increasing the chances of survival. Besides, through the development of infarction-related health education, various strategies for coping with work-related stress need to be highlighted. The role of occupational physicians in the maintenance of a stable condition based on a lifestyle change and on the appropriate type and level of physical activity also needs to be strengthened.

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2.2 THE CORRELATIONS OF LABOUR MARKET STATUS, THE PREVALENCE OF CERTAIN CHRONIC DISEASES AND HEALTHCARE EXPENDITURE

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In this subchapter we examine the correlations between labour market status, the prevalence of the most common chronic diseases, and healthcare expenditure, on the basis of the 2019 healthcare data reported to the National Health Insurance Fund Administration (NEAK, formerly OEP).[1] We present the rates at which economically active groups are being treated for chronic diseases, the rates of specialised health service utilisation, and the amount the social health insurance fund spends on patients annually.

Data

The persons examined are those of the age group of 20–65, who either have an insured status due to private employment on the basis of the Social Insurance Law (section 5 of the old Tbj. – Act LXXX of 1997 on the eligibility for social insurance benefits and private pensions and the funding for these services), or, having no insurance obligation, have gained eligibility for social insurance benefits by paying a so-called health service contribution (a monthly fee of HUF 7,500, around 20€).

Our investigation focuses on the type of employment (and entitlement) and on educational attainment. We have divided our subjects (a total of 4,469,926 persons)[2] into a total of five groups on the basis of their typical entitlement[3] reported to NEAK: 1) private employment (2,838,212 persons), 2) unemployed or public works employees (129,430 persons) (see subchapter K5.1), 3) individual or joint entrepreneurship (536,628 persons), 4) public service type work, public servants, government officials, law enforcement workers (547,466), 5) those paying a health service contribution (318,190). To this latter group belong those who are not officially employed and have no other status (such as childcare, invalidity, social circumstances, etc.) that would grant them access to the healthcare system. 1,549,226 persons were excluded from the working age population of over six million due to different statuses, such as university students, those on parental leave, those receiving invalidity benefits, the homeless, etc., and those who died during the year.

Complementing this, we have assigned those working within private employment (group 1) and public sector workers (group 4) to three further strata, based on their educational attainment (on the basis of the HSCO code – Hungarian Standard Classification of Occupations – recorded in the declaration): 1) undereducated (HSCO codes starting with 9 or 03; 610,329 per-

1 The Hungarian health care system is based on a compulsory social insurance system with the single payer NEAK providing health insurance coverage for nearly all 10 milion people residing in the country.

2 Due to the impact on healthcare expenditure (*Koczor-Keul,* 2017 and *Fadgyas-Freyler,* 2019) we have narrowed down the study in two ways: on the one hand, we have excluded those who died in the given year, and on the other hand, we have excluded the extremely high expenditures related to blood disorders and hematopoietic diseases, or endocrine and metabolic – rare – diseases.

3 There are altogether approx. 120 different entitlement categories under which access to social insurance services is granted. Even those engaged in gainful activity are classified into different groups by employer. Those who are not working may gain entitlement to healthcare services in other ways. Certain groups are granted access to healthcare via legislation (such as minors, those on maternity leave, pensioners, those in detention facilities), while others are required to pay a certain amount also determined by legislation (a so-called health service contribution) in order to be able to use the services of healthcare service providers without having to pay various fees for them. And those who do not belong to any of the entitlement categories and do not pay their due contribution, either, have a so-called "red flag" status, which service providers are informed of.

sons) 2) secondary educational attainment (HSCO codes starting with 3–8 or 02; 2,196,038 persons), and 3) tertiary educational attainment (HSCO codes starting with 1, 2 or 01; 1,007,930 persons). Finally, we control for the following factors in each analysis: age (by age groups with 5-year differences), sex, and the development/deprivation level of the place of residence,[4] as these factors have an impact on health status and on service utilisation (see *OECD*, 2019; and for the development level of the place of residence, see *Subchapter 2.1*).

Methods

Due to the fact that age, sex and the development level of the place of residence vary significantly within the various entitlement and educational attainment groups, and as these characteristics are known for having a strong impact on service utilisation, we neutralise their impacts through standardisation. To this end, the elements in the various groups are duplicated through random selection in such a way that each entitlement and educational attainment group have the same proportions in terms of age, sex and the development level of the place of residence. We analyse the prevalence rate of diseases, the rate of healthcare utilisation, and the average expenditure per patient in this standardised stock.

First, we scrutinise the rate of morbidity, based on the categorisation used in the general practitioners' indicator system of the Health Insurance Fund (*NEAK,* 2019). We examine the number of known heart disease patients,[5] the number of patients treated for high blood pressure, diabetes, or chronic obstructive pulmonary disease (most prevalent among smokers). We pay special attention to so-called multimorbidity, that is, we examine the number of persons affected by more than one of the above-mentioned diseases. We would like to emphasise that the number of those receiving care is not necessarily the same as the number of ill persons. The number of persons suffering from a given disease (but not receiving regular care) may be substantially higher. The difference between the number of ill persons and of those receiving care can be explained by, among other causes, individual health behaviour (see *Subchapter 2.1,* for example) or unmet healthcare needs (see *Subchapter 2.3,* for example).

Second, we examine how frequently patients use three typical segments of the publicly funded healthcare system: outpatient care, inpatient care, and the supply of medications and medical aids and devices (service utilisation rate).[6] The utilisation rate is influenced both by the health status of the given persons, and by the availability of the publicly funded and the private healthcare systems – the latter may decrease the utilisation of the publicly funded healthcare system, either through medical savings accounts (in certain cases), or through company-financed private health insurance. (Regarding private healthcare, see *Subchapter 2.3.*) We have put special focus on two forms of care: dentistry, and the supply of itemised medications. These, even though they

4 For the development level of the place of residence, we used the composite indicator of the HCSO created for the level of development of municipalities (*HCSO*, 2016), in a total of four categories (those under the age of 40, those between 41–60, those between 61–80, those above the age of 80).

5 Heart disease patient: patients who have had an infarction and/or coronary bypass surgery (CABG) and/or percutaneous transluminal coronary angioplasty (PTCA).

6 The outpatient segment includes specialised outpatient care and laboratory testing, high value diagnostic scans (CT, MRI), dialysis treatments, dentistry, and the transportation of patients. Inpatient care includes any type of hospital stays and related treatments, as well as specialised home care and hospice service. The supply of medications and medical aids and devices includes all prescription therapies (medications, medical aids and devices, health spa services) as well as itemised medications, given to patients as part of their stay at an institution. We do not examine general practitioner care, as the utilisation of that does not generate any additional expenses.

are a part of the above-mentioned larger groups, represent the two extremes of the Hungarian healthcare system: the coverage provided for dental care by the social health insurance fund to the working-age population is extremely limited, resulting in a very high rate of private care utilisation (*Babarczy et al.,* 2016), while the supply of high cost (so-called itemised) medications is a field where care is almost exclusively publicly financed.

Third, we seek to determine the amount the social insurance fund spends on those actually accessing a given segment of the publicly funded healthcare system (insurance fund's expenditure). The amount spent on the population examined is HUF 368.3 billion, which is exactly a quarter of the total patient-related annual expenditure of the Hungarian single payer NEAK.

Results

Morbidity indicators

Table 2.2.1 shows the morbidity indicators by disease groups.

Table 2.2.1: Differences in the morbidity rates of disease groups in the age group of 20–65, by entitlement and educational attainment, 2019

	Hyper-tension	Diabetes	Heart disease	Chronic obstructive pulmonary disease (COPD)	Multi-morbidity
Morbidity per 100 people	17.50	3.20	0.80	0.90	3.10
Divergence of morbidity rates relative to the average of those working within private employment, by entitlement category (percentage)*					
Private employment	0.00	0.00	0.00	0.00	0.00
Public works employee, unemployed	–6.34	–2.67	–3.46	+91.75	+11.28
Entrepreneur	–14.10	–7.00	–3.44	–31.66	–13.86
Public sector	+5.24	–1.74	–6.09	–21.98	–4.93
Those paying a health service contribution	–27.61	–14.60	+7.71	–12.85	–16.15
Divergence of morbidity rates relative to the average of those working within private employment with secondary educational attainment (percentage)*					
Private employment, tertiary educational attainment	–20.14	–22.77	–20.27	–47.63	–30.30
Private employment, secondary educational attainment	0.00	0.00	0.00	0.00	0.00
Private employment, undereducated	–0.13	–3.66	+26.48	+88.90	+14.16
Public sector, tertiary educational attainment	–5.21	–14.01	–13.54	–38.59	–19.40
Public sector, secondary educational attainment	+0.31	–6.64	–5.72	–11.35	–7.19
Public sector, undereducated	+35.96	+30.67	+51.91	+80.76	+50.05

* Based on a database standardised for age, sex and the development level of the place of residence.

Source: Authors' own calculations on the basis of the 2019 data of the *National Health Insurance Fund Administration* (NEAK).

The first row of *Table 2.2.1* shows the real, population-based average prevalence rates of various diseases. By far the most common of these is hypertension – nearly one in five persons was receiving treatment for this disease.

Over a third of our subjects have diabetes, and the rate of those who have at least two of the four diseases in question (multimorbid patients) was found to be the same. Approximately one percent of the group suffers from a severe pulmonary or heart disease. These figures are especially alarming considering that this is the segment of the working age population that is supposed to be healthy and able to work.

The upper part of *Table 2.2.1* shows, relative to the largest group (those working within private employment), the differences in morbidity rates among the various entitlement categories, standardised for age, sex and the development level of the place of residence. Public works employees and the unemployed seem to be the most unhealthy, as their multimorbidity rate is higher by more than 11 percent. This is brought about mostly by the dramatic rate of COPD, as the other (treated) diseases have a lower prevalence rate in this group compared to those working within private employment. This raises fundamental questions regarding health behaviour, health education and access to the healthcare system. The lowest morbidity rates are observed in entrepreneurs, followed by those paying a health service contribution. There is only one disease where contribution payers have higher prevalence, which is heart disease. We have to emphasise that the prevalence of heart disease is registered on the basis of previous heart attacks or serious heart surgeries and not on the basis of appropriate care (regular intake of pharmaceuticals). This raises serious doubts whether the other – seemingly favourable – values could be a sign of an unmet need (untreated disease). Hypertension occurs at higher rates among public sector workers, however, they are less affected by other diseases.

The lower part of *Table 2.2.1* shows the differences in morbidity by educational attainment in the two biggest groups: those working within private employment, and public sector workers.[7] The data suggest that educational attainment is a key factor. In the case of the undereducated, this can be observed mainly in the increased prevalence of smoking-related COPD, heart disease, and multimorbidity (in the case of COPD, this means a prevalence rate of +90 percent relative to those with secondary educational attainment in both entitlement categories); the undereducated workers of the public sector have a much lower health status. The disease rates of those with tertiary educational attainment are lower everywhere compared to those with secondary educational attainment, and the difference is more substantial in the case of those working within private employment. The indicator values of public sector workers with secondary educational attainment are generally lower than the values of those with secondary educational attainment working within private employment.

7 Public sector workers have a higher average educational attainment than those working within private employment.

Health service utilisation rates

Table 2.2.2 shows health service utilisation rates by type of care.

Table 2.2.2: Differences in the rates of specialised health service utilisation in the age group of 20–65, by entitlement type and educational attainment, 2019

	Inpatient care	Outpatient care	Medications and medical aids and devices	Dentistry	Supply of itemised medications	Any type of care
Rate of service utilisation per 100 people	10.30	70.00	67.00	17.40	0.28	81.30
Divergence of service utilisation rates relative to the average of those working within private employment, by entitlement category (percentage)*						
Private employment	0.00	0.00	0.00	0.00	0.00	0.00
Public works employee, unemployed	+3.04	–4.16	–6.33	+2.39	–46.15	–4.22
Entrepreneur	–4.46	–3.57	–3.41	–13.39	+11.54	–2.46
Public sector	+8.32	+18.68	+9.50	+38.30	+19.23	+11.35
Those paying a health service contribution	–1.12	–18.15	–20.90	–21.13	0.00	–17.19
Divergence of service utilisation rates relative to the average of those with secondary educational attainment working within private employment, by educational attainment and entitlement category (percentage)*						
Private employment, tertiary educational attainment	–9.16	–5.63	–1.02	–30.44	+19.23	–1.39
Private employment, secondary educational attainment	0.00	0.00	0.00	0.00	0.00	0.00
Private employment, undereducated	+2.29	–6.14	–8.64	–3.13	–11.54	–7.00
Public sector, tertiary educational attainment	+6.08	+10.38	+6.59	+4.70	+26.92	+6.69
Public sector, secondary educational attainment	+6.37	+20.39	+7.43	+51.16	+11.54	+11.46
Public sector, undereducated	+11.55	+12.72	+5.80	+25.47	+23.08	+7.06

* Based on a database standardised for age, sex and the development level of the place of residence.

Source: Authors' own calculations on the basis of the 2019 data of the *National Health Insurance Fund Administration* (NEAK).

According to the upper half of *Table 2.2.2*, more than four-fifths of the persons examined used some type of publicly funded healthcare within the given year. Approximately 10 percent could be found in inpatient care, 67 percent purchased some type of medication or medical aid, and 70 percent appeared in outpatient care. As for dental care, which is unique in terms of access, 17.4 percent of the population could be seen, and 0.28 percent of patients used some kind of itemised medication.

In terms of service utilisation, public sector workers and those paying a health service contribution represent two extremes (see the lower half of *Table 2.2.2*). Public sector workers turn to the public healthcare system at a much higher rate (+11.3 percent) than the average worker that works within private employment. The largest difference can be observed in dentistry (+38.3 percent), followed by the fund for itemised medications (+19.2 percent). Those paying a health service contribution use the public healthcare system at a rate that is well under the utilisation rate of those working within private employment. The largest difference (in a negative direction! a value of

approx. –20 percent) can be observed in the utilisation of dentistry, again, but it is also similar by medications. At the same time, it is quite unexpected that the utilisation of itemised medications by those paying a health service contribution is as high as in the case of those working within private employment. However, utilisation rates are extremely low among public work employees and the unemployed, which is slightly surprising, since they appear in inpatient care at a much higher rate. We should also not forget that according to the findings presented in the previous chapter, their health status is the most unfavourable among all the various entitlement categories.

Analysing the utilisation rates by educational attainment (the lower part of *Table 2.2.2*), what emerges is that the dividing line (unlike in the case of morbidity) is the employment category. Public sector workers use the public healthcare system at a substantially higher rate than those working within private employment, regardless of their educational attainment. The role of educational attainment is not negligible, either: for example, those with tertiary educational attainment get itemised medications at a salient rate, regardless of employment type.

Healthcare expenditure per patient

Our last focus of enquiry was the amount spent on each person by the social health insurance fund. We would like to emphasise that in our calculations we are not using the average annual expenditure per person, but we are dividing the annual total expenditure per fund by the number of patients (service users) that actually use certain types of care (expenditure per actual service user). The difference is shown in the first two rows of *Table 2.2.3*.

In 2019, the health insurance fund spent an average of HUF 82,000 per person on the examined population,[8] which is 56 percent of the average spending (HUF 146,000 per person) calculated for the entire population. The largest share of the expenditure per person is used in the inpatient sector and medications (HUF 31,000 each), but as for the expenditure per patient, it was highest by itemised medications (more than HUF 2 million) and inpatient care (HUF 308,000).

In the case of the expenditure per patient, we have found a rather mixed pattern; no clear trend line can be drawn on the basis of the usual factors (entitlement, educational attainment). The upper part of *Table 2.2.3* shows the impact of the entitlement category on healthcare expenditures. They are not negligible, but the differences are smaller than by utilisation. And also, the pattern differs greatly from that of utilisation. We wish to emphasise that the health insurance fund spends the highest amount (+26 percent) on the very group whose utilisation rate was the lowest (those paying a health service contribution). This may indicate that higher costs are a consequence of previously missed health maintenance and prevention (unmet healthcare need),

8 As a reminder: we have excluded diseases that are extremely rare and have rather high treatment costs from the scope of expenditures to be examined.

but it may also indicate that this group – in case of minor health problems – might rather turn to a private healthcare provider. The expenditure per patient of the unemployed and public work employee group was either similar to those working within private employment (except for itemised medications) or lower. Spending on the outpatient care and medications of public sector workers was higher compared to those working within private employment (and their service utilisation rate was higher, as well). The case of dentistry is different: we see many users from the public sector, but their per capita expenditure is relatively lower.

Table 2.2.3: Differences in the expenditure rates per patient in the age group of 20–65, by entitlement type and educational attainment, 2019

	Inpatient care	Outpatient care	Medications and medical aids and devices	Dentistry	Supply of itemised medications	Any type of care
Expenditure per person (HUF)	31,613	18,452	31,053	1,585	5,690	81,117
Expenditure per patient (HUF)	308,203	26,331	46,370	9,118	2,029,433	99,722
Divergence of the expenditure per patient relative to the average of those working within private employment, by entitlement category (percentage)*						
Private employment	0.00	0.00	0.00	0.00	0.00	0.00
Public works employee, unemployed	–1.80	+2.60	–9.02	–7.17	+19.29	–1.45
Entrepreneur	+1.57	+0.33	–0.02	–2.77	–2.19	–0.79
Public sector	–3.31	+9.05	+6.53	–10.72	+7.46	+3.15
Those paying a health service contribution	+17.50	+10.78	+25.97	–3.55	+7.85	+25.70
Divergence of the expenditure per patient relative to the average of those with secondary educational attainment and working within private employment, by educational attainment and entitlement category (percentage)*						
Private employment, tertiary educational attainment	+1.09	+1.14	+16.66	+1.30	+9.35	+2.94
Private employment, secondary educational attainment	0.00	0.00	0.00	0.00	0.00	0.00
Private employment, undereducated	+8.01	+9.71	+16.10	–5.62	+1.05	+15.14
Public sector, tertiary educational attainment	–1.47	+12.82	+22.71	–3.40	+13.92	+11.50
Public sector, secondary educational attainment	–2.45	+9.43	+1.63	–17.80	+5.28	+0.69
Public sector, undereducated	+5.68	+12.18	+37.05	–4.43	+16.93	+21.43

* Based on a database standardised for age, sex and the development level of the place of residence.

Source: Authors' own calculations on the basis of the 2019 data of the *National Health Insurance Fund Administration* (NEAK).

Usually, these differences remain even after controlling for the educational attainment of workers (the lower part of *Table 2.2.3*). Finally, it has also emerged that the expenditure per patient of the undereducated and of those with tertiary educational attainment is higher than that of those with secondary educational attainment.

Summary

In this subchapter we have presented the correlations of labour market status (entitlement) and educational attainment with 1) the prevalence of certain chronic diseases, 2) utilisation of the publicly financed healthcare system, and 3) the expenditure of the social health insurance fund spent on patients.

Three percent of the active, working-age population has at least two chronic diseases. More than 16 percent of this group take medications regularly for hypertension, and 3 percent do for diabetes, as well. Nearly one in 100 of this group received treatment for a severe pulmonary disease. The unemployed and public works employees seem to have a particularly poor health status. As for chronic diseases, educational attainment has the highest impact. We shall not forget that we only see patients in care, but if we were able to estimate those who are in need but not receiving care, these differences would be even more significant.

Analyzing utilisation rates, entitlement has proved to be the most significant influencing factor. Public sector workers turn to the publicly financed healthcare system much more often. Other labour market groups use dentistry and outpatient care to a much lower extent. This is probably attributable to the unknown utilisation rates of private service providers. Public work employees and the unemployed have less access to itemised medications despite the fact that they probably have the worst health status.

We have not found significant differences in the expenditures per patients. Although those paying their own health service contribution use the healthcare system less frequently, when they do, their care is much more expensive.

Significant differences (that are not being discussed here) can be observed between the data of men and women as well, based on all of the examined factors.

Beyond labour market status, there might be other reasons behind the phenomena presented in our analysis. The capacity for self-advocacy, the accessibility of the healthcare system and cultural norms linked to men's and women's roles may be such influencing factors. Presumably, there are people who "land" in the healthcare system late, when their care is much more expensive.

Based on what has been presented, especially in light of the current amendments to the social insurance act of Hungary, further analyses are needed so that we can understand the characteristics of health service contribution payers. It can also be concluded that both primary healthcare and occupational healthcare play important roles in access, coordination of treatments, and in an early enough start to health education.

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2.3 THE DISTRIBUTION OF INFORMAL PAYMENTS, OF THE USE OF PRIVATE HEALTH CARE AND OF UNMET HEALTHCARE NEEDS ALONG THE AXIS OF SOCIO-ECONOMIC STATUS

PETRA BAJI

The majority of the subchapters of *In Focus* examines the distribution of the state of health and the use of health care services along the axis of labour market status and socioeconomic status using administrative data. However, this naturally results in less attention on informal payments, on the use of private health care and on unmet health care needs – to name a few examples – which do not appear in the databases used. The following is a short summary of the results – related to inequalities based on social and economic status – of a few studies that explore these subjects.

According to an earlier, representative survey (*Baji et al,* 2014), nearly 80 percent of respondents visited a doctor during the year preceding the survey, and 21 percent of them made informal payments. 21 percent of respondents stayed in a hospital, and nearly half of them (44 percent) made such a payment. Controlling for the number of visits to the doctor and for the state of health – in the case of visits to the doctor – the elderly, those living in the capital, and those with a higher income were more likely to make informal payments, while those with a bigger household were significantly less likely to do so. In the case of hospital stays, income status and the size of the household had a significant effect on whether informal payments were made.

Informal payments are the most prevalent in obstetrics. Here we found that it was primarily the fact of having a doctor of choice that had an influence on the paying of an informal payment, and not the quality of the service (*Baji et al,* 2017). In a representative sample of 600, two-thirds of the women had a doctor of choice, and 79 of those did make informal payments; in contrast to only 17 percent of those without a doctor of choice. Having a doctor of choice was more frequent among older mothers and mothers with higher educational attainment, but controlling for the fact of having a doctor of choice, socio-demographic variables did not have a significant effect on the occurrence of informal payments. At the same time, those with a higher income, those living in Budapest, and those living in a marriage or partner relationship paid significantly higher amounts of informal payment. An important finding is that the quality of care was different for those with, and without a doctor of choice: medical interventions (Cesarean sections, induction of labour) were more frequent among those with a doctor of choice, but these mothers were also treated with more respect.

In one of our related studies (*Baji et al,* 2012) we examined the regressivity of household healthcare expenditure in the period between 2005–2008 (which is comprised of the expenditures (own contribution) spent on medications and medical aids, usage fees and informal payments). Informal payments totalled only 4–9 percent of healthcare-related expenditure in the period examined, which was approximately 0.2–0.3 percent of the total income of households. (In comparison: households spent the largest amount on medications and medical aids; these comprised 78–85 percent of the healthcare-related expenditure of households.) The annual informal payment expenditure was regressive, that is, poorer households belonging to the bottom income fifths spent a higher percentage of their income on informal payments than did wealthier households belonging to the top income fifth. Consequently, informal payments meant a greater burden for poorer households. However, it also emerged that in 2007, through the (temporary) introduction of the "visit fee", informal payments became proportionate to the income. This may have been for two reasons: poorer households either paid less informal payments, or did not even visit doctors.

Examining the healthcare-related expenditure of households, another detail that becomes clear is that the (official) expenditures of households spent on healthcare service fees comprised 11–15 percent of the total healthcare-related expenditure of the household, and 0.5–0.6 percent of the household income between 2005–2008. These expenditures were proportionate to the income (*Baji et al,* 2012), that is, households belonging to the top income fifths spent more money on usage fees in real terms. This can be explained mainly by the more frequent use of private healthcare services. According to the data of a representative survey we conducted in 2019 (*Lucevic et al,* 2019; *Zrubka et al,* 2020), 11 percent of the latest visits to doctors occurred at private healthcare providers during the year preceding the survey (*Zrubka et al,* 2020). In the age group of 25–44, among those with a paid job and among those with higher education as their attainment level, having had the latest visit to the doctor at a private healthcare provider was a more frequent occurrence.

Another frequent phenomenon is that the population chooses rather not to use the healthcare treatment otherwise needed, due to its cost or due to travel inconvenience. According to our representative survey conducted in 2019, 27 percent of respondents had postponed a visit to the doctor due to travel inconvenience; at the same time, 24 percent did not purchase the medication prescribed, 21 percent postponed a visit to the doctor, and 17 percent postponed a diagnostic test or a prescribed medical treatment due to costs, during the year preceding the survey (*Lucevic et al,* 2019). Regression analyses showed that women, younger individuals, and those with a lower income (1st and 2nd income fifths) gave the response that they had some kind of unmet healthcare need a significantly higher number of times. Those with a lower

educational attainment level (those who had the completion of elementary or secondary school as their educational attainment level) were more likely not to purchase the medications prescribed, and to postpone medical care due to travel inconvenience. At the same time, labour market status did not have a significant influence on the results. These results regarding unmet healthcare needs correspond, to the most part, to the statistics published by the Eurostat broken down by educational attainment level and income fifths, based on the EU-SILC survey.

Overall, it can be said that informal payments, the use of private healthcare services, and the presence of unmet healthcare needs are closely correlated to income status, which may compromise equal access to healthcare services.

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3 EMPLOYEE HEALTH

3.1 LABOR INCOME, HEALTH STATUS, AND HEALTHCARE SPENDING

ANIKÓ BÍRÓ & DÁNIEL PRINZ

Introduction

Hungary, like other developed countries gives nominally equal access to necessary healthcare and prescription drugs to everyone. Patients can use inpatient and outpatient care free of charge, while prescription drugs are subsidized to varying degrees. At the same time, the literature documents substantial barriers to access (*Lucevic et al*., 2019), as well as regional differences in spending (*Orosz*, 1990, *Nagy* 2010, *Fadgyas-Freyler–Korponai*, 2016, as well as *Subchapter 2.1* in this book). In this subchapter, we examine geographic and income-related inequalities and the relationship between these two dimensions of inequality using the "admin3" database of the Centre for Economic and Regional Studies Databank.[1]

The database contains monthly employment and income data for the period 2003–2017 and healthcare spending data for the period 2009–2017 for a quasi-random 50% sample of the Hungarian population.[2] Our sample includes 18–60-year-olds with full-year, full-time employment. We link year t income with year $t + 1$ healthcare spending (and 3-year mortality rates measured in year $t + 1$) in order to limit the influence of health on income. We adjust healthcare indicators and mortality for age, gender, and calendar year. The outcomes examined include mortality rates, inpatient spending, specialty outpatient spending, and prescription drug spending. In the latter category, we use the sum of social security spending and patient spending. We examine healthcare spending inequality by region[3] and the relationship between spending and income dividing income into ventiles (20 equal-sized groups).

We document four patterns: 1) substantial heterogeneity in healthcare spending across regions; 2) positive association between labor income and public healthcare spending; 3) geographic variation in the strength of the association between labor income and healthcare spending; and 4) negative association between labor income and mortality. Based on these, we conclude that in Hungary higher-income workers are healthier than lower-income workers, while social security spending on higher-income workers is also higher than spending on lower-income workers.

Geographic inequality in healthcare spending

Figure 3.1.1 shows inpatient spending, specialist outpatient spending, and prescription drug spending by region. In line with the previous literature, there

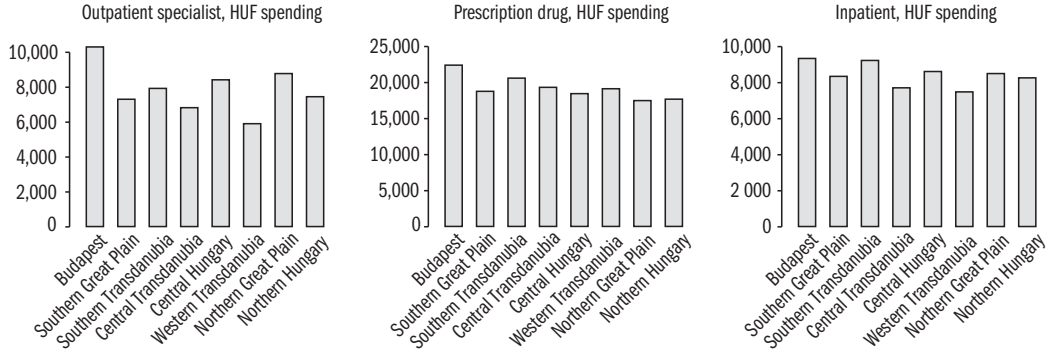
1 For a short description of the database, see the Appendix of the *In Focus* section. For more details, see *Sebők* (2019).

2 *Bíró–Prinz* (2020) examined healthcare spending inequality for the 2003–2011 period using an earlier version of the administrative database.

3 Budapest, Central Hungary outside Budapest, Central Transdanubia, Western Transdanubia, Southern Transdanubia, Northern Hungary, Northern Great Plain, Southern Great Plain.

are substantial inequalities across regions which are not explained by demographic differences (e.g., age structure). Differences are the largest for specialist outpatient care and prescription drug spending. Outpatient spending is highest in Budapest, 74% higher than in the lowest-spending region (Western Transdanubia). We also find the highest prescription drug spending in Budapest, 28% higher than in the lowest-spending region (Northern Great Plain). Differences are somewhat smaller for inpatient spending, which are 25% higher in Budapest than in the lowest-spending region (Western Transdanubia).

Figure 3.1.1: Regional differences in annual healthcare spending (adjusted for age, gender, and calendar year)



Source: Authors' calculation based on "admin3" data for 2009–2017.

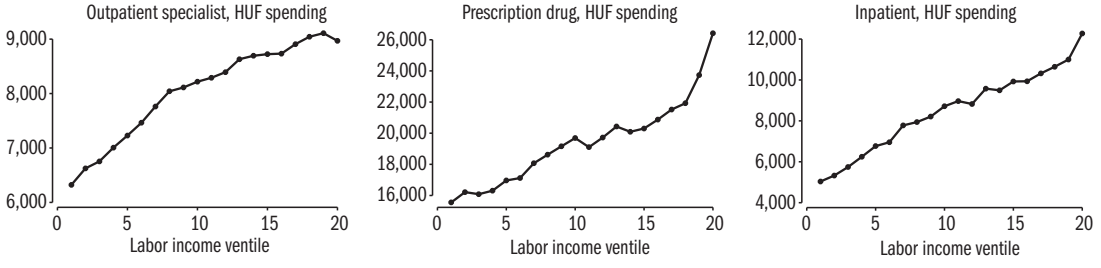
Association of healthcare spending and labor income

Figure 3.1.2 shows the relationship between labor income and healthcare spending. In each category, there is a positive relationship between spending and labor income. In the top ventile (workers with the highest 5% of annual labor income), outpatient spending is 42%, prescription drug spending is 70%, and inpatient spending is more than 100% higher than in the bottom ventile (workers with the lowest 5% of annual labor income).

Figure 3.1.3 shows the inequality by labor income separately for prescription drug spending categories (ATC – Anatomical Therapeutic Chemical). It is apparent that higher-income workers have higher spending in each category, but the strength of the spending-income relationship varies across categories. Inequality is largest in both absolute and relative terms for Antiinfectives for systemic use (ATC J, e.g., antibiotics) and for Antineoplastic and immunomodulating agents (ATC L). We find substantial inequality for Alimentary tract and metabolism (ATC A, mostly prescription drugs used to treat diabetes) and for Cardiovascular system medications (ATC C, mostly anti-hypertension and cholesterol medications). We find moderate inequality in both absolute and relative terms for Musculo-skeletal system (ATC M), Nervous

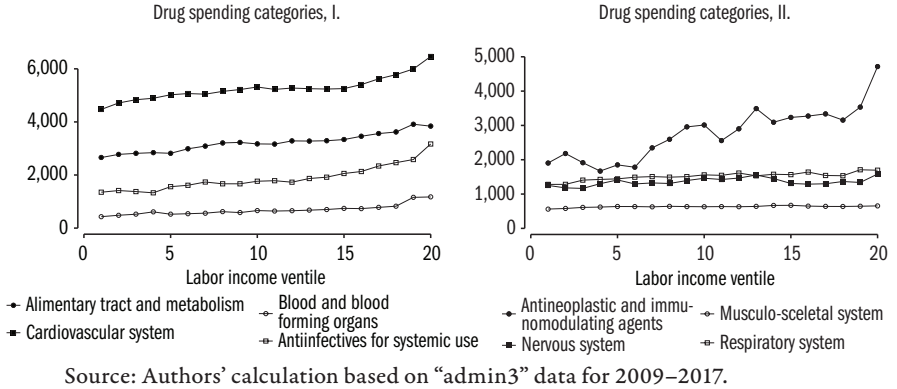
system (ATC N, including antidepressants and anxioliytics) and respiratory system (ATC R) drugs. Spending on Blood and blood forming organs medications (ATC B) is relatively low but the difference between the bottom and top ventiles is more than two-fold.

Figure 3.1.2: Annual indicators by ventile of labor income (adjusted for age, gender, and calendar year)



Source: Authors' calculation based on "admin3" data for 2009–2017.

Figure 3.1.3: Annual prescription drug spending by labor income ventile and therapeutic group (adjusted for age, gender, and calendar year)



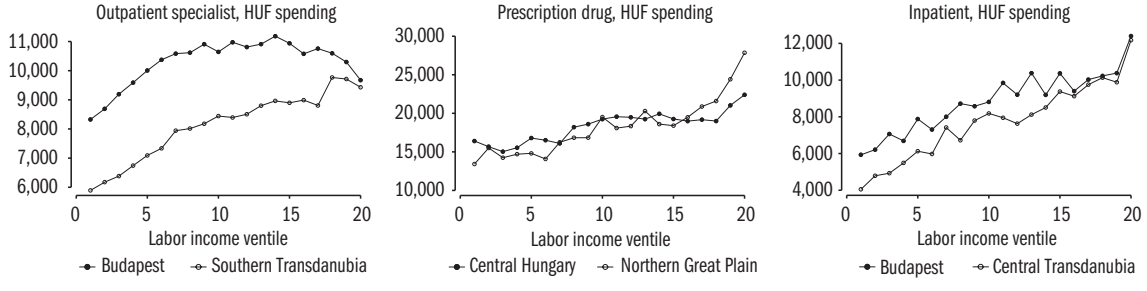
Source: Authors' calculation based on "admin3" data for 2009–2017.

Further calculations also show that inequality by income is not only present for prescription drug spending but also for the likelihood of having any spending, though this inequality also varies across therapeutic groups. When examining the likelihood of taking any prescriptions, we use a binary indicator for whether individuals falling in a particular income ventile used any drug in a therapeutic group (yes/no). For example, for cardiovascular drugs there is a 3% (0.1 percentage point) difference in the likelihood of taking any drugs between the bottom and top income ventile, while for alimentary tract and metabolism medications the difference is 18% (2.6 percentage points), and for respiratory system drugs it is 60% (6.2 percentage points). Overall, we find a positive relationship between income and both the likelihood of taking any drugs and drug spending.

Geographic dimensions of healthcare spending inequality

So far we have demonstrated that among workers, there is substantial geographic and income-related inequality in healthcare spending. One can also examine whether inequality by income is different across different geographic regions. *Figure 3.1.4* shows the relationship between healthcare spending and labor income in different regions. In each figure we show the most and least equal region for the particular indicator, defining income ventiles at the national level. The figure suggests that there is substantial within-region inequality in healthcare spending by labor income and that the degree of inequality varies across regions. For specialist outpatient care, the national difference is 42% between the lowest and highest income ventiles; in the most equal – Budapest –, the difference is 16%, while in the least equal – Southern Transdanubia –, it is 60%. For prescription drugs, the national difference is 70%; in the most equal – Central Hungary –, the difference is 36%, while in the least equal – Northern Great Plain –, it is 107%. For inpatient spending, the national difference is 244%; in the most equal – Budapest – the difference is two-fold, while in the least equal – Central Transdanubia –, it is three-fold.

Figure 3.1.4: Inequality by labor income in different regions (adjusted for age, gender, and calendar year)



Source: Authors' calculation based on "admin3" data for 2009–2017.

Association of health status and labor income

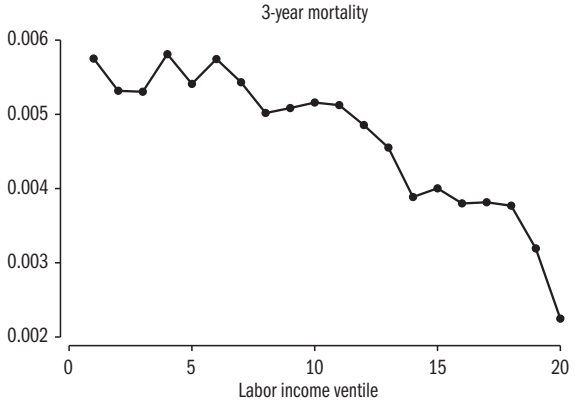
It is difficult to analyze the true health status of workers using our administrative data. Perhaps the easiest-to-examine and most reliable measure is mortality. *Figure 3.1.5* shows 3-year mortality by ventile of labor income. It suggests that higher-income individuals have lower mortality, and consequently they are likely to be healthier – the difference between the top and the bottom ventiles is almost three-fold.

Conclusion

Our analysis suggests that although in Hungary everyone has nominal access to social security-funded healthcare, regardless of income or geographic location, there are substantial inequalities in healthcare use between geographic regions and income groups. Among the working population, higher-income

groups use more care: they have higher inpatient spending, specialist outpatient spending, and prescription drug spending. The degree of inequality by income differs across regions. We also find that that while higher-income individuals use more care they are also healthier; for example, their mortality is lower. In this subchapter, we did not directly examine access to care, though it is likely that inequalities in healthcare spending are related to inequalities in access to care, as *Subchapter 2.1* discusses in more detail.

Figure 3.1.5: 3-year mortality by labor income ventile



Source: Authors' calculation based on "admin3" data for 2009–2017.

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3.2 FIRM CHARACTERISTICS AND HEALTH

MÁRTA BISZTRAY, ANIKÓ BÍRÓ & DÁNIEL PRINZ

In this subchapter we examine the relationship of health and firm characteristics, primarily ownership. The administrative labor market and health data prepared by the Databank of the Centre for Economic and Regional Studies make this analysis possible for the first time in Hungary. This data contains health indicators, employment history, and information on employers and firms.[1] The relationship between firm characteristics and health status runs both ways: individuals' health status influences their type of employment (*Madden,* 2004, *Pelkowski–Berger,* 2004), while the characteristics of employers and employment conditions influence health (*Fletcher et al.*, 2011). We focus on associations, rather than identifying causal relationships, our analysis is primarily descriptive. In the second part of the subchapter, we move towards a more causal analysis, examining the consequences of health shocks by firm characteristics.

Health indicators at domestic and foreign companies

We divide firms into two groups based on foreign ownership share: we categorize firms with less than 50% foreign ownership as *domestic firms* and firms with more than 50% foreign ownership as *foreign firms*. Our results are based on data for years 2009–2017.

Our sample contains workers between ages 20 and 60 who were employed for at least 6 months in a year at the same firm, limiting to firms with at least 10 workers.[2] We adjust health indicators for year fixed effects. In addition, we report results that are also adjusted for age and gender.[3]

Prescription drug spending and inpatient hospital days

We first examine annual prescription drug spending (sum of social security and out-of-pocket spending) and annual inpatient hospital days.[4]

The left panel of *Figure 3.2.1* shows that the average prescription drug spending of workers of foreign firms is 20% lower than that of workers of domestic firms. This difference decreases considerably once we adjust for age and gender, with age playing a larger role. The right panel of *Figure 3.2.1* reveals a similar pattern for inpatient hospital days. For this category the relative difference between the workers of foreign and domestic firms persists after adjusting for age and gender. Inpatient hospital days likely capture more serious illness. Overall, we see that foreign firms employ younger and healthier workers.

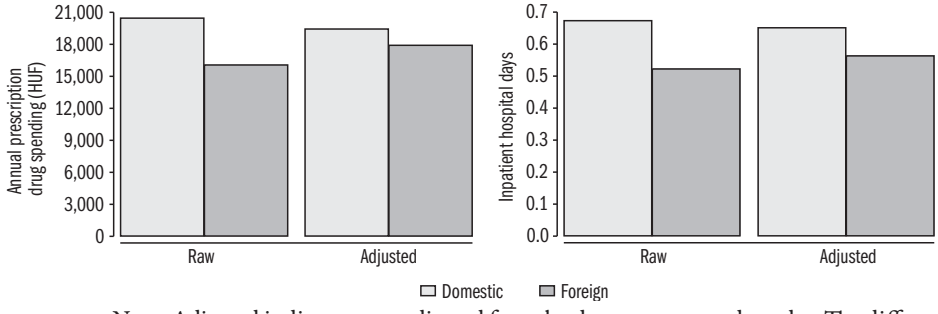
1 For a short description of the database, see the Appendix of the *In Focus* section. For more details, see *Sebők* (2019).

2 We exclude women receiving maternity payments, including the period during which they receive payments and the 12 months prior (approximately the period of pregnancy). We exclude companies where the majority of employees are categorized as public employees and also companies where there were more than 10 public employees in any year. Our goal with this exclusion is to focus on firms in the private sector that have at least 10 employees.

3 The key results are robust if in addition to calendar year, age, and gender we also adjust for industry (one-digit NACE code), firm size (in six bins), and occupation (one-digit ISCO code).

4 *Bíró–Elek* (2018) find that among healthcare spending categories, prescription drug spending is the most predictive of mortality. At the same time, among individuals with lower levels of prescription drug spending undiagnosed health problems can also occur, and these may be correlated with lower income.

Figure 3.2.1: Annual prescription drug spending and inpatient hospital days by firm ownership



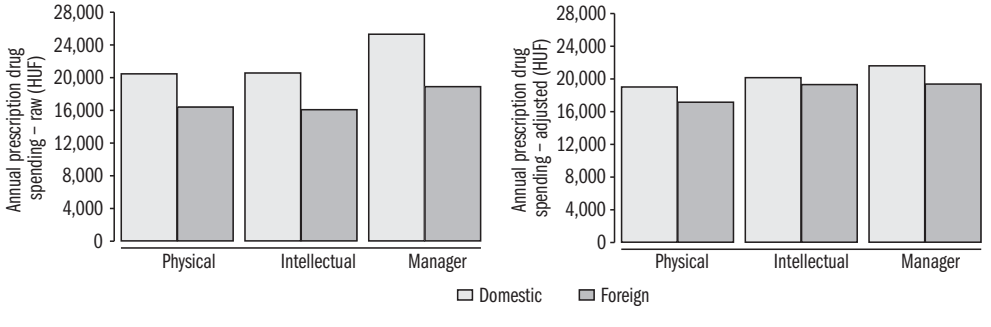
Note: Adjusted indicators are adjusted for calendar year, age, and gender. The differences between foreign and domestic companies are always significant at 99% level.
Source: Authors' calculation based on Admin3 data.

Prescription drug spending by occupation

Based on ISCO codes, we divide workers into two groups: physical and intellectual workers. Among intellectual workers, we separately examine managers.[5] *Figure 3.2.2* shows that average prescription drug spending is highest among managers in both domestic and foreign companies, even after adjusting for age and gender. Differences between intellectual and physical workers only emerge after adjustment, suggesting that age and gender composition is important. The difference between managers and other intellectual workers is larger at domestic companies than at foreign companies. It is important to emphasize that these patterns could mean that the health status of managers is worse or that for a given health status they are more likely to use prescription drugs – due to better access and stronger incentives to preserve their working capacity. This should be recognized when we interpret differences in prescription drug spending.

5 We categorize ISCO 1–4 as intellectual work and ISCO 5–9 as physical work. We categorize ISCO 1 as managers.

Figure 3.2.2: Annual prescription drug spending by ownership and occupation



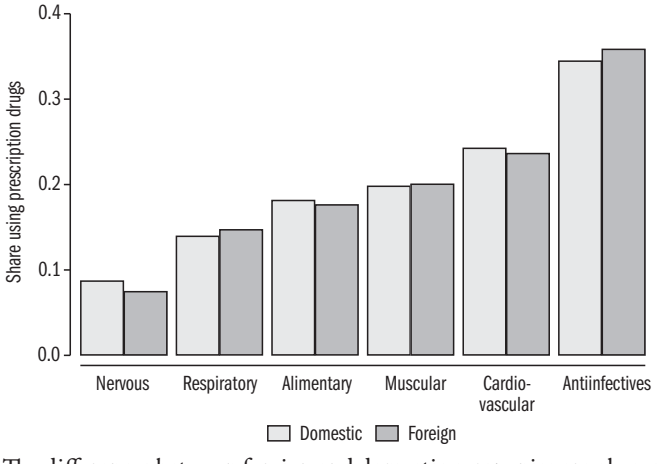
Note: Adjusted indicators are adjusted for calendar year, age, and gender. The differences between foreign and domestic companies are always significant at 99% level.
Source: Authors' calculation based on Admin3 data.

Figure 3.2.2 also shows that while using raw data, prescription drug spending is lower among the workers of a foreign firm in all three occupational groups, using adjusted indicators this difference substantially decreases, remaining the largest (10%) among physical workers. If we assume that access to care and health preferences are similar among workers of foreign and domestic companies, this result suggests that at foreign companies, physical workers are of better health. Further research is needed to understand whether this is a consequence of selection or of different working conditions.

Prescription drug spending by therapeutic categories

We examine six therapeutic categories based on the active ingredients of prescription drugs consumed. We categorize an individual as a user of a particular therapeutic category if they had any prescriptions in that category in a given year. The six categories examined are Alimentary Tract and Metabolism (ATC A, mostly antidiabetic drugs), Cardiovascular System (ATC C, mostly anti-hypertensives and cholesterol-lowering medications), Antiinfectives for Systemic Use (ATC J, mostly antibiotics), Musculo-skeletal System (ATC M), Nervous System (ATC N, including antidepressants and tranquilizers), and Respiratory System (ATC R) diseases. *Figure 3.2.3* shows the share of workers using drugs from each group, adjusting for calendar year, age, and gender.

Figure 3.2.3: Share using prescription drugs by category and firm ownership, adjusted for calendar year, age, and gender



Note: The differences between foreign and domestic companies are always significant at 99% level.
Source: Authors' calculation based on Admin3 data.

In line with *Figure 3.2.1* this figure also shows that adjusted indicators show only small differences between firm types. Prescription drug use in the Nervous System category is 6% lower at foreign firms. For Anti-infectives for Systemic Use and Respiratory System drugs this pattern is reversed, after adjust-

ment they are 3% and 7% more likely to be used at foreign firms, though the absolute difference is small, below 1 percentage point.[6] The latter categories contain drugs that are typically prescribed for infectious diseases, suggesting that these patterns are consistent with the hypothesis that conditional on being sick, workers of foreign companies are more likely to use prescription drugs.

Consequences of health shocks

Finally, we examine the probability of remaining in the workforce and remaining at the same firm in the year following a health shock. We define health shock as having prescription drug spending in the top decile of the distribution in a given year, such that in the preceding two year period it was lower than the top quartile. We categorize individuals as remaining in the workforce if they are employed for at least one month in the calendar year following the health shock. We categorize an individual as remaining at the same firm if they work at the same firm in the year preceding and following the health shock and as not remaining at the firm if they were working during the year preceding the health shock but not working in the year following the health shock or work at a different firm. We estimate fixed effects regressions, where the dependent variable is either working in the year following the health shock or working at the same firm in the year following a health shock, the main explanatory variable is the interaction of the presence of a health shock and firm type, and control variables include age, calendar year, and individual fixed effects.

Table 3.2.1 suggests that among those who worked at a domestic firm in the year before the health shock, the health shock decreases the probability of remaining in the workforce by 5.1 percentage points. Among workers of foreign firms this negative effect is 2 percentage points lower at 3.1 percentage points.

Table 3.2.1: The impact of health shocks on employment by firm type (linear probability model with fixed effects)

	Working	Working at the same firm
Firm type (reference group: domestic)		
Foreign	–0.0008	0.0815***
	(0.0007)	(0.0011)
Health shock	–0.0512***	–0.0338***
	(0.0020)	(0.0031)
Health shock × foreign firm	0.0200***	0.0265***
	(0.0033)	(0.0056)
Age, year, and individual fixed effect	yes	yes
Observations	5,870,079	5,870,079
Individuals	1,573,657	1,573,657

Note: Robust standard errors in parentheses. Sample average share remaining in the workforce 92%, sample average share remaining at the same firm 57%.
*** 1 percent, ** 5 percent, * 10 percent level significance.
Source: Authors' calculation based on Admin3 data.

6 Differences by ownership disappear completely for Respiratory System and Antiinfectives for Systemic Use drugs, and reverse for Musculo-skeletal System drugs if in addition to calendar year, age, and gender, we also adjust for occupation (one-digit ISCO), industry (one-digit NACE), and firm size.

The second column of the table shows that health shocks decrease the probability of remaining at the same firm by 3.4 percentage points at domestic firms, partly due to becoming unemployed or inactive, partly due to changing employers (moving to a company more accommodating of sickness). This estimate is lower – by less than 1 percentage point – among workers of foreign firms. Further calculations show that if we include additional interactions between health shocks with gender, age (as a continuous variable), and occupation (physical or intellectual) then the sign of the foreign firm coefficient remains the same but its size decreases. In this model, working at a foreign company decreases the impact of a health shock on remaining in the workforce by 1 percentage point (p-value 0.006). The impact of a health shock on remaining at the same firm is decreased by 1.3 percentage point (p-value 0.056) at foreign firms. It is possible that the difference between foreign and domestic firms is caused by higher average wage or better working conditions, but further research is needed to understand these explanations more precisely.

These results are robust under alternative definitions of health shocks: if we define health shocks requiring healthcare spending to be below the top decile (instead of top quartile) in the preceding year or if we only count two years in the top decile as a shock. It is important to emphasize, that our results count someone as working if they are on extended sick leave, and our interpretation assumes that there are no important differences in the types of health shocks experienced by workers at different types of firms.

Conclusion

Matched employer-employee (admin3) data shows that in the 2009–2017 period we can observe systematic differences in the health indicators of workers at domestic and foreign firms. The workers of foreign firms are on average healthier based on prescription drug spending and inpatient hospital days, but a large share of these differences is explained by compositional differences, in particular the employment of younger workers by foreign firms. Examining types of prescription drugs, controlling for compositional differences by age and gender, we uncover some evidence of the selection of healthier workers by foreign firms, although we see results reverse for Anti-infectives for Systemic Use and Respiratory System drugs. Finally, our regression analysis shows that following a health shock workers of foreign firms are more likely to continue working and remain at the same firm.

Our results suggest that health status is associated with type of employment. Healthier (and younger) individuals work at firms offering higher pay and better working conditions, contributing to health inequality by income. At the same time, we also see that following the deterioration of health, remaining in the workforce and at the same firm is more common at foreign firms, sug-

gesting that the impact of health status on joining a company is larger than the impact of remaining at a firm.

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3.3 ACCIDENTS AT WORK

JÁNOS KÖLLŐ & ZSUZSANNA SINKA-GRÓSZ

The European Commission estimates that someone dies in every three and a half minutes for work-related reasons in the European Union and more than three million suffer a serious injury at work – resulting in at least four days of absence from work (*EB,* 2008). In Hungary, there were two fatal accidents and 640 serious accidents per one-hundred thousand employees in 2017, as shown in the last row of *Table 3.3.1*.

Table 3.3.1: Work accident rates per one-hundred thousand employees in the EU, 2017

	Fatal		Non-fatal, serious[a]	
The highest	4.49	Romania	3,396	France
The second highest	3.40	Bulgaria	2,848	Portugal
...	...	...	...	...
The second lowest	0.54	Cyprus	84	Romania
The lowest	0.45	Malta	82	Bulgaria
EU27 average	1.79		1,704	
Hungary	2.01		640	

[a] Accident resulting in at least four days of absence from work.
Source: *Eurostat* (2019).

Table 3.3.1 also highlights that it is impossible to give a precise picture of incidence rates across countries. Fatal accidents in the highest-ranking Romania are over ten times more likely and in Bulgaria nine times more likely to occur than in the seemingly safest Malta. However, the incidence of serious, non-fatal accidents is the lowest in Romania and Bulgaria: only two to three per cent (!) of the incidence rate in the highest-ranking France.

Differences in the *actual* incidence rates of accident at work between countries depend on several factors: the type of work and technology, the sectoral composition of the economy, the stringency of accident prevention regulations and compliance monitoring as well as the compliant or negligent behaviour of employees and employers. In terms of *observed* incidence rates, the proportion of accidents reported (strongly depending on the balance of power) and how victims are compensated by the welfare system are just as important. In countries with high non-fatal incidence rates, victims are offered a significant compensation at the expense of a specific work accident insurance (*insurance based accident reporting systems*). In other countries, including most of Eastern Europe, victims are covered by the general social security system (*legal obligation systems*) and may claim compensation from their employer, which strongly reduces the willingness of enterprises and institutions to report accidents (*Eurostat,* 2019). The strikingly different ranking of Bulgaria and Romania

in the statistics of non-fatal and fatal accidents, which are more difficult to avoid reporting, is probably due to this.

In view of the above, it is more relevant to compare workplace accidents over time within a country. As seen in *Table 3.2.2*, in Hungary there were 50–100 fatal and 14–22 thousand non-fatal accidents reported annually over the period. Data for the former displayed a significant decrease over 2009–2013, followed by a slight increase. (Chance may have been a significant factor in that because of the low number of accidents). After 2014, the number of reported cases stabilised at about 70–80 annually. The number of non-fatal accidents reported increased from 14–17 thousand a year to 20–22 thousand a year over 2015–2018.

Table 3.3.2: Work accident rates per one-hundred thousand employees in Hungary, 2009–2018

Year	Fatal	Non-fatal, serious[a]	Year	Fatal	Non-fatal, serious[a]
2009	91	15,326	2014	74	15,918
2010	89	16,326	2015	81	17,013
2011	75	14,277	2016	75	22,429
2012	60	16,717	2017	76	20,858
2013	50	15,401	2018	71	19,580

[a] Accident resulting in at least four days of absence from work.
Source: *Eurostat* (2019).

The differences between incidence rates in Hungarian sectors and types of businesses are also distorted by differences in willingness to report, similarly to international comparison. As shown in *Table 3.3.3*, the *construction sector* accounts for more than one-quarter of fatal accidents; however, its share in the total number of accidents is less than four per cent. A similar imbalance is seen in *agriculture* and to some extent *transport,* while the opposite is seen in manufacturing which accounts for 40 per cent of all reported accidents and only 15 per cent of fatal accidents in the period 2011–2017. Similarly, while the share of *enterprises with a headcount of less than ten* report more than 40 per cent of fatal accidents, they only account for 9 per cent of all reported accidents.

The data reveal that the likelihood of reporting non-fatal accidents is considerably below the average in construction, agriculture, transport and in general at small enterprises and that this has a major impact on the total incident rate at national level. Economy-wide risk cannot be judged and the differences in risks across sectors or occupations may only be inferred from the incidence rates of fatal accidents.

The ESAW (*European Statistics on Accidents at Work*) database we used – the microdata of which is collected by the Department of Occupational Safety of the Ministry for Innovation and Technology and was made available for us by the Central Statistical Office (CSO) with the permission of the Ministry – only includes accidents and not the number of cases per person or per hours worked in the various sectors or occupations. Therefore we calculated the number of

working days in occupations, sectors and size of enterprise from the 2011–2017 data of the Admin3 database[1] compiled by the Centre for Economic and Regional Studies (CERS) and expressed the number of fatal accidents in these categories in relation to that.[2] The rates are shown in the three parts of *Figure 3.3.1*.

1 The brief description of the database is included in the Annex of *In Focus* and in more detail in *Sebők* (2019).

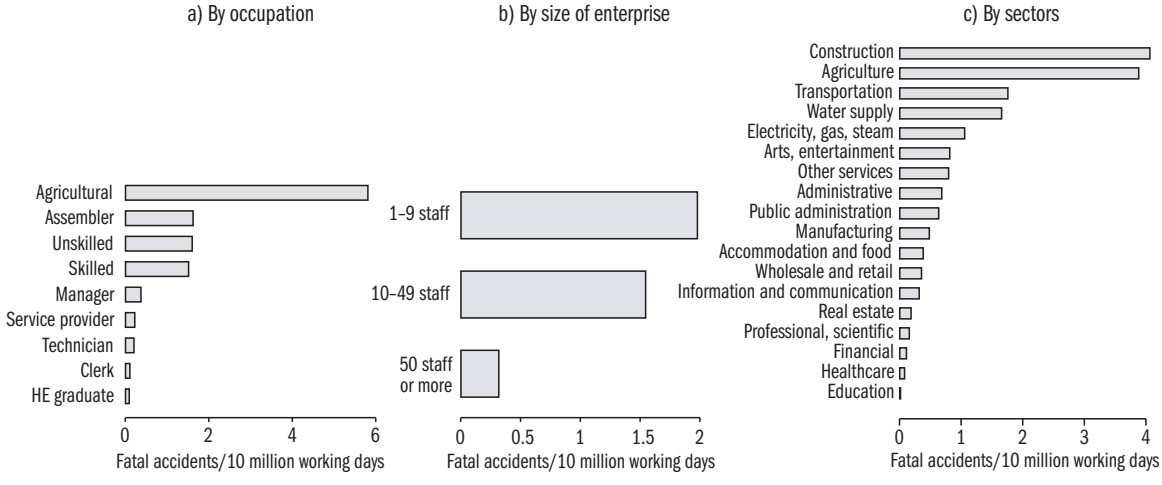
2 The calculations were made in the CSO–CERS research lab.

Table 3.3.3: The share of sectors and size of enterprises in total and fatal accidents, 2011–2017

	Share (percentage)	
	in fatal accidents	in total accidents
Sectors		
Construction	25.4	3.9
Transportation and storage	16.4	12.9
Manufacturing	15.1	37.2
Agriculture and fishing	14.4	3.5
Trade	6.6	11.8
Other sectors	22.1	30.7
Total	100.0	100.0
Enterprises with a headcount of		
1–9	40.6	9.0
10–49	32.8	24.7
50–249	15.9	33.5
250–499	4.0	11.4
500 or more	6.4	21.3
Unknown	0.3	0.1
Total	100.0	100.0

Number of cases: 161,659 accidents, of which 603 fatal
Source: *ESAW* database.

Figure 3.3.1: Incidence of fatal accidents in 2011–2017, per 10 million working days



Source: Authors' calculations based on the *ESAW* and Admin3 databases.

As for the victims of fatal accidents, 95 per cent of them are male and 41 per cent of them are older than fifty, while only slightly more than a quarter of employees fall into this category according to the Labour Force Survey of the CSO.[3] 69 per cent of victims had the accident at a temporary place of work (i.e. not in a familiar work environment) and 40 per cent of them had it on the way (but only 11 per cent on road). The latter reveals that an unknown and changeable environment is a significant risk factor.

The time of absence from work resulting from accidents reported may only roughly be calculated (and obviously underestimated) "on the back of an envelope". Supposing that the same proportion of absence that started in year $t - 1$ extends into year t as that of year t into year $t + 1$ implying a kind of steady-state, calculations based on ESAW data from 2016 may be made as follows.

We assumed that all accidents occur on 1 January. The number of fatal accidents were known: they were included with an absence of 365 days. In the case of absences of more than six months we assumed a six-month duration as the low-end estimate and a 12-month duration as a high-end estimate, while absences with unknown duration were included as the average of those with a known duration. The total number of insured days were assumed to be 4.2 million times 365 days. Based on this calculation, the rate of working days lost due to accidents at work is between 0.12 and 0.16 per cent and is definitely lower than 1 per cent even if accounting for latency. These figures are not high: the sad significance of workplace accidents lies not in direct financial loss but in the trauma suffered by victims and their families and the possible long-term health damage (of unknown duration).

3 In Q3 2018 it was for example 28.5 per cent.

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K3.1 Accident risk and wages – theoretical considerations

JÁNOS KÖLLŐ

Most people would offer all their possessions to avoid an *almost certain* death. We would also spend a lot of money and time to prevent a *highly likely* accident. However, in our everyday decisions, when these risks seem smaller and more distant, we tend to take risks that we would be able to mitigate or effectively prevent at some financial expense. When we make financial sacrifices to preserve our health or accept financial advantages in exchange for minor or major health or death risks, we implicitly put a price on our life and health whether admitting it or not. (For a more detailed and comprehensive description of this trade-off, see for example *Ashenfelter–Greenstone,* 2004b).

Take two firms, both with a thousand employees who have identical characteristics and do the same job. At firm *A* the probability of a fatal accident within a year is nearly zero ($p \gg 0$), while at firm *B* it is $p + 0{,}001$. The employees of firm *B* accept this additional risk for higher wages: whereas employees of firm *A* earn HUF *w* annually, employees at firm *B* earn HUF $w + 6600$. In other words, workers at firm *B* accept the one-thousandth higher risk in exchange for a premium of HUF 6600 – for the fact that one of them almost certainly dies each year. In total, the one thousand employees accept HUF 6.6 million for an annual fatality: according to their not necessarily conscious judgement reflected in their choice this is the value of a life. It is highly likely that the employees of firm *B* would not give this as an answer for the question "How much do you think a life is worth?" if they talked to you at all after hearing such a question. However, this is the judgement reflected in the preferences revealed by their decision, under certain circumstances.[1]

What are the circumstances? "Compensatory wage differences", reflecting differences in accident risks, can only evolve if workers are aware of the existence and extent of workplace risks (for example 60–70 years ago they knew very little about the carcinogenic effect of asbestos or petroleum). It is equally important that employees can choose from low- and high-risk but otherwise similar workplaces freely, aware of health risks and based on their risk preferences.[2] Another prerequisite is that the staff or institution deciding about wages appropriately assess the risk preferences of the typical member of the targeted segment of the labour force. It is disputed and needs thorough analysis to what extent these conditions exist in the various labour markets.

In a purely competitive economy, with well-informed and freely deciding actors, a specific balance is established between accident risk and wages. Individuals are different in assessing risk and wages and firms differ as to what costs they incur to reduce accident risks. Where these costs are high, it is worthwhile for firms to offer well-paid but high-risk jobs and where they are low, the offer of less risky but worse-paying firms is more competitive. The balance implies that risk averse employees find worse-paying but less risky vacancies more attractive and these are offered by firms that can mitigate risks at a low cost. Less risk averse employees prefer well-paid but high-risk jobs and these are offered by firms that would only be able to mitigate accident risks at very high costs. Ideally, a "wage–risk balance price curve" develops, which provides a range of equally favourable and feasible salary offers for heterogeneous employers and employees.

1 The labour economics textbook by *Borjas* (2009) uses a similar example to illustrate the notion of "statistical value of a life" *Borjas* (2009).

2 The time of learning about the risks is not crucial for *the development of compensatory wage differences*. The decrease in the number of applicants or the increasing number of those quitting may also force an employer to raise wages if staff turnover is costly for them. Obviously, from the point of view of individuals it is quite a difference whether they are informed about the risks before or after joining the firm.

The empirical analysis of these associations is particularly difficult (*Ashenfelter–Greenstone,* 2004a). It must be guaranteed that jobs differing in the extent of accident risk but similar in all other respects are compared and that the impact of workplace characteristics *generally considered* advantageous or disadvantageous on wages is included.[3] Consequently, it was only at the end of the twentieth century that significant research has started, when large and rich databases became accessible.

Several empirical studies have been conducted on the trade-off between accident risk and time saving valued at an average hourly wage (see *Bellavance et al,* 2009). The pioneering research of *Ashenfelter–Greenstone* (2004b), which explored the consequences of raising the speed limit in the United States, is a good example of the logic of this method. In the late 80's speed limit was raised for rural interstate roads in 38 states. The raise increased fatality rates per passenger-kilometre by 35 per cent but considerably reduced journey times. Based on the relationship of the two and traffic data, it was possible to estimate that every additional fatality saved 125,000 hours of journey time. Using the 12-dollar average hourly wage of the time, savings were estimated to be 1.5 million dollars per fatality: this is considered the value of a *statistical* life in the decision concerned.[4]

Estimates adopting similar logic have also been undertaken in Hungary about the trade-off between workplace accident risks and wages by *Adorján* (2001) and *Kaderják et al* (2005). The latter study included estimation based on 456 fatal and 90,673 non-fatal workplace accidents from the period 1994–1996. The time and location of the accidents, broken down by sector, occupation and firm, was also known. The authors estimated wage equations using explanatory variables measuring risk among others and found that a one-thousandth higher risk of fatality resulted in 20–25-months' and a one-thousandth higher risk of non-fatal accident in 1 months' of additional lifetime earnings. According to this estimate, the value of a statistical life was equal to HUF 13–44 million (HUF 78–264 million at current prices), while the price of preventing an accident was HUF 540–640 thousand (HUF 3.2–3.8 million at current prices). (More recent assessment of workplace accidents broken down by occupation, size of employer and sector is presented in *Subchapter 3.3.*)

Handling the Covid-19 pandemic, rampant both in Hungary and abroad at the time of writing the Subchapter, is a good example of a similar logic behind government decisions. Hungary restrained the number of serious cases within hospital capacities at great economic costs in the first wave. In the second wave, until the submission of this manuscript, the government refused to adopt measures which are significantly detrimental to economic performance, consciously acknowledging that it results in numerous fatalities avoidable at greater economic costs.

3 The importance of workplace attributes is subjective: for example some like to work indoors, at a permanent location, while others prefer to work outdoors and constantly on the move.

4 Adopting the difference-in-differences method, authors compared data from before and after the introduction of the measure in states raising and those not raising the speed limit.

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K3.2 The effect of the smoking ban on the newborns of women working in the hospitality sector

TAMÁS HAJDU & GÁBOR HAJDU

Numerous diseases and a significant proportion of avoidable deaths can be linked to smoking, both globally (*GBD 2015 Tobacco Collaborators*, 2017) and in Hungary (*Wéber*, 2016). This creates a notable level of healthcare expenditure (*Gresz et al*, 2012). Thus, among the public policy measures intending to promote a healthier lifestyle, the measures aimed at discouraging smoking are of highlighted importance. In this piece we are presenting an example of the possibility that public policy measures pertaining to the workplace environment and regulating smoking may have a sizeable positive impact on health.

In Hungary, as a result of the tightening of Act XLII of 1999 on the protection of non-smokers that came into effect in 2012, smoking was banned in workplaces, public institutions, and public means of transportation, among others. The biggest changes occurred in catering establishments and pubs, which formerly, in the absence of considerable statutory restrictions, enjoyed a rare exemption from the smoking ban (*Tárnoki et al*, 2009).

Using micro data sets of the HCSO on live births, fetal losses, and infant deaths, we examined how the smoking ban influenced the health of the newborns of women working in restaurants and drinking establishments (*Hajdu–Hajdu*, 2018). We used the difference in differences method for the analysis. We compared the changes in the health indicators of the newborns of women working either as waitresses or servers that occurred between the periods prior to and following the tightening of the law (a two-year period in total) to the similar data of a control group. The control group was comprised of the newborns of women working in the commercial and service sectors (such as shop attendants, cashiers, hairdressers, beauticians). In the latter group, mothers had typically worked in smoke-free workplace environments during their pregnancies already before the change in legislation, and not only after it, but they did not differ significantly from the women working in catering establishments in their other characteristics.

According to our findings, the smoking ban caused a significant improvement in the health of the newborns of women working at catering establishments. As a result of the change in legislation, the average birth weight increased (by 55 grams), and the rates of low birth weight newborns (under 2500 grams) and premature births decreased (by approximately 2 percentage points each). Favourable changes can be seen in other health indicators as well. The estimated effects are similar to the effects of restrictive measures on smoking measured in other countries (see *Bharadwaj et al*, 2014).

The introduction of the smoking ban may improve newborn health by way of two main mechanisms. On the one hand, it may motivate women smokers to quit smoking. On the other hand, the workplace environment becomes smoke-free as a result of the ban, and thus, passive smoking is decreased. The databases used do not contain any information about smoking habits, therefore we were unable to investigate the significance of these two factors directly, but we found bigger effects for the newborns of women who had no secondary school diploma – who, according to surveys, are smokers in higher proportions. (*Tombor et al*, 2011). These facts indicate that the ban may have caused an improvement in indicators of health at birth by way of causing a change in the smoking habits of the women in question.

In conclusion, our findings show that the smoking ban introduced in catering establishments and pubs had a favourable effect on the indicators of health at birth of the newborns of women working at such locations.

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3.4 THE INCENTIVE EFFECTS OF SICKNESS ABSENCE COMPENSATION

MÁRTON CSILLAG, KINGA MARCZELL & LILI MÁRK

While labour economists have studied the behavioural effects of unemployment insurance benefits in depth, research on the labour market effects of insurance-based monetary compensation for (long-term) ill health (such as long-term sickness absence compensation or temporary disability benefits) only started 20 years ago. During the same period, the take-up of, and public spending on, such benefits have increased significantly, and the total spending on such benefits regularly exceeds the outlay on unemployment benefits.[1] Simultaneously, in a number of countries the behavioural requirements for UI benefits have been made stricter, and in many cases sickness absence compensation is significantly higher than unemployment benefits. Hence, the question is to what extent is the use of sickness absence compensation unwarranted, and how can those individuals affected be incentivised to return to work as quickly as possible after their health has recovered?

Changes in sickness absence compensation and the number of days spent on long-term sickness leave (2015–2019)

The role of sickness absence on the labour market in Hungary is more limited, and since the second half of the 1990s the proportion of eligible workers on sickness leave, and the total number of days on (long-term) sickness benefit was relatively low, and hence the public spending on this benefit amounted to roughly 0.4 percent of the GDP. Despite these low numbers, and largely for budgetary reasons, the generosity of (long-term) sickness benefits was cut in several steps and in different ways between 2009 and 2011.[2] As a result, Hungary is among the least generous among the EU member states (*Spasova et al*, 2016).

These changes in rules governing sickness absence compensations made it possible for researchers to study the incentive effect of the design of benefits. The changes affected three key parameters. First, starting in 2009 the *replacement rate* of the sickness benefit was reduced to 60 percent from the prior 70 percent of earnings. Second, a *maximum* for (daily) sickness benefits was introduced in May 2009 (this amounted to four times the daily minimum wages), and in May of 2011 this upper threshold was cut to half its previous value. Third, the length of '*passive sickness benefits*' – which is a sickness compensation a person could receive even after their insurance (employment spell) has ended (in the event that they applied for sickness benefit within 3 days following the end of the employment relationship) – was shortened in several

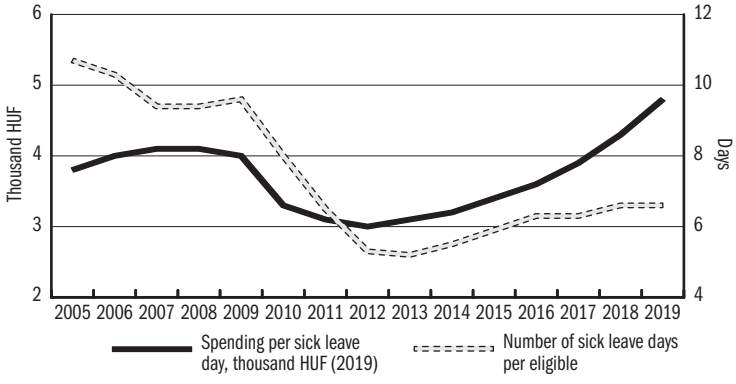
1 The prime example for this is Norway where the spending on sickness-related benefits amounts to 2.5 percent of GDP (which is more than triple the spending on unemployment-related benefits), but – for instance – in Germany and the Netherlands spending on sickness benefits is around 1.5 percent of GDP. Source: Eurostat [spr_exp_fsi].

2 For more details, see: KSH (2014).

steps. Until 2009,[3] the maximum duration of the benefits was 90 days, which was cut to 45 days in 2007, to 30 days in 2009, and finally, 'passive sickness benefits' were abolished in 2011.[4]

It is likely that the aggregate number of days spent on sick leave and the total compensation was primarily driven by these changes in regulations. As can be easily seen in *Figure 3.4.1,* following the curbing of the generosity of benefits between 2009–2011, the number of days spent on sick leave dropped (by more than 40 percent), and the spending per sick day also decreased (by close to 25 percent).[5] Besides these factors, it is clear that spending per sick day is driven by changes in real wages; while the number of days spent on sick leave is influenced by the economic cycle, it follows a pro-cyclical pattern.

Figure 3.4.1: Number of sick leave days per eligible person (right scale) and costs per sick leave days (left scale)



Source: *KSH* Stadat, 2.5.19. Health insurance, sick leave.

The incentive effect of sick pay

Csillag (2019) analysed whether the cuts in long-term sick pay incentivised sick workers to return to work quickly.[6] The main issue is that the income while on sick leave (the sick pay) and the financial payoff to returning to work (wages) are highly positively correlated, since sick pay is typically equal to a fixed proportion of labour income. Thus, *Csillag* (2019) uses the drastic cut of the maximum sickness benefit as a natural experiment. He compares the evolution of sick leave days of persons who had earnings slightly lower than the 2011 maximum sick pay with two groups: 1) those who had earnings higher than the 2011 maximum sick pay, but lower than the 2009 threshold; and 2) those with the highest earnings, who were already affected by the 2009 maximum threshold.[7] While the 2011 legislation left the replacement rate of the sick pay in the first (control) group unchanged between 2010 and 2011; the (average) replacement rate fell from 60 to 30 percent in the second group; and it was cut in half (from 42 to 21 percent) in the highest earnings group.

3 Earlier, between 1997 – 2003 the maximum duration of passive sickness benefits was 180 days, it was decreased to 90 days in 2004.

4 In most EU member states the insured unemployed are eligible for some kind of sickness benefits (*Spasova et al.,* 2016).

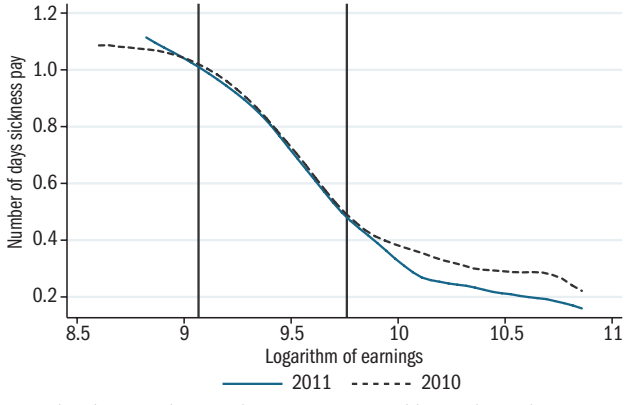
5 As a result of these changes, while in 2009 spending on sickness benefits amounted to 0.38 percent of GDP, in 2012 spending was ony 0.19 percent of GDP.

6 While it seems straightforward that sick pay influences the length of sickness leave spells, there is a large range of results in the empirical literature. While *Böckermann et al*. (2019) find that in Finland, a 10 percent decrease in sick pay decreases the duration of sickness leave by about 10 percent, neither *Ziebarth* (2013) for Germany, nor *Bryso–Dale-Olsen* (2019) for Norway found any effect.

7 These values were the following (expressed in gross earnings in 2010): the maximum in 2009 was 520 thousand HUF, while the 2011 maximum was half of this. This threshold potentially affected only the highest earning 6 percent of male (full-time) employees, the 2011 maximum affected 23 percent.

The basic results of the analysis[8] can clearly be seen in *Figure 3.4.2:* while the number of sick leave days significantly decreased between 2010 and 2011 in the highest earnings group, in the medium and lower earnings group there was no change. The regression results confirm that the number of days spent on sick leave fell to half its value in the high earnings group; and the estimated elasticity of the number of days of sick leave to the sick pay is 0.45. In other words, if the sick pay is reduced by 10 percent, the number of days spent on sick leave is reduced by 4.5 percent.

Figure 3.4.2: The number of days spent on sick leave as a function of previous earnings, 2010, 2011



Note: Local polinomial smoothing. The vertical lines show the maximum benefit thresholds for 2009 and 2011.
Source: *Csillag* (2019).

The finding that sick workers do react to financial incentives leads to further questions. To what extent did sick workers remain on sickness benefit longer than which their health status strictly required prior to the sick pay cuts? Or is it the case that due to the sick pay cuts they return to work before full recovery, and as a result their own health deteriorates in the long term or they possibly infect their co-workers?[9] *Marczell* (2018) sought to answer these questions by estimating the effect of the decrease in sick leave days brought about by the sick pay cuts on health expenditures. Her hypothesis is that if the health expenditures of the sick workers (or their colleagues') increases due to the decrease in sick leave days, this is a sign that sick workers returned 'too early' to work. However in her empirical analysis, *Marczell* (2018) does not find a statistically significant relationship between the number of days spent on sick leave and (later) health expenditures.

The role of managers in sick leave take-up

Naturally, the number of days spent on sick leave is influenced not only by financial incentives, but also by corporate culture. *Marczell* (2018) found em-

8 *Csillag* (2019) used a sample of male employees between age 25–54, restricting the sample to those with a stable employment history and who were in the top 35 percentiles of the earnings distribution. The sample was bassed on the CERS Databank 'admin2' database, specifically using data from the second semester of 2010 and 2011.

9 *Csillag* (2019) only showed that those are the most sensitive to financial incentives who, in all likelihood, are not chronically ill.

pirical evidence supporting this hypothesis in the case of pregnant women. What influences sick leave in this group is a very important question, since the typical pregnant woman in Hungary spent 16 weeks on sickness leave between 2003–2011 (due to the pregnancy being considered 'high risk');[10] and spending extended periods out of work negatively affects later employment status of women according to the international literature. *Marczell* (2018) puts forward the hypothesis that managers who recently gave birth can induce pregnant employees to spend less time on sickness leave, likely by creating a more inclusive workplace. According to the author's results, pregnant employees spend on average 1.5 weeks less on sickness leave when working with such managers. It seems that 1) this is not simply due to having female managers; 2) it is not due to the sorting of women who are in better health working in more inclusive workplaces, and 3) there is no (long-term) adverse health effect of working longer for these women.[11]

Long-term sickness benefits or unemployment insurance benefit following job-loss?

Márk–Csillag (2020) analysed the outcomes of those sick employees who lost their jobs and were eligible for the 'passive sickness benefits'.[12] First, they looked at the role of financial incentives in claiming passive sickness benefits. They find that not only are variables proxying individuals' health (health spending in the recent past) correlated with the decision to claim passive sickness benefits, but also those with higher earnings (and working in the public sector) had a higher propensity to take up passive sickness benefits following job-loss. They find that those who got significantly higher monetary benefits from claiming passive sickness benefits rather than UI benefits (which was maximised at a relatively low value) had a 1 percentage point higher probability to take up the first type of benefit.

The authors' second question is: if a portion of eligible persons indeed used passive sickness benefits as a substitute for UI benefits, then did the radical cuts to the maximum length of the claiming period speed up return to work for sick jobseekers?[13] Looking at the labour market history of those claiming passive sickness benefits before and after the 2007 legislation change, *Márk–Csillag* (2020) found no statistically significant difference. More precisely, those workers who had low health spending prior to job-loss (who are likely to be healthier) had a higher probability to be re-employed immediately after the expiration of the claimed passive sickness benefits (after 45 days), but this difference between the claimants before and after the policy change disappeared by 90 days following job-loss. By contrast, the legislative change had no effect on the re-employment behaviour of those who are likely to be chronically ill. In other words, while it is true that some employees who lost their jobs claimed passive benefit due to financial (rather than health-related)

10 This finding relates to those employees who had stable employment patterns. The sample was composed of those eligible for maternity benefits, meaning that they worked at least 180 days in the two years prior to giving birth, and from May 1st 2010 they had to work at least 365 days out of the last two years. The analysis was based on the CERS Databank 'admin2' database.

11 *Marczell* (2018) had no data on the health of the newborn.

12 They used males aged 25–54, who worked as employees at firms with at least 100 employees. In their sample, roughly 3 percent of all job endings result in 'passive sickness benefit'.

13 The literature on the maximum duration of UI benefits clearly shows that longer potential duration leads to longer non-employment spells.

reasons, shortening the benefit duration did not lead to significantly quicker job finding on average. This is in line with the early literature on the effect of cutting the maximum duration of unemployment insurance benefits (see *Galasi–Nagy*, 2002).

Summary

The legislative changes concerning long-term sickness benefits in the past fifteen years led to a significant cut in its generosity. The papers analysing claiming behaviour of long-term sickness benefits all came to the conclusion that not only the person's health condition, but also financial incentives played a role. This was the case both for the number of days spent on long-term sickness benefits and the take-up of passive sickness benefits. The crucial question in future research projects ought to be whether sickness benefits are at such a low level that many people return to work before full recovery, or rather that the decrease in generosity led to the curbing of fraudulent claiming behaviour.

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K3.3 The effect of the development of outpatient health care services on workers – the example of a social infrastructure development project

MÁRTON CSILLAG & PÉTER ELEK

Investment in health care services can have indirect labour market effects, as the health status of local residents might improve leading to higher employability, as well as by decreasing the time spent on sick leave for those employed. We aim to measure these potential effects in the case of a development project funded by the European Union (Social Infrastructure Operative Project 2.1.2), whereby local outpatient units were established between 2010 and 2012 in twenty micro-regions which did not have such specialised services previously.[1] In previous papers (*Elek et al.*, 2015, 2019) we showed that, thanks to these investments, an additional 310 thousand persons could access outpatient care with a car ride of no more than 20 minutes, and as a result, the number of outpatient care visits increased by 19 percent. We also found results which point to positive health effects: the number of impatient stays decreased by 1.6 percent and potentially avoidable hospitalisation (PAH) decreased even more, by 5 percent. In this short piece, we look at the distribution of these effects across groups of the working age population defined by labour income; as well as estimating the effect of the investment on the number of days spent on long-term sick pay and on the employment probability. Similarly to our earlier papers, we compare the outcomes of individuals in the twenty micro regions affected by the development with those of control micro-regions which were matched on the basis of pre-treatment characteristics using propensity score matching.

We use the Admin3 database provided by the Databank of the Centre for Economic and Regional Studies [CERS (KRTK)], which contains labour market data for the years 2003–2017 and health care data for the years 2009–2017 for a 50 percent random sample of the Hungarian adult population.[2] In *Table K3.3.1*, we show the effect of the development for all persons aged 25–59, as well as effects separately for four groups of roughly equal size defined based on their average labour market incomes between 2007–2009. As a result of the investment, the number of outpatient care visits increased by 18–23 percent for the working age population, irrespective of labour incomes. By contrast, the increase in spending (in HUF) on outpatient care was more than 50 percent higher for individuals with no labour market income than for persons in the highest income category, which is due to the fact that the first group is in worse health, hence health spending in the baseline period was already much higher for them. We can observe some substitution between inpatient and outpatient services, as the probability of hospitalisation (more precisely: the odds of hospitalisation) decreased by 3 percent. The number of drug prescriptions and the number of visits to GPs also increased by a few percent, primarily for the groups with low labour income.

Our hypothesis is that if quality health care becomes accessible in a micro-region, then the health status of residents will improve and hence they will be out of work due to illness less (among those employed). We measured this by the number of days on long-term sick leave,[3] but we found no effects (see *Table K3.3.2*). We also estimated the potential effect on employment rate, which is relevant for three reasons. First: due to improvement in health condition, more persons can work. Second, if more persons work, then the pool of employed persons is less positively selected based on health status, hence estimated effects on sickness absence can be biased.

(*continued on page 134.*)

1 At the time of the infrastructural development, the 'subregion' administrative system was in place, this was changed to the 'district' system in 2012. We use the latter coding system, due to data availability.

2 See the Appendix to the 'In Focus' section for a detailed description of the database.

3 We only included individuals who worked at least three months in a given year in the sample.

Table K3.3.1: The effect of the establishment of new outpatient care units on different health care utilisation variables, by labour market income groups

	All age 25–59	Average monthly labour income in 2007–2009 (thousand HUF)			
		0	1–600	600–1320	1320+
Yearly totals (logarithm)					
Number of outpatient care visits	0.217***	0.231***	0.228***	0.221***	0.183***
	(0.0060)	(0.011)	(0.012)	(0.012)	(0.012)
Inpatient stay odds	-0.034**	-0.047*	-0.048*	0.018	-0.047
	(0.013)	(0.025)	(0.025)	(0.027)	(0.030)
Number of drug prescriptions	0.033***	0.037***	0.041***	0.031***	0.017*
	(0.0047)	(0.0083)	(0.0106)	(0.0093)	(0.0091)
Number of GP visits	0.025***	0.021***	0.041***	0.030***	0.0032
	(0.0035)	(0.0071)	(0.0074)	(0.0069)	(0.0068)
Yearly total spending (HUF)					
Outpatient spending	2433***	3165***	2361***	2305***	1905***
	(80)	(179)	(150)	(148)	(163)
Inpatient spending	-849	-2160	-1369	-768	716
	(604)	(1395)	(1,326)	(981)	(1117)
Spending on medications	-392	-944	385	-1408	552
	(690)	(1725)	(1165)	(1342)	(1257)
Number of observations	1,403,478	346,804	372,952	358,657	325,065
Number of individuals	249,358	68,510	68,235	59,201	53,412

Notes: Standard errors clustered at the individual level (except logit models).
Estimated models were fixed-effect Poisson for number of visits, fixed effects logit for probability of hospitalisation, fixed effects linear models for spending. Control variables: cubic function of age; calendar year, individual fixed effect. Sample: individuals aged 25–59 living in micro-regions with outpatient unit development and control micro-regions. Sample period: 2009–2015.
Significant at the *** 1 percent, ** 5 percent, * 10 percent levels.
Source: Own estimation based on the Admin3 database.

Table K3.3.2: The effect of the establishment of new outpatient care units on employment outcomes

	Number of days on long-term sick pay (log effect)	Employed for at least 3 months (log odds)	Number of days in insured employment (linear effect)
After the establishment	0.0059	-0.0189*	0.502
	(0.0205)	(0.0108)	(0.517)
Number of observations	508,531	372,952	1,820,493
Number of individuals	76,664	68,235	267,919

Notes: Standard errors clustered at the individual level (except logit models).
Estimated models were fixed-effect Poisson for number of days on sick leave, fixed effects logit for probability of employment, fixed effects linear model for number of days employed. Control variables: cubic function of age; calendar year, individual fixed effect. Sample: individuals aged 25–59 living in micro-regions with outpatient unit development and control micro-regions. The estimation for number of long-term sickness pay days was done on a sample which included those who were insured for at least 3 months in a given year. The number of observations differ across estimations since the logit model does not use those individuals whose outcome did not.
Sample period: 2009–2015.
Source: Own estimation based on the Admin3 database.

Third, the investment in health care infrastructure can lead to an increase in employment (irrespective of the population's health outcomes). We examine effects on two outcomes: the probability that a person worked for at least 3 months, and the total number of days in (insured) employment in a given year. We find no statistically significant effect on employment (see *Table K3.3.2*). In future work, we plan on estimating effects on employability for persons suffering from specific long-term health conditions.

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K3.4 Health of Central and Eastern European Migrants*

ANIKÓ BÍRÓ

I analysed the health level of migrants from Central and Eastern Europe and Turkey (CEE, broadly defined) living in Germany, and how their health changes during the years spent in Germany. On average, population health in CEE is worse than in Germany. After moving to Germany, the health behaviours and healthcare use of the migrants might change, possibly affecting their health status.

The data used in my analysis originate from the German Socio-economic Panel (SOEP) database. The German SOEP is an annual panel survey of a representative sample of households living in Germany. I used data from years 1984–2013. The data cover lots of different topics, including demographic, socio-economic and health indicators, the country of origin and the integration to the host country. The first SOEP sample oversampled households with a Turkish, Greek, Yugoslavian, Spanish or Italian household head, which then constituted the main groups of foreigners in Germany. The first wave included 1,393 immigrant households and 4,528 native households. An immigrant sample was added to the SOEP in 1994–1995. This additional sample of 531 households consisted of households in which at least one household member had moved from abroad to West Germany after 1984. Finally, in year 2013, a migration sample of around 2,700 households was added, each household containing at least one person who had either immigrated to Germany since 1994 or whose parents had done so.

First, I conducted a descriptive analysis of the differences in health status in 2013 by the country of origin. On average, except for Turkish migrants and except for the indicators related to being overweight, the migrants with origins in CEE have better health than the native population. The better health of the immigrants can be due to the so-called *healthy migrant effect*, which is widely documented in the related literature (*Antecol–Bedard*, 2006, *Janevic et al.,* 2011). According to the healthy migrant effect, healthy individuals are more likely to migrate from a sending country, thus the immigrants in the host country have typically above average health status.

Next, I analysed with the help of regression models, how the estimated relation between the country of origin and health changes if individual level factors are netted out (age, gender, marital status, education level, labour force status, earnings, German language skills). The health differences remain even

* This chapter summarises the main results of *Bíró* (2018).

after netting out the influence of these individual level factors (*Table K3.4.1*). For instance, someone originating from an "other CEE country" (which group includes Hungary) is on average 8.7 percentage points more likely to report better health than a native German respondent in 2013, controlling for the other individual characteristics.

Table K3.4.1: Health differences between migrant and native groups in 2013

	Health satisfaction (0 to 10)	Good health (0/1)
Country of origin	(1)	(2)
Turkey	0.412***	0.0676**
	(0.158)	(0.0315)
Ex-Yugoslavia	0.870***	0.105***
	(0.143)	(0.235)
Russia, Ukraine, Belarus	0.742***	0.0511*
	(0.126)	(0.0267)
Other CEE	0.698***	0.0872***
	(0.119)	(0.0250)
Individual level controls	yes	yes
Number of observations	19,384	19,395

Notes: Robust standard errors in parentheses. Column (1) shows linear regression model results, column (2) shows average marginal effects from probit regression. *** 1 percent, ** 5 percent, * 10 percent significance levels.
Source: *Bíró* (2018).

I did not find evidence that the health of the immigrant population would deteriorate faster than the health of the native German population.

Further results show that the health advantage of the CEE migrants can be observed primarily among those who found employment in Germany. The lack of integration (reporting disadvantages due to origin) and limited German knowledge eliminate the health benefit. Thus, in order for a migrant from CEE to report good well-being, it is necessary to be sufficiently integrated in German society.

Overall, my analysis shows that typically the healthier individuals migrate from the CEE countries to Germany. If migrants can achieve good socio-economic conditions in terms of employment, earnings, and lack of isolation, then they are unlikely to impose additional burden on the health system of the host country.

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4 THE HEALTHCARE SYSTEM AS EMPLOYER

4.1 THE HEALTH OF HEALTHCARE WORKERS

JÚLIA VARGA

There have been relatively few studies conducted on the state of health and health behaviour of healthcare workers in Hungary. The existing analyses are usually based on data from survey-based data collection (see, for example, *Rurik–Kalabay,* 2009, *Győrffy et al.,* 2012, *Terebessy et al.,* 2016). In this subchapter, we provide a descriptive analysis of the development between 2009 and 2017 of some of the indicators that demonstrate the health behaviour and state of health of physicians and nurses,[1] using the data of the Admin3 dataset compiled by the databank of the Centre for Economic and Regional Studies (KRTK).[2]

The upper part of *Table 4.1.1* shows the frequency of use of various healthcare services (general practitioner, outpatient care, laboratory testing), as well as the number of days spent in inpatient care by the members of the observed groups. The lower part of the table attempts to grasp the occurrence of certain chronic illnesses. It shows, by various groups, the rate of these groups that take medications belonging to certain medication categories on a regular basis, that is, what is the rate of those among them who purchase these medications at least four times per year. The data is presented by the following groups: the adult population of at least 24 years of age; those working in professions requiring a tertiary educational attainment;[3] physicians who are actively working, that is, those who were working as physicians at the time of the observation; the group of former physicians, who worked as physicians for at least a month during the observed period, but no longer work as such, either due to a career change or because they chose to become inactive; finally, the group of nurses and specialised healthcare workers.

The separate examination of active and former physicians aims to uncover the differences that may be observable between those who are still working in healthcare and thus are able to access the services more easily, and those who had left healthcare. The group of former physicians is rather heterogeneous: it includes those who are working in other careers in Hungary, those who are temporarily inactive (on parental leave, for example), and retired physicians as well. However, the shared characteristic of the members of this group is that they used to work as physicians, but are no longer in direct connection to healthcare. This may affect their state of health or health behaviour.

In order to remove the effect of a few observed factors on the frequency of healthcare service use, and on the occurrence likelihood of certain diseases, we have estimated regression models. We compared the adult population and specialised healthcare workers using the subsample of the population of 24 years

1 Those belonging to the following FEOR codes were classified here: nurse, specialist nurse, midwife, general health assistant, health documentary, medical imaging diagnostic and therapeutic equipment manager, medical laboratory assistant, dental assistant, physiotherapy assistant.

2 For a brief description of the database, see the Appendix of In Focus. A more detailed description see *Sebők* (2019).

3 As there is no data available on educational attainment, we have considered those working in professions requiring a tertiary educational attainment (main FEOR groups 1, 2 and 3) as possessing such educational attainment. The group of those with a tertiary educational attainment does not include active and former physicians and specialised healthcare workers.

of age or older. We have examined active and former physicians and those with other tertiary educational attainment in separate models, using a subsample of data narrowed down to these three groups. We have examined the annual frequency of the use of the various healthcare services through OLS regressions, and we examined the likelihood of certain chronic and acute diseases through binary outcome probit models. The dependent variables in these models showed whether the individual suffers from the observed chronic illness (that is, whether they have purchased medications belonging to the medication group that is used for treating the given disease at least four times per year). Additionally, we have also run a model that examined the likelihood of whether the individual had a myocardial infarction during the period examined.

Table 4.1.1: The annual average healthcare service use rates of physicians, specialised healthcare workers, those with a tertiary educational attainment, and the adult population, between 2009 and 2017

	24-year-old or older population	Those with a tertiary educational attainment[a]	Active physicians	Former physicians	Nurses and specialised healthcare workers
A) Healthcare service use					
General practitioner (piece)	6.9	4.3	3.1	2.7	5.0
Outpatient care (piece)[b]	7.3	5.8	8.8	7.5	10.2
Laboratory testing (piece)	1.6	1.3	2.1	1.8	2.0
Inpatient care[c] (days)	2.4	0.62	0.85	0.82	0.78
B) The number of those regularly taking certain medications (percentage)[d]					
Insulin preparations and oral antidiabetics	6.3	2.3	3.0	2.9	2.2
Medications for hypertension (ATC C02 and C09)	30.1	15.0	20.6	18.4	16.1
Medications for psychotic disorders (ATC N05 and N06)	2.2	2.4	3.6	2.4	3.9
Medications for obstructive airway disease (ATC R03)	1.0	1.0	1.7	1.2	1.4
Antibiotics (ATC J01)	1.7	1.5	8.2	6.3	3.0

[a] Excluding physicians and specialised healthcare workers.
[b] Excluding laboratory testing.
[c] Days spent in inpatient care.
[d] At least four purchases per year.
Source: Authors' own calculations based on the Admin3 database.

Explanatory variables included the individual's sex, age, the logarithm of the total of their monthly wages, the logarithm of the total of the time they spent in employment (across all jobs), and year fixed effects. Additionally, in the models examining the behaviour of specialised healthcare workers, a binary variable showed whether the individual was working as a specialised healthcare worker. In the models comparing physicians and those with other tertiary

educational attainment, binary variables showed whether the individual was an active or former physician.

The results of the OLS models that describe the frequency of service use and the estimated coefficients are presented in *Tables 4.1.2* and *4.1.3,* while the results of the probit models and the marginal effects are shown in *Tables 4.1.4* and *4.1.5.*

Nurses and specialised healthcare workers visit their general practitioners less frequently than the rest of the adult population. While active and former physicians visit their general practitioners much less frequently than those with other tertiary educational attainment. Nurses and specialised healthcare workers, as well as active and former physicians use the outpatient care and laboratory testing more frequently than the reference groups used for comparison. Physicians also spend somewhat longer periods in inpatient care than those with other tertiary educational attainment. The reason behind the lower use rate of general practitioner care is presumably the fact that in the case of minor symptoms, both physicians and specialised healthcare workers are capable of establishing a diagnosis and determining the necessary treatment. The difference in outpatient care, laboratory testing and the days spent in inpatient care could be explained by their worse state of health, but also by their behaviour being more health-conscious compared to the other groups.

Table 4.1.2: The use of various healthcare services among specialised healthcare workers, relative to the adult population of at least 24 years of age (excluding physicians)

	Number of visits to the general practitioner (annually)	Number of times outpatient care was used (annually)	Number of times laboratory testing was used (annually)	Days spent in inpatient care (annually)
Specialised healthcare worker, nurse	–0.53***	3.88***	0.74***	–0.04
	(0.04)	(0.06)	(0.02)	(0.03)
Number of cases	672,742	672,742	672,742	672,742

Note: OLS regressions. Control variables: sex, age, total of monthly wages (logarithm), total of the time spent in employment, across all jobs (logarithm), year fixed effects. Robust standard errors in brackets.
Significant at the *** 1 percent, ** 5 percent, * 10 percent levels.
Source: Authors' own calculations based on the Admin3 database.

Compared to the total adult population, nurses and specialised healthcare workers are more likely to be taking medications used to treat diabetes and hypertension, as well as antibiotics, and are less likely to be taking medications used to treat psychotic disorders, than the total adult population (*Table 4.1.4*). Active and former physicians are significantly less likely to be regularly taking medications used to treat diabetes and hypertension, compared to those with other tertiary educational attainment who have similar characteristics. Active physicians are more likely to be taking medications used to treat obstructive airway diseases (*Table 4.1.5*).

Table 4.1.3: The use of various healthcare services among active and former physicians, relative to the adult population with tertiary educational attainment

	Number of visits to the general practitioner (annually)	Number of times outpatient care was used (annually)	Number of times laboratory testing was used (annually)	Days spent in inpatient care (annually)
Active physician	–2.26***	3.16***	0.93***	0.12***
	(0.04)	(0.10)	(0.03)	(0.04)
Former physician	–2.70***	1.57***	0.51***	0.11*
	(0.06)	(0.15)	(0.04)	(0.06)
Number of cases	412,754	412,754	412,754	412,754

Note: OLS regressions Control variables: sex, age, total of monthly wages (logarithm), total of the time spent in employment, across all jobs (logarithm), year fixed effects. Robust standard errors in brackets.
Significant at the *** 1 percent, ** 5 percent, * 10 percent levels.
Source: Authors' own calculations based on the Admin3 database.

Table 4.1.4: The likelihood of the occurrence of certain chronic and acute diseases and of taking antibiotics on a regular basis, relative to the adult population of at least 24 years of age (excluding physicians)

	Myocardial infarction	Diabetes	Hypertension	Psychotic disorders	Obstructive airway diseases	Antibiotics
Specialised healthcare worker	0.000	0.002**	0.005***	–0.001**	0.000	0.012***
	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)
Number of cases	672,742	672,742	672,742	672,742	672,742	672,742

Note: Binary outcome probit estimates, marginal effects (*dy/dx*). Chronic diseases defined on the basis of medication use. Control variables: sex, age, total of monthly wages (logarithm), total of the time spent in employment, across all jobs (logarithm), year fixed effects. Standard errors in brackets.
Significant at the *** 1 percent, ** 5 percent, * 10 percent levels.
Source: Authors' own calculations based on the Admin3 database.

Table 4.1.5: The likelihood of the occurrence of certain chronic and acute diseases and of taking antibiotics on a regular basis, among active and former physicians, relative to those with a tertiary educational attainment who are in employment

	Myocardial infarction	Diabetes	Hypertension	Psychotic disorders	Obstructive airway diseases	Antibiotics
Active physician	0.000	–0.005***	–0.023***	0.001	0.003***	0.059***
	(0.000)	(0.001)	(0.003)	(0.000)	(0.001)	(0.003)
Former physician	0.000	–0.007***	–0.040***	0.000	–0.001	0.033**
	(0.000)	(0.001)	(0.004)	(0.001)	(0.003)	(0.004)
Number of cases	412,754	412,754	412,754	412,754	412,754	412,754

Note: Binary outcome probit estimates, marginal effects (*dy/dx*). Chronic diseases defined on the basis of medication use. Control variables: sex, age, total of monthly wages (logarithm), total of the time spent in employment, across all jobs (logarithm), year fixed effects. Standard errors in brackets.
Significant at the *** 1 percent, ** 5 percent, * 10 percent levels.
Source: Authors' own calculations based on the Admin3 database.

There was no significant difference between the three groups regarding the likelihood of a myocardial infarction. Whether these differences are explained by differences in the likelihood of disease, the likelihood of the recognition of disease, or the likelihood of following treatment instructions, is yet to be determined through further research.

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4.2 THE OUT-MIGRATION OF PHYSICIANS BETWEEN 2009–2017

JÚLIA VARGA

In this subchapter, we present the development of the likelihood of the out-migration of physicians abroad between 2009 and 2017. This analysis repeats, using more recent data, the calculations of an earlier study (*Varga,* 2017) that examined the same question regarding the 2003–2011 period, in order to see whether changes can be observed in the likelihood of the out-migration of physicians. The earlier study found that beside the out-migration of physicians abroad, a domestic tendency of changing careers was also substantial between 2003 and 2011, and the rate of those going into inactivity temporarily or permanently was also rather high (by the end of this period, the rate of those leaving their careers as physicians due to the causes mentioned above was 12, 16 and 14 percent respectively between 2003 and 2011). Out-migration abroad accelerated particularly after employment restrictions were lifted in Germany and Austria.

The analysis uses the Admin3 database compiled by the databank of the Centre for Economic and Regional Studies (KRTK) as its baseline database, from which we have created a sample of physicians.[1] In the sample of physicians, it can be followed month by month, for nine years (between 2009 and 2017), whether the observed individual worked; if they did, in what positions, employment relationships, and for which employers; and if they did not, whether they received any social allowances,[2] and whether they were studying. We have chosen this period because the previous study also analysed the out-migration of physicians throughout a nine-year period, and in this way, findings can be compared. We included every individual in the sample who had worked as a physician between January 2009 and December 2017 *for at least one month,* that is, had a FEOR code as a general physician,[3] specialist physician or dental practitioner at least for one month during this period. 12,892 individuals were selected for the sample of physicians, whose status changes were followed month by month.[4]

In the category of those working abroad, we have included not only those who have officially signed out of Hungarian administration,[5] but we also tried to identify those who have retained a Hungarian address but are working abroad indefinitely. The same method was used for identifying this latter group of those working abroad that was used in the previous study.[6]

We examined the changes in physicians' likelihood of moving abroad for work through event history analysis. Since those who had changed careers did so due to different, mutually exclusive causes (moving abroad, starting a new career in a different profession but domestically, their status becoming inac-

1 You can find a brief description of the database in the Appendix of *In Focus*, and more details in the study of *Sebők* (2019).

2 Parental leave (GYES and GYED), pension, unemployment benefits, etc.

3 The FEOR group of general physicians includes general practitioners, occupational physicians and residents.

4 We have created five consolidated status categories: 1. is working as a physician, 2. is probably residing abroad, 3. is working within Hungary but in a different career (not as a physician), 4. is inactive or unemployed, 5. has deceased.

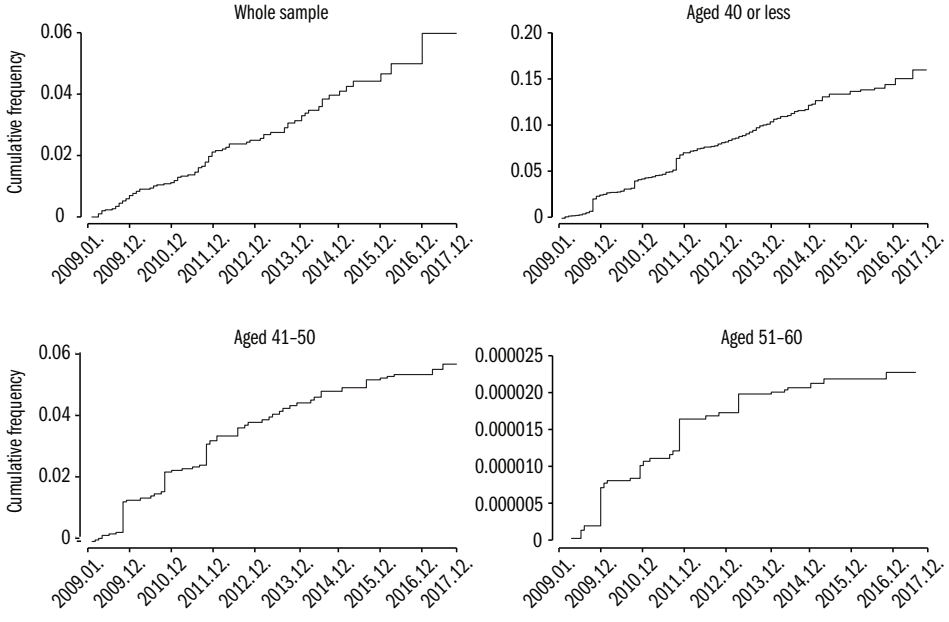
5 Those who have returned their official address card and have declared that they had settled abroad.

6 For a detailed description of the method, see: *Varga* (2017).

tive, or passing away), we have estimated competing risk models (*Fine–Gray,* 1999). This model calculates sub-hazards for the various competing outcomes, which show the momentary risk of someone changing careers due to one of the presented causes, if they were still working as physicians in the given month. We have completed the analysis for all of the competing outcomes, but here, only the results that pertain to moving abroad are presented.

Figure 4.2.1 shows the cause-specific cumulative incidence functions of *moving abroad* calculated for the whole sample and for the age group samples. The cause-specific cumulative frequency function shows the rate of doctors in month *t* who have, until month *t*, left their careers as physicians due to the given *cause* (in our case, moving abroad), considering that physicians may change careers not only due to moving abroad, but possibly other causes as well (changing careers within Hungary, becoming inactive or unemployed, death).

Figure 4.2.1: Cumulative incidence functions – moves abroad

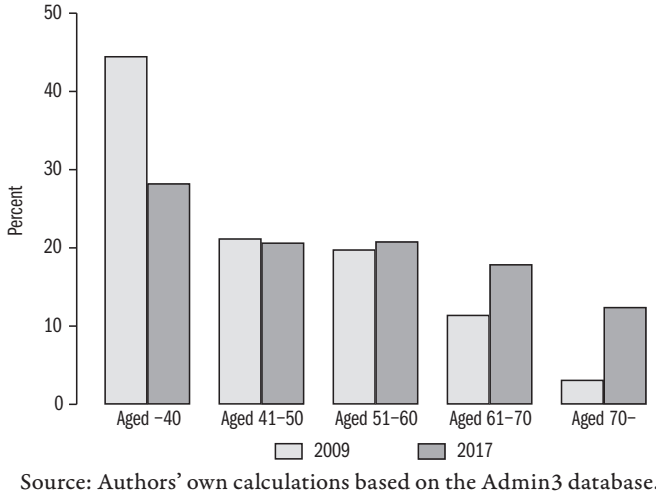


Source: Authors' own calculations based on the Admin3 database.

Approximately 6 percent of the whole sample left Hungary between January 2009 and December 2017. More than 16 percent of young physicians (under 40), 6 percent of those between the ages of 41–50, and a negligible fraction of physicians above the age of 50 moved abroad. Relative to the data of the 2003–2011 period, across all physicians, the rate of out-migration has become somewhat lower. At that time, 12 percent of all physicians left Hungary during that nine-year period. Examining the differences by age groups, what emerges is that among those under the age of 40, the rate of out-migration was higher

in the 2009–2017 period than during the preceding nine-year timeframe (16 percent *versus* 14 percent). The out-migration rate of those between the ages of 41–50 was the same in both periods, but the out-migration rate of physicians above the age of 50 decreased. Thus, the lower overall out-migration rate of the whole sample was a result of the lower out-migration rate of older physicians, as well as the fact that the rate of older physicians among all physicians grew substantially between 2009–2017 (*Figure 4.2.2*).

Figure 4.2.2: The distribution of physicians by age groups, in 2009 and in 2017



Source: Authors' own calculations based on the Admin3 database.

Table 4.2.1 presents the results pertaining to moving abroad of the competing risk models, for the whole sample and for the various age-based subsamples. The table shows the sub-hazard rates. In the case of a sub-hazard rate value that is higher than one, the likelihood of career change grows alongside the growth of the value of the variable; in the case of a value that is lower than one, the likelihood of career change decreases.

The results of the estimations made using the whole sample show that age is a determining factor in out-migration: younger physicians, as well as those whose peers from the same employer also left in the preceding 3 months of the observation, are more likely to go abroad. (As the age group-based results show, this effect is only significant in the age group of older physicians between the ages of 51–60.) Among young physicians not older than 40, and thus within the whole sample, females are more likely to move abroad for work. Among physicians between the ages of 40–50, the out-migration of males is more prevalent. Among young physicians not older than 40, the physicians that are more likely to move abroad for work are those whose relative wages (relative to the wages of those of the same age and same sex) are lower. Among physicians between the ages of 41–50 however, those that are more

likely move abroad for work are those with higher relative wages, which means that in the 41–50 age group, more successful physicians seem to be the ones that decide to make the move. (This result may be distorted by possible (not admitted) informal payments.)

Table 4.2.1: Moves abroad for work – sub-hazard rates

Variable	Whole sample	Those under the age of 40	Aged 41–50	Aged 51–60
Age	0.94***	–	–	–
	(0.004)			
Male	0.82*	0.52*	1.65**	1.41
	(0.084)	(0.071)	(0.356)	(0.435)
Dental practitioner	0.926	0.85	0.66	0.54
	(0.148)	(0.167)	(0.260)	(0.422)
Specialist physician	1.12	0.89	0.81	0.85
	(0.146)	(0.134)	(0.235)	(0.334)
Relative wages	0.97	0.78*	1.52***	1.31
	(0.113)	(0.1187)	(0.207)	(0.255)
Others from the same employer have also moved abroad in the preceding three months	1.24*	1.14	1.09	2.73*
	(0.112)	(0.169)	(0.251)	(0.387)
Others from the same employer have also changed careers in the preceding three months	0.99	1.15	0.97	1.07)
	(0.112)	(0.169)	(0.251)	(0.387)
Region	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Number of observed events	379,061	107,479	93,997	113,032
Number of observed individuals	12,892	5,423	4,381	4,874

Note: Competing risk models. Competing risks: Works in Hungary in a profession other than physician, is inactive or unemployed, deceased. Reference category: female, general physician.
Significant at the *** 1 percent, ** 5 percent, * 10 percent levels.

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5 UNEMPLOYMENT AND HEALTH

5.1 THE IMPACT OF THE ECONOMIC CRISIS AND JOB LOSS ON HEALTH

PÉTER ELEK, JUDIT KREKÓ & BALÁZS MUNKÁCSY

The impact of economic crises, including that of losing a job, on health indicators is an important subject of the economic literature. The cyclical fluctuations of the economy affect health through several direct and indirect, often conflicting, channels.

The cumulative effect of economic crises – channels and empirical findings

One of the most important channels is unemployment and, in general, the effects of income loss and labour market uncertainty on health. Declining standards of living may directly contribute to deteriorating health, since in poor financial circumstances there are fewer opportunities to live a healthy lifestyle. However, based on the literature, the mental health effects of unemployment and related uncertainties, the so-called "diseases of despair" (*Case–Deaton,* 2020) are likely to be more important than the direct effect of the deterioration of financial standing. Uncertainty about the future, lack of purpose and feelings of futility lead to mental health problems, which may manifest in drug abuse, suicide or alcohol-related liver diseases. *Schwandt–Wachter* (2020) found that cohorts entering the labour market in times of crisis have worse mortality rates even when middle-aged than those entering the labour market during an economic recovery, with diseases of despair playing a key role. *Bíró–Branyiczki* (2020), reviewed in *Subchapter 5.2*, report that the economic transition in Eastern-Europe and the related psycho-social shocks had long-term negative effects on the health of the local populations.

Nevertheless, reductions in economic activity may also improve health. At times of economic downturns, the number of road and occupational accidents and of the resulting deaths declines and health risks related to air pollution also decrease. At times of crisis it is easier to find staff for elderly care, which improves the mortality rate of the elderly. Less work-related stress also boosts health.

What does empirical research say about the overall effect? Aggregate analyses of the year 2008 and earlier economic crises suggest that total mortality is not strongly associated with the economic climate and is rather procyclical (that is, the number of deaths tends to decrease during economic downturns), although the effect strongly depends on the specificities of the crisis. Death rate from accidents is procyclical, while the number of suicides is con-

tracyclical and, among broader health indicators, primarily the deterioration of mental health is found as the result of economic crises.[1] Using Hungarian time series data, *Fountoulakis et al* (2014) found that an increase in unemployment is followed by the increase in suicides in 3–5 years.

Detailed analysis indicates that the slightly procyclical nature of total mortality is primarily due to the death rate of the elderly rather than the death rate of the working age population, implying that it is driven by effects beyond direct labour market factors. These may include a reduction in air pollution during crises or the worsening staff conditions of elderly care during economic recovery (see for example *Stevens et al,* 2015).

The impact of job loss on health

Indeed, the international literature specifically examining the impact of job loss on health mainly finds the increase of mortality and the deterioration of health. Since there may be a two-way causal relationship between changes in health and job loss (on the one hand, deteriorating health may accelerate job loss, on the other hand, job loss itself may impair health), therefore studies on the subject tend to focus on job loss due to plant closures and mass layoffs rather than job loss in general in order to reduce health-related selection (for example *Browning–Heinesen,* 2012). In the basic setup, dismissed workers are matched, using propensity score matching, with employed workers who have similar health and labour market history and then the two groups (treated and control) are followed to compare their mortality and other health indicators. Such analyses confirm the effect of job loss on mental health (for example *Kuhn et al,* 2009, *Schaller–Stevens,* 2015). Analysis of US data typically reveal greater effects than European data (for example *Riumallo-Herl et al,* 2014), which may be due to the fact that job loss in the United States often entails the loss of health insurance.[2]

Hungarian findings

Effect on claiming disability pension. Based on anonymised, linked health and labour market data from 2003–2011 of a 50 percent random sample of the Hungarian population (Admin2), available at the Databank of the Centre for Economic and Regional Studies [CERS (KRTK)], *Bíró–Elek* (2020) used mass layoffs in Hungary to investigate the impact of job loss on mortality and claiming disability pension. In accordance with the international literature, the study found that the mortality rate of those who have lost their jobs in mass layoffs is higher than the mortality rate of the control group, which had similar labour market and health history prior to the time of the job loss. Consequently, this estimate measures solely the impact of job loss on health. Similarly, the probability of claiming disability pension in four years is 1.5 times higher than that of the control group (4.3 per cent versus

1 See for example *Stuckler et al.* (2009), based on data of European countries from the period 1970–2007, the meta-analysis of *Parmar et al.* (2016) on studies exploring the impact of the 2008 crisis in Europe and *Ruhm* (2016), using US data, and the references therein.

2 For example *Schaller–Stevens* (2015) confirmed a reduction in the use of healthcare services among patients with a chronic disease whose employment used to be the primary form of health insurance in the United States.

2.9 per cent). At the time of claiming disability pension, individual inpatient, outpatient and pharmaceutical expenditures nearly triple, then start to diminish but still stay higher than prior to disability retirement. Detailed health data indicate that increased healthcare expenditure is due to the deterioration of physical health, to more frequent diagnoses of chronic diseases (for example hypertension and diabetes) and to the deterioration of mental health (measured by the consumption of medicines of the nervous system, including antidepressants).

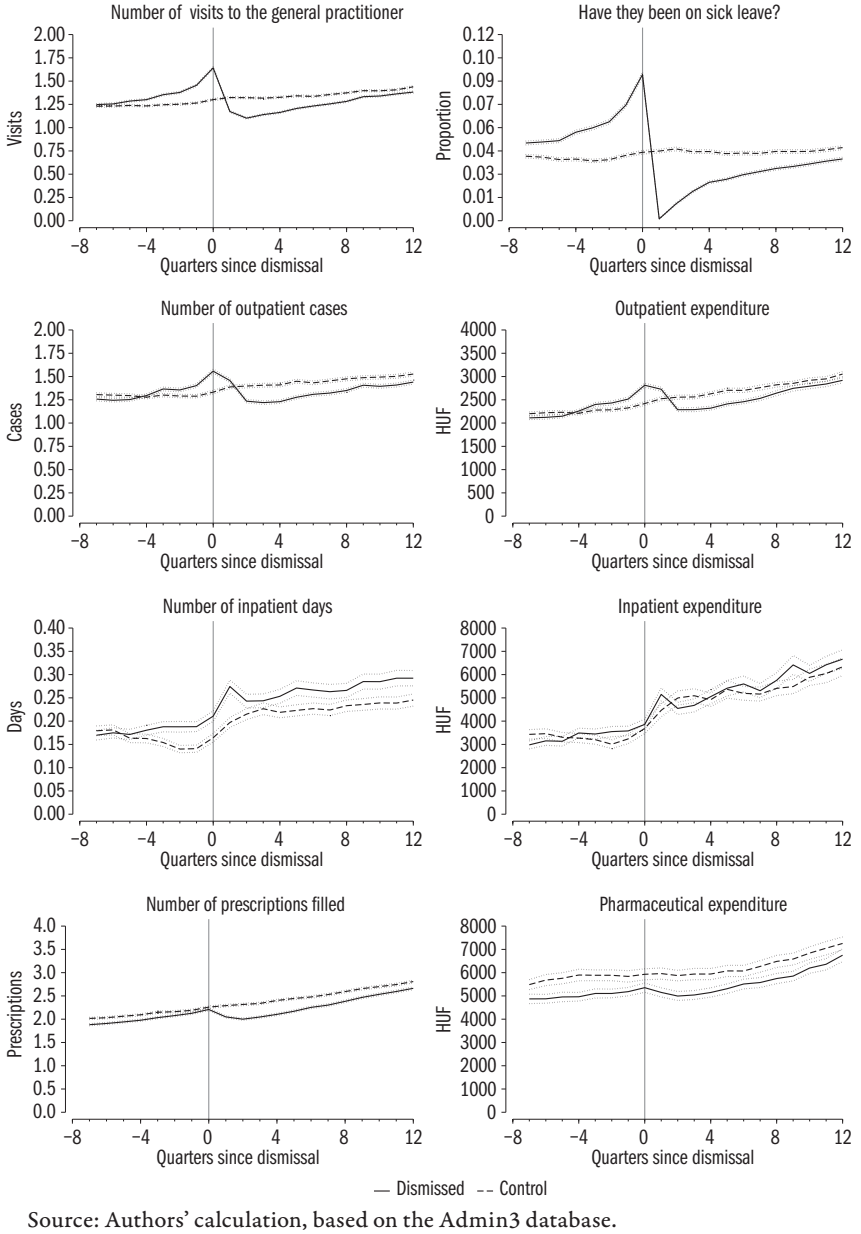
Changes in the health of dismissed workers. The subject of the following analysis is not mass layoffs but individual dismissals, i.e. workers whose employment was terminated during 2011–2014 after a minimum of six months' of continuous employment and who did not start a new job for at least two months but were registered at the local job centre.[3] [We used individual-level labour market and health data from 2009–2017 of the Admin3 database compiled by the CERS (KRTK) Databank.][4] The propensity-matched control group included individuals of the same gender, similar age and employment history (occupational category, size of employer, number of months worked during the past two years and wages). Changes in the health indicators of the two groups over the two preceding years and the next three years were compared. *Figure 5.1.1* presents quarterly usage of the various levels of the healthcare system and the probability of claiming sick pay, *Figure 5.1.2* shows the quarterly proportions of users of four important medicine categories [antihypertensives (medicine for high blood pressure), antidiabetics, psycholeptics (including tranquilizers), psychoanaleptics (including antidepressants)] and *Figure 5.1.3* displays cumulative mortality of the two groups. It must be noted that the majority of dismissed workers find a new job relatively soon: 59 per cent of them are in employment a year later and 75 per cent of them three years later (this proportion is constantly over 90 per cent in the control group).

The Figures show that two years prior to the job loss, dismissed workers are not sicker than the control group: the health indicators of the two groups are similar. Pharmaceutical expenditures (covered by social security and the patients) and the consumption of antihypertensives are lower, while the consumption of psycholeptics and psychoanaleptics is slightly higher among them. Approaching the time of job loss, the number of visits to general practitioners starts to rise steeply (it is 15 per cent higher in the year preceding the job loss than one year prior), the number of workers on sick leave also grows (still only 9 per cent of dismissed workers are on sick leave in the quarter of the job loss) and the use of specialist outpatient care slightly increases. However, those healthcare use variables that better predict health conditions (inpatient and pharmaceutical expenditures) do not change significantly: only the number of days spent in hospital and the consumption of medicines for mental illness increases compared to the control group.

3 The sample excludes those who received old-age or disability pension, parental leave benefit, disability benefit or carer's allowance within two months of dismissal. The age group studied is the 35–54 year-olds, therefore old-age retirement does not play a role in the results.

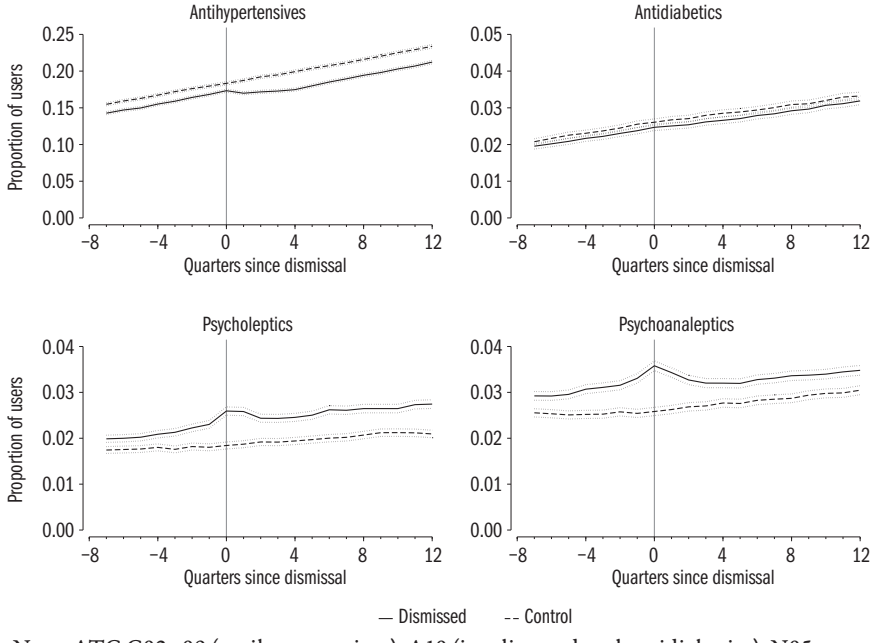
4 For the brief description of the database, see the Annex of *In Focus*, and see *Sebők* (2019) for more detail.

Figure 5.1.1: Quarterly health indicators in the dismissed and the control groups (with 95 percent confidence intervals)



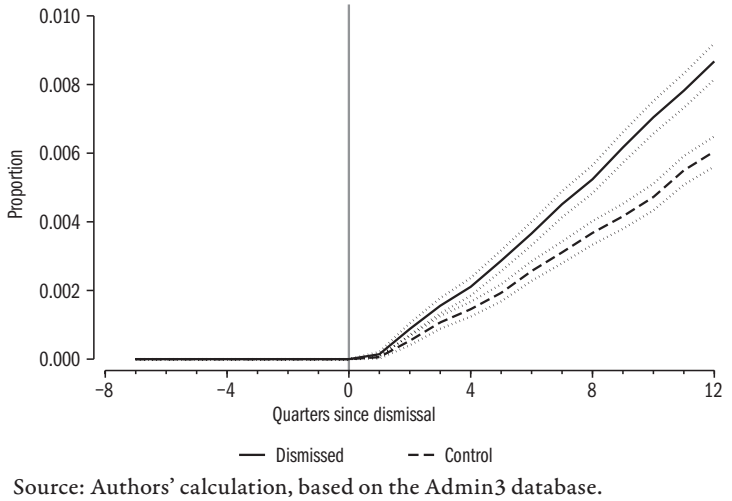
Source: Authors' calculation, based on the Admin3 database.

Figure 5.1.2: Quarterly proportions of users of four medicine categories in the dismissed and control groups (with 95 percent confidence intervals)



Note: ATC C02–09 (antihypertensives), A10 (insulins and oral antidiabetics), N05 (psycholeptics, including tranquilizers), N06 (psychoanaleptics, including antidepressants).
Source: Authors' calculation, based on the Admin3 database.

Figure 5.1.3: Quarterly cumulative mortality rates in the dismissed and the control groups (with 95 percent confidence intervals)



Source: Authors' calculation, based on the Admin3 database.

After job loss, visits to general practitioners and outpatient care as well as pharmaceutical consumption drop. The consumption of antihypertensives decreases permanently by one percentage point and more detailed data (not presented herein) indicate that both the share of newly diagnosed patients starting antihypertensives and the share of those continuing their antihypertensive treatment decline compared to the control group. There is no such drop in the consumption of antidiabetics, which in the age group of 35–54 year-olds are mostly used for type 1 diabetes requiring an extremely precise therapy. At the same time, the consumption of psycholeptics (including tranquilizers) remains permanently higher by 0.3 percentage point. *Figure 5.1.3* shows that at the end of the third year the cumulative mortality of dismissed workers is 1.4 times that of the control group but is still relatively low, below 1 per cent. In accordance with the relevant literature, the differing dynamics of the consumption of various types of medication suggest that unemployment affects health and the use of healthcare through various, sometimes divergent, channels. The increasing consumption of psycholeptics and psychoanaleptics may reflect the negative effect of unemployment on mental health.

Our analysis does not necessarily estimate the pure causal effect of job loss on health because it is possible that some of the dismissed workers, defined above, left employment for health reasons, as opposed to those dismissed in mass layoffs. Nevertheless, the advantage of the approach adopted here is that we were able to investigate the potential selection of dismissed workers based on their health conditions by analysing their health indicators before the job loss. Increases in the visits to general practitioners, sick pay and medication for mental illness prior to unemployment may have several reasons. It is possible that the job loss is anticipated and the fear of dismissal has a detrimental impact on health, especially mental health. Increases in sick leave may be due to the regulation that the notice period of staff on sick leave commences after the end of the sick leave but not later than one year after the first 15 days of the sick leave period. It is also possible that employers are more likely to dismiss workers who take sick leave frequently.

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K5.1 Health care use following public works participation

MÁRTON CSILLAG & BALÁZS REIZER

In this note, we study the effect of public works participation on the usage of public health care, which is an important issue for two main reasons. First, public works is the largest active labour market policy (ALMP) in Hungary, with over 300 thousand participants at its peak. Second, predicting the potential effect size and its sign is not straightforward. A wealth of previous studies have estimated a negative effect of (long-term) unemployment on health. While ALMPs might have positive effects on health, there is very scarce empirical literature on this issue. The public works programme is special from this perspective. First: it guarantees an income higher than the employment substitution subsidy,[1] thus financially enabling access to public health care. Second, participants need to perform work, which through regular activity and access to social relations can have a positive effect on mental health. Third, as the work performed is usually low skilled, and the public works income is lower than the minimum wage, some participants could consider participation as compulsion and hence participation could lead to consumption behaviour that is ultimately detrimental for health.

Disentangling the effect of public works is complicated by the fact that inflows to (and outflows from) the programme is not random. *Cseres-Gergely* (2014) showed that those living in small villages, those with low qualifications and the long-term unemployed have a much higher probability to participate. We can also hypothesize that the persons who remain in the public works programme have both lower observable and unobservable productivity in the primary labour market.

In this study we use the 'Admin3' database provided by the Databank of the Centre for Economic and Regional Studies;[2] thus we have access to detailed data on individuals' labour market histories and their use of public health care, enabling us to take into account a host of variables influencing public works participation.

In our analysis, we focus on those registered unemployed (inflows between 2012 and 2016) who were entitled to 90 days UI benefits, and lived in settlements with populations lower than 10 thousand persons. We only keep those who exhausted their UI benefits, and did not find work on the primary labour market within 15 days following benefit exhaustion.[3] Thus, on the one hand, we use a sample which is relatively homogeneous in terms of labour market history; but on the other hand, we focus on a small and atypical group of public works participants (only 15 percent of new public works spells started following UI benefit exhaustion). We consider those as public workers, who entered the programme within 3 months following benefit exhaustion. We compared them to those registered jobseekers who did not enter a public works programme in the 3-month window after their UI benefit ran out.

Finally, we used matching based on their observable characteristics to ensure comparability of the two groups.[4] In our analysis, we use two one-year periods: the year prior to inflow to UI benefits (which is typically the year before job-loss), and the year after the exhaustion of benefits, We examined five different outcomes: 1) the number of GP visits; 2) whether the individual had positive spending on medication; 3) whether the person had any spending in the public healthcare system (including in-

1 This is the main means-tested welfare benefit for the long-term unemployed in Hungary.

2 See the Appendix to the 'In Focus' section for a detailed description of the database.

3 These employees had a stable employment relationship, more precisely they worked at least 30 months out of the 36 months before applying for UI benefits.

4 We used the following variables when estimating the propensity score: gender, educational attainment, age, health care spending from the previous year, and micro-region fixed effects. In the matching procedure, we used one-to-one nearest neighbour matching (no replacement), within a given inflow semester.

and outpatient spending and medications); 4) the natural logarithm of spending on medications; and 5) the natural logarithm of total public healthcare spending. (The last two only contain observations with positive health care spending.)

In *Table K5.1.1* below, we present the results of regression analyses, where we include individual fixed effects. We show the coefficient estimates on two key variables: how the usage of the public health care changed between the year before job-loss and the year after the exhaustion of UI benefits in the control group; while the coefficient on public works participation shows how this differed for public works participants.[5]

Table K5.1.1: The use of public health care following entry into public works

	GP visits	Positive health spending	Positive medication spending	All medication spending (log)	All health care spending (log)
Public works entry	0.7239***	0.02863**	0.02839***	-0.02258	0.02530
	(0.1682)	(0.01144)	(0.009998)	(0.03410)	(0.09430)
After benefit exhaustion	-1.8287***	-0.06014***	-0.06206***	0.007596	-0.1530**
	(0.1197)	(0.008127)	(0.007313)	(0.02434)	(0.06667)
Number of observations	16,631	16,631	16,631	11,484	13,657
Number of individuals	8,316	8,316	8,316	6,882	7,703

Notes: Standard errors clustered at the levelof individuals are in brackets.
Significance levels: *** 1 percent, ** 5 percent, * 10 percent.
Source: Own calculations based on the Admin3 database.

Our results are similar for all outcomes. The use of public health care decreased following UI benefit exhaustion, and public works participation moderated this effect. For GP visits, this means that long-term unemployed decreased visits by almost 2 occasions (relative to when they were still employed), while this decrease was only 1 visit per year for public works participants. Similarly, the decrease in the probability of positive medication or overall medical spending is 3 percentage points higher among public works participants relative to the long-term unemployed. By contrast, among those with positive medication or medical spending, we found no differences across the two groups in the amount of spending.

In this short research project we could not disentangle (as we have no data proxying objective health status, such as biomarkers), whether the estimated differences were thanks to the positive income (or behavioural) effect of public works participation or rather due to a deterioration of public workers' health.

5 Thus, we used a difference-in-difference type estimation strategy.

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5.2 THE LONG RUN HEALTH CONSEQUENCES OF THE ECONOMIC TRANSITION

ANIKÓ BÍRÓ & RÉKA BRANYICZKI

Based on our study published at the BMC Public Health journal (*Bíró–Branyiczki,* 2020), using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), we analyse the link between the economic transition in Central and Eastern Europe (CEE) and population health two-three decades later. Health of the population of post-socialist CEE countries lags behind the European Union average. The aim of our research was to investigate whether experienced psychosocial stress as an adult around the transition period had adverse health implications observable at older ages in the life course.

The SHARE is a freely available, cross-national, bi-annual, multidisciplinary panel database of micro data on health, labour force status and socio-economic status of individuals aged 50 or older.[1] The third and seventh SHARE waves (from 2009 and 2017) included retrospective questions about respondents' life history, such as employment history, periods of stress and financial difficulties, and health at younger ages. Based on these data, we observe if respondents had stressful periods, financial difficulties or lost their jobs between 1987–1993, that is around the transition. We investigate the relationship between these indicators of difficulties and subjective and objective health, as measured in 2017. We compared these relationships across three CEE country groups (Visegrád fours, Baltics, South-East Europe) and Western Europe. We also compared the health implications of difficulties occurring around the transition to difficulties occurring before or after the transition.

We found that stressful periods, financial difficulties and job loss around the period of transition are generally associated with worse health at older ages in all groups of CEE countries. This relation holds even after netting out the effect of childhood health and demographic factors. The three types of difficulties have similar relation to health at older ages (*Table 5.2.1*). Our results indicate that the implications of the difficulties around transition accumulate over the life course, resulting in worse health at older ages. For example, looking at subjective health, we found that people who experienced some difficulties around the transition report 50–100 percentage higher odds of fair or poor health in 2017 (as opposed to excellent, very good or good health).

The SHARE data also show that the health of the older population is worse in CEE than in the West, for instance, most chronic diseases and obesity are more prevalent. We also see that compared to the West, a higher ratio of CEE respondents report difficulties around the years of transition (*Figure 5.2.1*). However, when we analysed the health implications of similar difficulties in Western Europe, we found similar results as in CEE. The health implications

1 This paper uses data from SHARE waves 1–7, see *Bergmann et al.* (2019) and *Börsch-Supan et al.* (2013) for methodological details. The SHARE data collection has been primarily funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812) and FP7 (SHARE-PREP: N°211,909, SHARE-LEAP: N°227,822, SHARE M4: N°261,982). Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06–11, OGHA_04–064, HHSN271201300071C) and from various national funding sources is gratefully acknowledged (see www. share-project.org).

of difficulties experienced at other periods (before or after the transition) are also similar. Thus, we conclude that the consequences of hardships due to the transition are not specific, health implications of these difficulties seem to be similar to the implications of other shocks possibly unrelated to the transition. Thus, not the transition-specific nature of the difficulties, but the higher fraction of individuals experiencing them around the transition contributed to the current health disadvantage in CEE.

Table 5.2.1: Health measures regressed on experienced difficulties occurring in 1987–1993 in CEE (logit odds ratios)

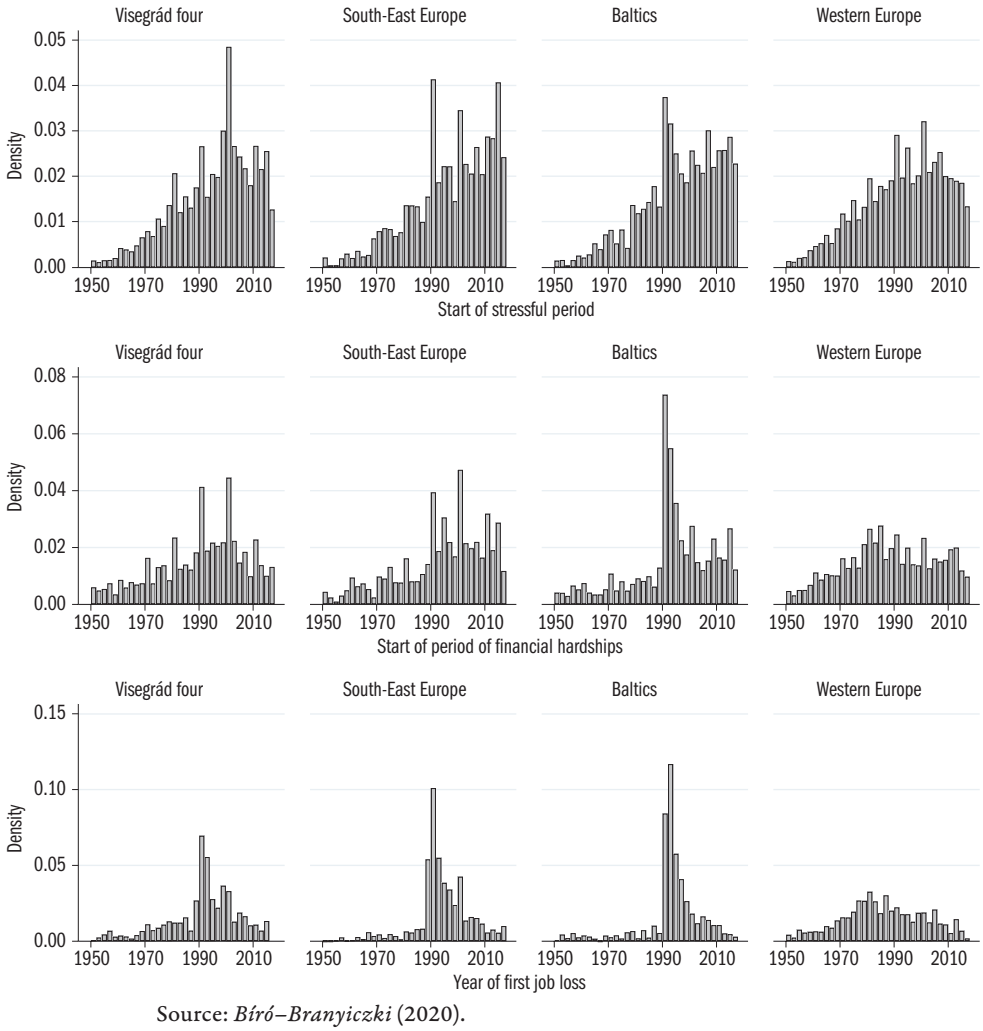
	Fair or poor health	Long-term illness
Stress × Visegrád fours	1.728***	2.610***
	(1.502–1.988)	(2.243–3.037)
Stress × South-East Europe	2.042***	2.236***
	(1.607–2.596)	(2.052–2.438)
Stress × Baltics	1.592**	1.724***
	(1.112–2.280)	(1.222–2.434)
Number of observations	17,452	17,452
Wald-test *p*-value	0.425	0.034
Financial difficulties × Visegrád fours	1.923***	2.112***
	(1.211–3.054)	(1.676–2.663)
Financial difficulties × South-East Europe	1.771***	1.549***
	(1.263–2.484)	(1.111–2.159)
Financial difficulties × Baltics	1.175***	1.522***
	(1.111–1.243)	(1.208–1.917)
Number of observations	20,503	20,503
Wald-test *p*-value	0.007	0.121
Job loss × Visegrád fours	1.502***	1.419***
	(1.355–1.665)	(1.331–1.514)
Job loss × South-East Europe	1.599***	1.343***
	(1.430–1.788)	(1.222–1.476)
Job loss × Baltics	1.967***	1.707***
	(1.585–2.442)	(1.502–1.940)
Number of observations	20,524	20,525
Wald-test *p*-value	0.081	0.008

Notes: Individual characteristics and country effects are controlled for. We show logit odds rations with 95 confidence intervals. The Wald test tests the equality of the coefficients of the interaction terms.
$^{***}p < 0{,}01$, $^{**}p < 0{,}05$, $^{*}p < 0{,}1$.
Source: *Bíró–Branyiczki* (2020).

Our heterogeneity analysis revealed that the health implications of difficulties around the transition were stronger among males and the younger.

Overall, we found evidence that stressful periods, financial difficulties and job loss around the period of transition increased the health disadvantage of the population of CEE countries. Our results draw the attention to the long-lasting impacts of psychosocial stress during adulthood on later health.

Figure 5.2.1: Starting year of difficulties by regions



Source: *Bíró–Branyiczki* (2020).

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6 AGEING AND THE LABOUR MARKET

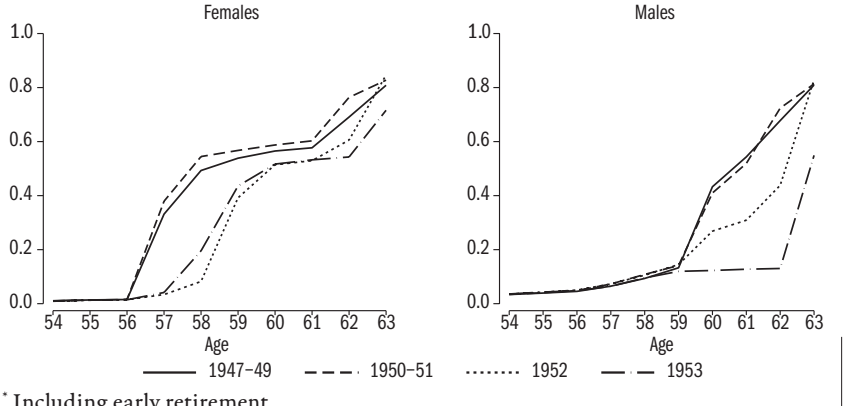
6.1 OLD-AGE RETIREMENT AND HEALTH

ANIKÓ BÍRÓ & PÉTER ELEK

The ratio of the older population (aged above 65) is expected to increase relative to the active-age population (age 15–64) over the coming decades in Hungary. While this ratio was 0.24 in 2011, it will increase to 0.6 by 2060 according to baseline demographic projections. Thus, there will be less than two active aged people for each retirement aged person in forty years from today (*Földházi,* 2015). For the sake of the sustainability of the pension system, the employment rate at older ages should increase, and increasing the old-age retirement age is a basic policy tool for achieving this aim.

Since the middle of the 2000s, the statutory retirement age has significantly increased in Hungary. The early retirement age of females increased in 2009 from age 57 to 59. As a result, the ratio of pensioners at ages 57–58 decreased considerably among the cohorts born after 1951. The growth of the retirement age of females halted with the introduction of the so-called Women40 programme in 2011.[1] The early retirement age of males born between 1946–1951 was age 60. However, early retirement was abolished starting from 2012, hence younger male cohorts could retire only when reaching the statutory old-age retirement age (which was age 62.5 for the 1952 cohort and increases by a half year annually, reaching age 65 for the 1957 cohort). This also decreased considerably the rate of pensioners at ages 59–62 (*Figure 6.1.1*).

Figure 6.1.1: The ratio of old-age pensioners* in the population by age and year of birth



* Including early retirement.
Source: Own calculation based on CERS Admin3 data.

Considering the major changes in retirement age, it is important to understand how health status affects the retirement decision and how retirement

1 Based on the Women40 programme, females who were employed at least for 40 years could retire before reaching the statutory retirement age without a reduction in their pension benefit (*Simonovits–Tir,* 2018).

(and the increasing statutory retirement age) affects health. The first line of causation is that employees in worse or deteriorating health are less likely to remain employed and more likely to retire at a given age. This is because the productivity deteriorates and the disutility of labour increases with worsening health, hence, the utility derived from leisure increases.[2] The second line of causation is that retirement itself may influence health. Increasing leisure time may improve health but, on the other hand, the loss of social status and social network derived from employment may have negative health effects (for instance, on mental health). In addition, as income decreases with retirement, it might reduce the demand for healthcare services, also, after retirement, there are no incentives to maintain the capacity to work, thus health may deteriorate. Altogether, the majority of the related international empirical literature concludes that the health effects of retirement are generally positive.[3]

The role of health status in old-age employment

We use data from years 2009–2017 of the administrative dataset (Admin3) processed by the Databank of the Centre for Economic and Regional Studies (CERS), which includes linked labour market and health indicators of a random 50 percent of the Hungarian population.[4] We first analyse the relationship between health status and the probability of continued work at older ages. We look at two age groups, to examine the continued work before and after the statutory retirement age separately.

1) What is the probability that a person who is working at 54 is still working four years later (at age 58), *before* the statutory retirement age? Due to the time coverage of the data, we look at people born between 1955–1958. For these cohorts, the early retirement possibility at age 57 was no longer available, not even for females.

2) What is the probability that a man aged 59 or a woman aged 58, who is employed at this age (i.e., before the statutory retirement age) is still working four years later, thus *after* the statutory retirement age? We look at men born in 1950–1951 and women born in 1952–1954, due to the time coverage of the data and changes in the statutory retirement age.

We investigate with linear regression models (OLS regressions) the relationship between health at earlier ages and employment at later ages. We capture health status with the following indicators of healthcare use: whether the person was in hospital in the quarter of reaching the analysed age; and whether the number of his/her primary care visits, outpatient specialist care visits and spending on prescription drugs in the given quarter was in the top quartile of the age and gender specific distribution. As control variables we use the year of birth, region, one-digit occupation (ISCO) code, quarterly logarithmic earnings and the first level economic activity (NACE) code of the employer.

2 See *Cai* (2010) and *Disney et al.* (2006) for international empirical evidence.

3 The systematic review of *Van der Heide et al.* (2013) clearly shows this relation for mental health. For the recent literature, see the positive findings of *Grøtting–Lillebø* (2020), *Kolodziej–García-Gómez* (2019), *Rose* (2020). The impact of changing retirement age is ambigous (see for example, *Hagen,* 2018).

4 See the Appendix for a short introduction of the database and *Sebők* (2019) for further details.

According to the results presented in *Table 6.1.1,* higher usage of healthcare services (hence, supposedly worse health status) decreases the probability of continued work. This relationship is clearer and stronger before the statutory retirement age (first two numerical columns of the table) than after the retirement age (second two numerical columns). The probability that a 54-year-old employee still works four years later (before the retirement age) is, separately, 1–2 percentage points lower if the indicators of primary care use, outpatient specialist use and drug spending are in the top quartile. Having been in hospital decreases the probability by 4–7 percentage points. Continued work after the statutory retirement age is the most affected by primary care use (with a negative effect of 2–4 percentage points).

Table 6.1.1: Effect of health status on continued work

	Probability of continued work four years later			
	Before retirement age (54 years old employees)		After retirement age (58/59 years old employees)	
	males	females	males	females
Hospital stay	-0.066***	-0.042***	-0.033**	-0.015
	(0.0080)	(0.0076)	(0.015)	(0.011)
Outpatient specialist care visits in top quartile	-0.014***	-0.0055	0.015*	0.001
	(0.0033)	(0.0036)	(0.0076)	(0.0051)
Primary care visits in top quartile	-0.020***	-0.022***	-0.044***	-0.021***
	(0.0036)	(0.0038)	(0.0080)	(0.0052)
Drug spending in top quartile	-0.017***	-0.023***	0.018***	-0.011**
	(0.0030)	(0.0040)	(0.0069)	(0.0050)
Number of observations	88,932	103,017	29,768	62,439
Ratio of continued work	0.876	0.751	0.396	0.434

Notes: Linear probability model coefficients, robust standard errors in parentheses. Quarterly data.
Control variables: year of birth, region, one-digit occupation (ISCO) code, quarterly logarithmic earnings and the first level economic activity (NACE) code of the employer.
Sample: people reaching the analysed age in the given quarter.
Significant at the *** 1 percent, ** 5 percent, * 10 percent level.
Source: Own calculation based on Admin3 data.

Effect of continued work/retirement on health status

We have seen that poorer health (as measured by greater use of health services) reduces the likelihood of continued work. As a next step, we examine the other direction of the two-way relationship, i.e., the impact of continued work (or, conversely, of retirement) on health indicators. To this end, we have two increases in the retirement age (raising the early retirement age for women from 57 to 59 in 2009 and abolishing the 60-year early retirement age for men in 2012), which can be used as "exogenous shocks" to estimate the causal impact of retirement on health indicators. As *Figure 6.1.1* has already shown, cohorts with close birth years faced markedly different effective re-

tirement ages and therefore had different retirement patterns. By comparing health indicators from these very similar cohorts, we can estimate the causal impact of retirement in the short to medium term.

Formally, we estimate fixed-effects instrumental variable panel regression models in which the dependent variable is an individual's health indicator, the main explanatory variable is the dummy variable of being retired at a given time, and we control for age, calendar year, and individual fixed effects. Due to the two-way relationship between health status and retirement, the retirement variable is endogenous, so we use the dummy variable of whether the individual is above the (early) retirement age at a given time as an instrument.[5]

In our earlier paper (*Bíró–Elek,* 2018) we examined the year 2009 increase of the retirement age for women based on the Admin2 dataset, which was compiled by the CERS Databank, and contains individual-level labour market data as well as the annual outpatient, inpatient and prescription drug expenditures for a 50% random sample of the Hungarian population for years 2003–2011. *Table 6.1.2* shows that retirement reduces the probability that an individual uses the outpatient, inpatient and (prescribed) pharmaceutical care system at least once in a given year by 1.3–3.0 percentage points. Meanwhile, retirement typically does not have a significant effect on the size of (positive) expenditures provided that the patient used the given segment of the healthcare system. The heterogeneity analyses reported in the article also showed that the effects are stronger among those who are relatively healthy, among those who have previously been on sick pay and among the less educated.

Table 6.1.2: Effect of old-age retirement on annual health expenditure, females

	Outpatient		Inpatient		Drug	
	ratio	logarithm	ratio	logarithm	ratio	logarithm
Dependent variable	of positive expenditure		of positive expenditure		of positive expenditure	
Effect of old-age retirement	-0.030***	-0.027	-0.014**	-0.074	-0.013**	-0.035*
	(0.006)	(0.026)	(0.007)	(0.094)	(0.006)	(0.019)
Number of observations	186,296	157,637	186,296	8,789	186,296	159,248

Notes: Robust standard errors clustered on the individual level in parentheses.
Instrumental variable: being above the early retirement age.
Controls: individual fixed effects, age and its square, calendar year dummies.
Sample: women born in 1949–1953, aged 56–59 years and working at age 54.
Significant at the *** 1 percent, ** 5 percent, * 10 percent level.
Source: *Bíró–Elek* (2018), based on Admin2 data for years 2003–2011.

Based on the quarterly Admin3 dataset that contains more detailed health indicators for 2009–2017, and using the increase in the retirement age for men in 2012, we can gain more insight into why healthcare use decreases after retirement. *Table 6.1.3* shows the effect of retirement on more detailed case- and prescription-level indicators for men. The reduction of the use of outpatient specialist care, general practitioner care and pharmaceutical con-

5 For more details see *Bíró–Elek* (2018).

sumption can be seen here as well after retirement (the effect on hospital stay is not significant). Examining the consumption of different pharmaceutical ATC categories in more detail, the proportion of users of systemic antiinfectives (including antibiotics) and musculoskeletal, respiratory and nervous system agents (including antidepressants) is significantly reduced as a result of retirement.

Table 6.1.3: Effect of old-age retirement on quarterly health indicators, males

	Number of outpatient care visits	Number of GP visits	Number of inpatient days	Number of filled prescriptions
Old-age retirement	−0.177***	−0.343***	0.036	−0.130***
	(0.038)	(0.018)	(0.037)	(0.045)
Mean of dependent var.	1.98	1.95	0.567	6.03
	Probability of consumption of the given pharmaceutical (ATC) category			
	A	B	C	J
Old-age retirement	0.00096	0.00201	0.00122	−0.00560*
	(0.00276)	(0.00245)	(0.00280)	(0.00298)
Mean of dependent var.	0.259	0.176	0.551	0.104
	L	M	N	R
Old-age retirement	0.00121*	−0.0168***	−0.00337*	−0.00459**
	(0.000682)	(0.00285)	(0.00191)	(0.00203)
Mean of dependent var.	0.008	0.159	0.080	0.072
	antidiabetics	antihypertensives	psycholeptics	psychoanaleptics
Old-age retirement	0.00132	−0.00179	−0.00080	−0.00277**
	(0.00150)	(0.00274)	(0.00088)	(0.00119)
Mean of dependent var.	0.127	0.516	0.018	0.032

Notes: Robust standard errors clustered on the individual level in parentheses.
Instrumental variable: being above the early retirement age.
Controls: individual fixed effects, age and its square, calendar year effects.
Sample: men born in 1950–1954, aged 59–63 years and working at age 58. Period: 2009–2016.
Number of observations: 1,664,234, number of individuals: 92,973.
ATC drug categories: A – Alimentary tract and metabolism; B – Blood and blood forming organs; C – Cardiovascular system; J – Antiinfectives for systemic use; L – Antineoplastic and immunomodulating agents; M – Musculo-skeletal system; N – Nervous system; R – Respiratory system.
A10 – Drugs used in diabetes; C02–09 – Antihypertensives; N05 – Psycholeptics (including tranquilizers); N06 – Psychoanaleptics (including antidepressants).
Significant at the *** 1 percent, ** 5 percent, * 10 percent level.
Source: Own calculations based on Admin3 data.

Conclusions

In this subchapter we found that, after controlling for a number of other factors, workers with a high health expenditure at age 54 are significantly less likely to work four years later – but still before retirement age – than their counterparts with lower health expenditure. In the other direction, our results examining the health effects of retirement are largely in line with the interna-

tional literature by showing that retirement reduces the use of the healthcare system. There are partly institutional reasons for this: as long as the individual is employed, he or she has to go to the GP in order to receive sick pay, which can generate additional doctor visits and medication use (such as of antibiotics). The decline in the use of musculoskeletal drugs after retirement suggests that individuals are less interested in maintaining the health status they previously needed for work, while the reduction in the use of psychoanaleptics (including antidepressants) suggests an improvement in mental health. In addition to these, due to the limitations of the administrative data, our results provide little evidence of the net health impact of retirement in Hungary.

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6.2 THE LABOUR MARKET CONTEXT OF THE INCREASING DEMAND FOR PALLIATIVE CARE*

KÁROLY FAZEKAS & MELINDA TIR

Rise in the proportion and number of patients with serious health-related suffering (SHS)

Average life expectancy at birth increased from 42 years in 1900 to 76 years in 2000 in Hungary and at the same time the structure of the most common diseases leading to death transformed completely. In the last decades, the rise in average life expectancy has been caused by the increase in the life expectancy of the population over 65 rather than the decrease in infant mortality. This contributes to the increase in the number and proportion of the elderly. The proportion of the population over 60 rose from 7.5 per cent to 23.5 per cent between 1900 and 2011. The share of those older than 65 was 20 per cent in 2018, which is foreseen to reach 30–35 per cent in 2050.

At present, one does not tend to die of a contagious disease or in accidents any longer but of chronic diseases such as cancer, cardiovascular or respiratory diseases, stroke, dementia and neuro-organic diseases. The increasing number and proportion of deaths caused by chronic diseases is common knowledge. However, it is less well-known that the number and proportion of deaths due to diseases involving serious (physical and mental) health-related suffering (SHS)[1] has also risen. This has been accompanied by a surge in the *number* of patients needing *palliative care* (which aims at mitigating suffering rather than treating diseases) and the *duration* of end-of-life palliative or hospice care. In the end stage of a terminal illness it is no longer possible to cure the disease. The aim is to alleviate or relieve suffering and support patients in reaching their end-of-life goals (*Hegedűs,* 2006). The average duration of the end-of-life stage was a few weeks in 1900. In just over 100 years, this period expanded to two to two and a half years on average.

The shift in public opinion and policy debate on the end-of-life stage substantially contributed to the increase in the demand for palliative care. The modern hospice movement, which started in the sixties of the previous century, changed the expectations and possibilities of an increasing proportion of patients, healthcare workers and geriatric nurses on the end-of-life stage globally (see for example *IAHPC*, 2019).

The Lancet report published in 2018 (*Knaul et al*, 2018) was a major milestone in assessing demand for palliative care and designing programmes to meet this demand. The working group "Lancet Commission on Global Access to Palliative Care and Pain Control"[2] organised by the project "Harvard Equity Initiative"[3] in 2017 at Harvard University had developed a method

* We would like to thank *Ágnes Ruzsa* (Hungarian Hospice Palliative Association) for her expert guidance and help with writing the Chapter.

1 See: pallipedia.org.

2 See: Harvard University.

3 Ibid.

for estimating the annual number of SHS-related deaths globally and, based on the experience of several hundreds of specialist doctors, also the average duration of nursing tasks characteristic of the end-of-life stage in the various groups of diseases. Relying on health economists, they then prepared pilot case studies to estimate the costs that low- and middle-income countries selected from various regions would incur if they integrated palliative care according to Western-European standards in the system of primary healthcare. According to estimates of the Lancet report there were 56.2 million deaths globally in 2015. Nearly half of those who died had suffered from a condition involving SHS for an indeterminate period and leading to death.[4] The report states that there is an enormous gap between high-income and low-income countries especially as regards relieving the pain associated with illness. Nevertheless, estimates indicated that the costs of a universal palliative basic care package are possible to be financed from only 0.03–0.25 per cent of the GDP in the countries considered (Ruanda, Vietnam and Mexico) (*Knaul et al,* 2018, p. 1421.).

Based on indicators of the quality of palliative care, Hungary is in the bottom end of the mid-range in Europe. In spite of significant improvements in the institutional and regulatory environment in recent years (*Csikós et al,* 2018, *Benyó–Lukács,* 2017), the country's position in international ranking is deteriorating. It is because several countries, including Eastern-European ones, have made more rapid progress than Hungary. It is particularly worrying that (similarly to the majority of Eastern-European countries) the increasing demand for palliative care will be accompanied by low capacities (*EIU,* 2015, p. 52.).

The quality of palliative care is determined more by the lack or spread of the palliative approach than the size of the GDP. The surveys and position papers of Hungarian[5] and European[6] hospice/palliative associations, foundations and universities play a crucial role in shaping attitudes about palliative care in Hungary (*Hegedűs–Farkas,* 2019, *Hegedűs–Munk,* 2018, *Arias-Casais et al,* 2019). European trends revealed by surveys in 2019 and prior were recently outlined by *Arias-Casais et al,* (2020). The results indicate that Hungary belongs to the group of countries which lag behind the targets for all three forms of care set by the WHO, in spite of their growth.

In order to have a more precise overview of the challenges facing Hungarian society, we estimated the changes in the demand for palliative care in Hungary between 1970 and 2018, using the mortality database of the Central Statistical Office[7] and the methodology of the researchers at Harvard. Based on the estimates, the proportion of those in the annual mortality figures who died of diseases requiring palliative care increased from 38.7 to 46.9 per cent over this period (*Figure 6.2.1*). While the number of annual deaths rose by 9 per cent, the number of deaths associated with diseases requiring palliative care rose by 32.3 per cent over the same period.

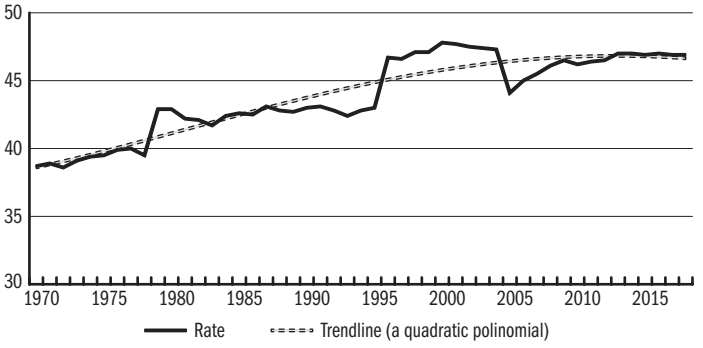
4 The International Association for Hospice & Palliative Care created an interactive website based on the results of the project, which also provides a breakdown of estimates by country. Global Data Platform to Calculate SHS and Palliative Care Need.

5 Hungarian Hospice Palliative Association.

6 European Association of Palliative Care.

7 See: KSH.

Figure 6.2.1: Changes in the estimated proportion of patients needing palliative care within the number of deaths in Hungary annually, 1970–2018



Note: In 1976, 1995 and 2004 there were modifications to the International Classification of Diseases (ICD) and their impacts were not possible to eliminate entirely during transcoding.
Source: *CERS* Databank, *CSO* mortality data base, authors' calculation.

Changes in the composition of the most frequent diseases leading to death are presented in *Table 6.2.1,* which includes the ten most frequent disease groups involving SHS in 1970 and 2018. It is seen that malignant tumours and cardiovascular diseases occupy the first three places in both years. By 2018, injuries, poisoning, tuberculosis and birth defects had no longer been a leading cause of death. However, neuro-organic diseases common in old age (such as dementia, Parkinson's and Alzheimer's disease) and, to a large extent due to increasing alcohol consumption, liver diseases, have now been included.

Table 6.2.1: The ten most frequent disease groups with SHS leading to death in Hungary

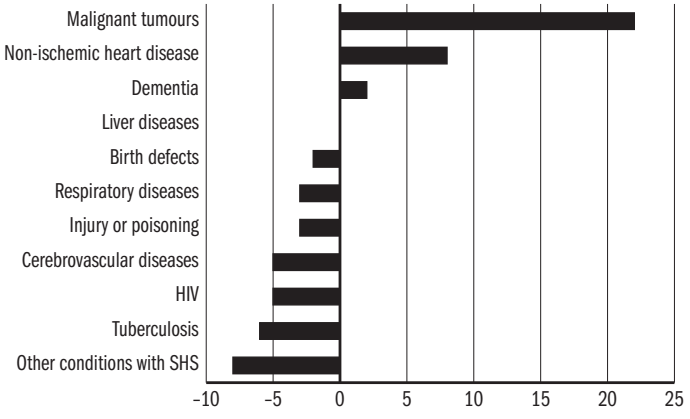
1970	2018
1. Malignant tumours	1. Malignant tumours
2. Cerebrovascular diseases	2. Cardiomyopathy and heart failure
3. Cardiomyopathy and heart failure	3. Cerebrovascular diseases
4. Atherosclerosis	4. Respiratory diseases
5. Respiratory diseases	*5. Dementia* ∧
6. Injury or poisoning ∨	*6. Liver diseases* ∧
7. Tuberculosis ∨	7. Chronic ischemic heart disease
8. Birth defects ∨	8. Atherosclerosis
9. Chronic ischemic heart disease	9. Leukemia
10. Leukemia	*10. Neuro-organic diseases* ∧

Note: Disease groups that were excluded or newly included in the ten most frequent disease groups involving SHS between 1970 and 2018 are in italics.
Source: *CSO* mortality database, authors' calculation.

The proportion of patients in need of palliative care is not significantly different from the average of countries included in the Lancet report. The estimated share of people who died of diseases requiring palliative care was 47

per cent in Hungary in 2016, whereas it was 45 per cent in the countries of the Lancet report. However, there was a significant difference in the *composition* of diseases leading to death in palliative care. The share of those who died of malignant tumours, chronic heart diseases and dementia is higher in Hungary than the average of the countries included in the Lancet report (*Figure 6.2.2*).

Figure 6.2.2: Difference between the proportions of patients who died with SHS in Hungary and the Lancet countries, 2016 (percentage points)



Source: Authors' calculations, based on *CERS* Databank, *CSO* mortality figures and *Knaul et al.* (2018).

Relying on the methodology of the Lancet report, it was possible to estimate the optimum duration, in nursing days, of palliative care of those who died in a given year. The estimated demand for care increased by nearly 50 per cent over the period concerned, since the proportion of conditions requiring lengthy palliative care increased among the causes of death. The number of deaths from SHS conditions increased by 132 per cent, the estimated duration of the cumulative demand for palliative care rose by 147 per cent and the maximum duration of palliative care increased by 153 per cent.[8]

Changes in the composition of diseases leading to death also had an impact on the structure of tasks in palliative care. In Hungary, nursing tasks related to pain relief, breathing difficulties and physical or mental fatigue expanded the most during the period considered.

These changes are in line with tendencies resulting from the shifts in the composition of diseases leading to death. However, most of the increase in the demand for palliative care is caused not by these but from the development of palliative care and the awareness and recognition of the right to palliative care. It is now acknowledged that the role of the healthcare system is not merely to cure but also to support patients during their end-of-life stage to reach their end-of-life goals and die with dignity. Society must not toler-

8 The duration of the *cumulative palliative care* is not equal to the actual duration of palliative care but to the sum of the estimated duration of the various forms of care. Since some forms of care are provided in parallel, this indicator is longer than the actual duration of the need for care. Its use is justified on the grounds that it illustrates the extent of the burden on the healthcare system. The duration of *maximum palliative care* is equal to the duration of the longest form of care multiplied by the number of deaths in a disease category. This is closer to the actual duration of care but is somewhat shorter (*Knaul et al.*, 2018).

ate patients and their families living the final stages of their lives (or a relative's life) in physical and mental agony. It is now also recognised that society is able to create the necessary institutional, human and financial conditions so that they are not forced to do that.

The labour market context of the increasing demand for palliative care

The expansion of palliative care presupposes that in the end-of-life stage the emphasis is shifted from treating the disease to achieving the palliative goals. This shift not only improves the quality of life of patients but, according to studies, it increases life expectancy and reduces the costs of care (*Higginson et al*, 2003, *Gardiner et al,* 2016). The spread of palliative care provided at home or in hospices eases the burden on the most expensive and labour intensive services of healthcare systems (*Dózsa et al,* 2013). In the following, two elements of the process are highlighted, which are especially important for matching labour market supply and demand.

Improving the key competences of workers in palliative care

Acquiring and developing the key competences of palliative care also require non-cognitive skills that are indispensable for achieving the goals of palliative care. These include conscientiousness, agreeableness, emotional stability, openness and extroversion (*Roberts et al,* 2015). Some of them are innate but can be continuously developed. Others are consolidated through parenting and formal education. Therefore the role of school education is not only to raise awareness of the palliative approach among youth but also to reinforce the non-cognitive skills needed for the effectiveness of palliative care.

Developing palliative care starts with raising awareness of the palliative approach and increasing its acceptance. Core values associated with palliative care include autonomy, dignity, quality of life and a holistic approach to life and death. In recent years, the WHO as well as international and European palliative associations prepared detailed analyses and guidelines to summarise key competences needed by staff working in the various fields of palliative care (*Ryan et al,* 2014). We herein focus on cooperation and communication skills, which are needed for teamwork.

Palliative care is a complex, multiprofessional task, which calls for close cooperation between family members participating in nursing, various professionals providing care and the patient. Several analyses found that the coordinated work of palliative teams belonging to different professions is considerably more efficient than traditional nursing based on separate care providers (*Higginson et al,* 2003). In recent years, the WHO compiled detailed handbooks with the aim of integrating the development of key palliative competences in education systems (*Radbruch et al,* 2010).

Setting up a decentralised institutional system that matches the needs of palliative care

Criteria of access to palliative care are crucial in the development of the system of institutions of palliative care. Only an institutional system with most of its elements regionally decentralised is able to attain the primary goals of palliative care. Patients prefer to spend the end-of-life stage of their life with their family or in a hospice (*Arnold et al,* 2013). Yet today they spend most of this period in hospital. This is, on the one hand, because there is a high share of elderly living in nursing homes or alone among those needing palliative care and, on the other hand, because family members do not have the skills and knowledge necessary for providing palliative care and they lack professional and financial support. In countries with a high proportion of patients who spend the end-of-life stage in their families, a carefully designed and decentralised system of institutions supports families in carrying out this task. This support also enables family members to find full-time or part-time employment (*Guerrierea et al,* 2015).

Therefore the development of the institutional system of palliative care has to be aligned with the regional characteristics of access and demand. The palliative care system has to have a structure that supports patients' home-based or hospice-based care in accordance with their disease and family conditions. This requires knowing the geographical distribution of patients needing palliative care and the transport conditions of regions as well as determining the appropriate geographical distribution of general and special palliative care institutions in order to provide for the conditions of home-based palliative care, where possible.[9]

The two-volume white paper of the European Association of Palliative Care on the standards of palliative care contains recommendations for European countries concerning the number and headcount of various levels of palliative services (palliative care wards, hospices or hospice wards, mobile palliative teams of hospitals, home-based palliative teams) proportional to the population as well as their geographical and temporal availability (*Radbruch et al,* 2010). In spite of recent developments, Hungarian palliative care institutions are not yet able to follow these recommendations (*Hegedűs–Farkas,* 2019).

9 The study "Access to palliative care in Hungary", launched in 2020 in the Institute of Economics of CERS, aims at assessing the geographical and social characteristics of patients in need of palliative care.

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7 REDUCED CAPACITY TO WORK, DISABILITY, REHABILITATION

7.1 EMPLOYMENT OF THE DISABLED POPULATION AND DEMAND-SIDE POLICY MEASURES*

JUDIT KREKÓ & ÁGOTA SCHARLE

The employment of the disabled population

Internationally, there is a growing recognition that a large proportion of people with reduced work capacity may be integrated into the labour market through appropriate support and this is beneficial to everyone. Employment may improve the physical and mental health of those involved, reduces the risk of poverty, eases the budgetary burden associated with the allowances provided for them and is conducive to economic growth through higher employment rates (*OECD,* 2010).

The below average employment of working age people with disabilities (i.e. with reduced work capacity) depends on supply and demand factors. In the standard labour economics model, individuals basically decide on taking up employment based on the value of leasure and consumption.[1] This simplified decision is also influenced by personal preferences, the available wage levels, commuting costs, welfare benefits as well as the preferences of family members. In the case of people with reduced work capacity, these factors usually work against taking up employment, since their expected wages are lower, commuting costs are often higher, they may need more rest because of their age or disability and many of them receive some kind of disability benefit. Welfare benefits reduce the supply of labour (since they make minimum consumption levels attainable); they have an even more negative effect if disabled people lose their eligibility after taking up employment (for example *Bound–Burkhauser,* 1999). In this case they have to give up both their free time and welfare benefits (which represent a stable income).

It should be taken into account that work, as a source of self-expression and social contacts, may also give pleasure, therefore the time spent working reduces utility in proportion to the free time lost but not at a one-to-one rate. This may affect the decisions of people with disabilities in two opposing ways: if the workplace is inclusive and tolerant, the relationships established may be more important for them than to their non-disabled colleagues (especially if they live in isolation because of their disability); and conversely, if the workplace is (seemingly) not inclusive, it may discourage taking up employment.

Labour demand primarily depends on what price a firm is able to sell its products for, how high the wages are and how productive the employees are.[2] However, employers are not always able to measure labour productivity and

* This subchapter was prepared using datasets from the Labour Force Survey of the Central Statistical Office. The calculations and their outcomes are the intellectual products owned by the authors Judit Krekó and Ágota Scharle exclusively.

1 If they work, they will have less free time but they can spend the wages received in exchange for work on consumption: according to the model, every employee considers this; however, individuals vary in their preferences for free time and consumption (*Ehrenberg–Smith,* 2017).

2 For the derivation of the labour demand curve see for example *Ehrenberg–Smith* (2017).

they often assume that the productivity of employees with disabilities is lower than that of their non-disabled colleagues: for example they work more slowly, make more mistakes or are on sick leave more often. This assumption is sometimes based on earlier experience but may also be based on prejudice.[3] Another factor may reduce demand: when the costs of hiring (for example due to a need to improve accessibility or reallocate tasks across positions) or working (for example support staff is needed) are higher. Prejudices attributed to colleagues or clients may also lead to discrimination (*Lovász–Telegdy,* 2010).

The supportive and encouraging interventions of governments are especially justified in the employment of people with reduced work capacity. On the one hand, the government is responsible for appropriately regulating access to cash benefits, in a way to avoid disincentives to labour supply. On the other hand, neither rehabilitation services, nor anti-discrimination can be entrusted to market players partly because of limited information and partly due to the welfare benefits that go beyond individual interests (*OECD,* 2010).

The evaluation of the employment of people with reduced work capacity is encumbered by the lack of a common definition and clearly defined measurement methods and thus the comparability of data from various surveys is limited (for more details see *Box K7.2*).

In the following, we mainly rely on data from the Labour Force Survey (LFS) of the Central Statistical Office (CSO) to assess the employment of the population with disabilities. Based on the definition of the LFS, a person with a disability is someone who has suffered a long-term health or mental problem for at least six months that restricts him or her in an aspect of work (duration or nature of work or commuting). It is important to note that the LFS is based on the self-assessment of respondents and it does not mean that their disability (reduced work capacity) has been officially confirmed.

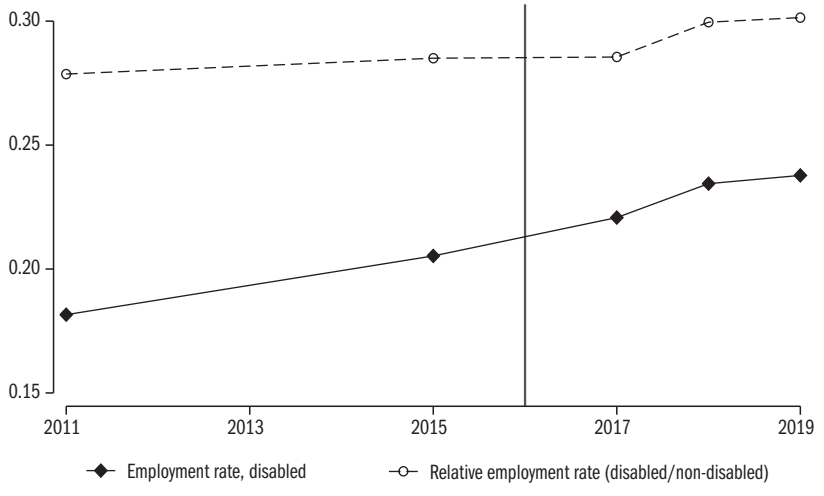
Since the question in the LFS concerning health condition was altered in 2017, compared to the surveys conducted in 2011 and 2015, the share of those with disabilities is not comparable to data from 2017–2019.[4] Based on the above definition, 8 per cent of the population aged 19–64 may be regarded as disabled in the LFS in 2019: because of the change in the definition, this proportion is considerably lower than the 11.2 per cent observed in 2011.

The employment situation of the population with reduced work capacity is described by the absolute and relative employment rates. The latter measures the employment rate of the population with disabilities relative to the employment rate of the non-disabled population. *Figure 7.1.1* shows that only less than a quarter of the population with disabilities (23 per cent) worked in 2019, which is barely a third of the employment rate of the non-disabled population. This relative indicator hardly changed between 2011 and 2015 as employment also grew speedily in the entire population. However, between 2017 and 2019 both the relative and the absolute employment rates increased slowly.

3 Nearly two-thirds of employees with reduced work capacity have already experienced discrimination during job search (*CSO,* 2015).

4 In the 2011 and 2015 surveys, the question "Have you got a long-term health problem?" was followed by the list of potential conditions and there was also an "other" category for respondents. However, since 2017 only yes/no answers are possible to give, therefore it is possible that respondents do not think of a health problem which would be on the list. Someone can only be regarded as a person with reduced work capacity if they gave an affirmative response to this question and their long-term illness poses an obstacle to employment.

Figure 7.1.1: The absolute and relative employment rates of the population with reduced work capacity aged 19–64



Note: The vertical line indicates the change in the question about reduced work capacity in the LFS survey.
Source: LFS, *CSO*.

In the following we will explore what role the different composition of the population with reduced work capacity plays in the employment gap. As seen in *Figure 7.1.2*, the average age of this group (also within the age group 19–64) is considerably higher than that of the healthy population, since a large proportion of long-term health problems are diseases developed over one's life. In addition, the average educational attainment of the group with reduced work capacity is substantially lower, for several reasons. On the one hand, disabilities present or acquired in childhood reduce the chances of school attendance and further studies (see *Subchapter 8.1.* and *Box K8.1*). On the other hand, those with low educational attainment are more likely to work in manual jobs, which involves a higher risk of deterioration of work capacity (see *Subchapter 3.3*).

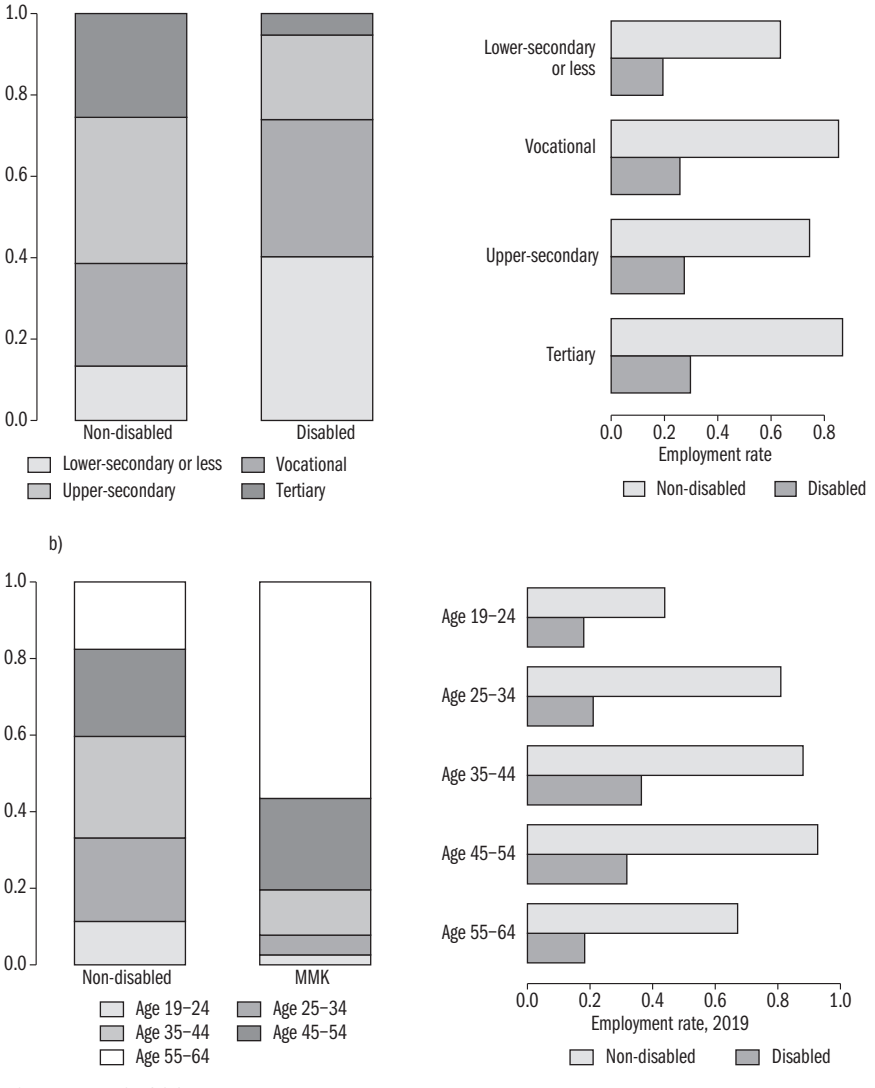
However, the figures also reveal that among those over 55 and those with a lower-secondary qualification the employment rate of the healthy population is also lower.[5] In order to assess the effect of the different composition, the Oaxaca–Blinder decomposition method was used: we divided the difference (in percentage points) between the employment rate of the healthy and reduced work capacity population aged 19–64. The results are summarised in *Table 7.1.1.* The composition effect indicates to what extent the dissimilar characteristics of the two groups (educational attainment, age, gender, regional distribution and urban or rural residence) explain the difference in employment rates.[6] The parameter effect shows the effect of disability, while the (negligible) interaction component describes that the same

5 The distribution of the population with reduced work capacity by age and educational attainment is similar during the years between 2011 and 2018.

6 The role of age was assessed based on the following categories: 19–24, 25–34, 35–44, 45–54, 55–64. Educational attainment was broken down by the four categories of lower-secondary, vocational school, upper-secondary ending in a Matura and tertiary education qualification.

characteristics differently affect the employment chances of the two groups. The results indicate that the dissimilar composition of the population with disabilities explains less than one-fifth of the differences in employment; the majority of the employment gap (about 46 percentage points) is due to reduced work capacity.

Figure 7.1.2: The educational attainment and employment rate of the population with and without disabilities in 2019, broken down by educational attainment (a) and age (b)



Source: *LFS, CSO*.

Table 7.1.1: Difference between the employment rates of populations with and without disabilities aged 19–64, broken down by factors, 2017–2019

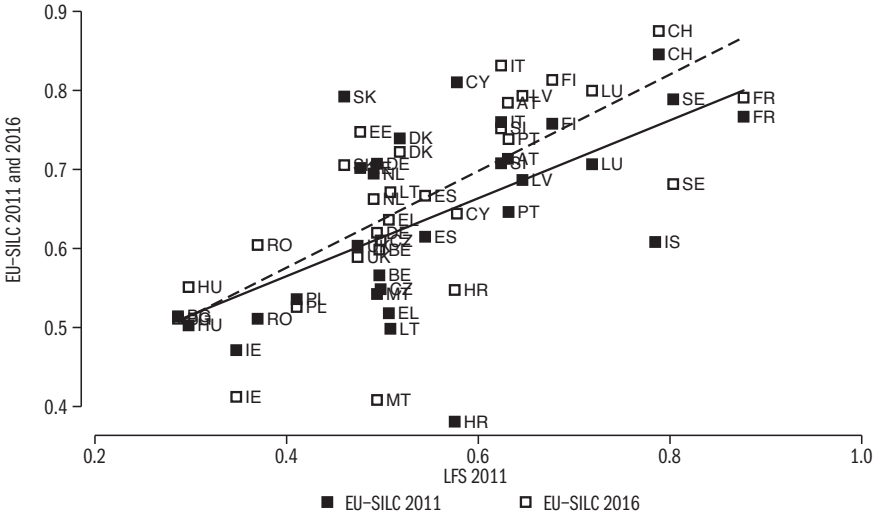
	2017	2018	2019
Non-disabled	0.773	0.783	0.789
Disabled	0.221	0.234	0.238
Total difference	0.552***	0.548***	0.551***
Composition effect	0.105***	0.098***	0.062***
Parameter effect	0.460***	0.463***	0.472***
Interaction	–0.012	–0.013	0.017

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Authors' calculation, based on *LFS* data from 2017–2019, using the Oaxaca–Blinder decomposition method.

The labour market situation of the Hungarian population with reduced work capacity does not compare favourably internationally either. The Labour Force Survey (LFS), covering all the countries of the European Union last included a question about disability in 2011. According to this survey, Hungary is at the back of the pack of European countries: the relative employment rate (30 per cent) hardly exceeded one half of the EU average (56 per cent) and the indicator was lower only in Bulgaria (*Figure 7.1.3*).

Figure 7.1.3: The relative employment rate in the LFS and the EU–SILC surveys



Country codes: AT – Austria, BE – Belgium, CH – Switzerland, CY – Cyprus, CZ – Czech Republic, DK – Denmark, DE – Germany, EE – Estonia, EL – Greece, ES – Spain, FI – Finland, FR – France, HR – Croatia, IE – Ireland, IS – Iceland, IT – Italy, LT – Lithuania, LU – Luxembourg, LV – Latvia, HU – Hungary, NL – Netherlands, PL – Poland, PT – Portugal, RO – Romania, SI – Slovenia, SK – Slovakia, SE – Sweden, UK – United Kingdom.

Note: The calculations and the figure was prepared by *Boldmaa Bat-Erdene*. The relative employment rate is the ratio of the employment rates of the reduced work capacity and the healthy populations aged 15–64.

Source: *Eurostat* (EU-SILC and LFS).

The relative employment rate is also low by international comparison according to another European questionnaire survey, EU–SILC, which relies on a broader definition. It reveals that although the employment gap of the population with reduced work capacity compared to the EU average has decreased since 2011, in 2016 it was still significant (see *Box K7.2* for more details about the comparison of EU–SILC and LFS).

Policy measures

On the demand side of the labour market, the most important financial incentives for employing people with reduced work capacity include wage subsidies, tax allowances, obligatory employment quotas and grants for improving the accessibility of workplaces. What these measures have in common is the reduction of the relative costs of employing disabled workers relative to non-disabled workers and in this way diverting demand in their direction in the open labour market. Based on international experience, these financial incentives have a positive but typically modest impact (for example *Datta Gupta et al,* 2015, *Scharle–Csillag,* 2016). In addition to financial incentives, awareness-raising campaigns and training that reduce discrimination and improve their inclusion also boost demand for employees with reduced work capacity (*Phillips et al,* 2015, *McDonnall–Antonelli,* 2020).

In Hungary, demand-side measures strongly encourage employers to employ disabled individuals. One of the most important measures boosting labour demand for people with reduced work capacity is the obligatory employment quota, widely used across countries, which requires the employment of a certain number of workers with disabilities or, failing that, the payment of a punitive tax. In Hungary, all employers with over 25 employees (including public sector and non-profit organisations) have to pay a so called 'rehabilitation contribution' if the share of employees with disabilities does not reach the obligatory employment rate, which is 5 per cent of the headcount. The contribution is significant: it was HUF 1,449 thousand/per person in 2020, which is 63 per cent of the annual amount of the minimum wage and the related contributions or nine times the monthly amount of the minimum wage. The obligatory employment rate can only include employees confirmed as individuals with reduced work capacity by the complex assessment of a rehabilitation committee and who at the same work at least four hours a day.[7] The obligatory employment quota of employees with reduced work capacity is widely adopted in other countries; however, the associated rehabilitation contribution (a punitive tax) is high in Hungary by international comparison (*OECD,* 2010, *Lalive et al,* 2013). (Regarding its impact see *Box K7.1*).

The significant tax allowance offered for employers when employing disabled people may also increase demand: employers are entirely exempt from paying social contribution tax on wages amounting up to twice the minimum wage,[8]

7 See Act CXCI of 2011 on the benefits provided for persons with reduced work capacity and on the amendment of certain acts.

8 The allowance was introduced on 1 January 2019 (Act LII of 2018). It replaced the rehabilitation card, which was possible to claim by people with reduced work capacity and which also provided substantial allowances.

and for firms with fewer than 20 employees the wages of employees with reduced work capacity (up to the minimum wage) are deductible from the corporate tax base.[9] Nevertheless, disabled employees are entitled to additional five days annual paid leave, which increases labour costs. Besides incentives for employment in the open labour market, substantial government funding is granted for accredited employers, who provide secure (sheltered) but segregated jobs for 30 thousand persons. According to international experience, this is considerably less efficient in terms of rehabilitation than support granted for employment in the open labour market (see for example *Scharle–Csillag,* 2016).[10]

On the supply side, the extent and accessibility of cash benefits as well as rehabilitation services for restoring work capacity (assessment of existing skills, motivating, reskilling, coaching) and job placement are the most significant policy measures (for more details see *Subchapter 7.2*).

As shown in *Box K7.1* in more detail, the rehabilitation contribution demonstrably increases the employment of people with disabilities in the open labour market. However, the low uptake of the quota, which has not been improving over recent years, and the considerable employment gap of the population with disabilities indicates that the substantial financial incentives alone are not sufficient to integrate people with disabilities in the labour market.

9 See Act LXXXI of 1996. The maximum company size was not raised in line with the increase in the minimum company size pertaining to rehabilitation contribution from 20 to 25, therefore firms with employee numbers between 20 and 25 are not subject to either the corporate tax relief or the quota.

10 In principle, rehabilitation also takes place at these workplaces: about one-fourth of employees with reduced work capacity are in transitional employment, which means that they are supposed to find employment in the open labour market in three years with the help of their employers. However, we were unable to obtain information on the actual compliance with this regulation.

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K7.1 The disability employment quota and the rehabilitation contribution

JUDIT KREKÓ & ÁGOTA SCHARLE

We assess the impact of the obligatory disability employment quota on the employment rate of the population with disabilities using the raise of the rehabilitation contribution in 2010, when the amount of the rehabilitation contribution increased significantly, more than fivefold for firms employing at least 20 workers.[1] The horizontal axis of part a) of *Figure K.7.1.1* indicates company size and the vertical axis indicates the average number of workers with disabilities in the particular group of employers. The comparison of years preceding and following the raise shows that the business sector responded vigorously to the raise: the quota considerably increased the employment rate of disabled people in the open labour market. There is no significant break in the number of disabled employees in 2008, when the amount of the rehabilitation contribution was significantly lower, one-fifth of the current amount. However, after the raise, firms with slightly over 20 employees (the size threshold effective at the time), employed 0.28 more disabled employees than prior to the raise, which is equal to 28 per cent of the quota in their case.

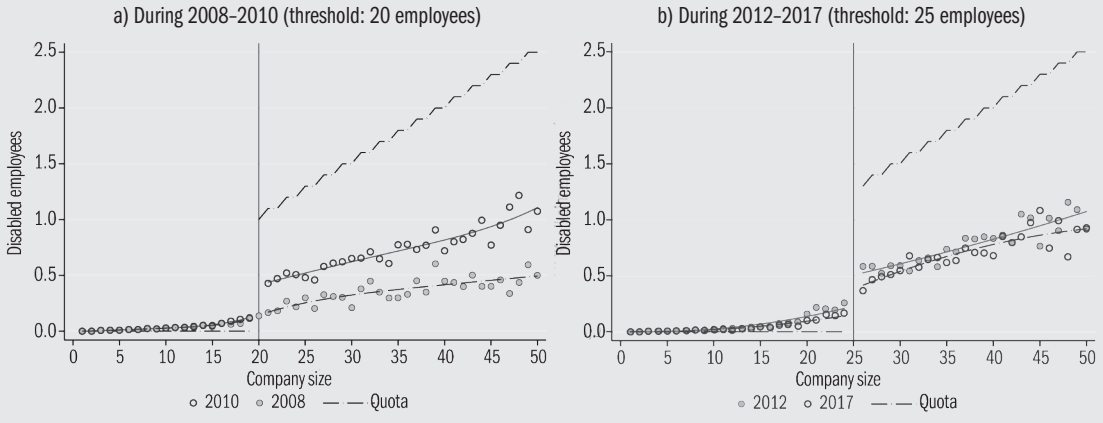
The discontinuity in 2010 unequivocally shows the impact of the raise of the rehabilitation contribution, which is confirmed by the fact that the break in the average number of disabled workers moved to the new minimum company size after this threshold was raised from 20 employees to 25 employees in 2012. Part b) of Figure *K7.1.1* presents the average number of disabled workers in 2012 and in 2017 at firms with different headcounts below and above the new threshold of 25 specified in the law. Firms with headcounts just over the threshold of 25 had considerably more disabled workers (about 0.6) on average than those below it (about 0.3) in 2012.[2] Despite the significant impact, the number of disabled employees is far below the obligatory employment quota even at firms above the threshold (1.3 at firms with 25 employees), and the situation did not change significantly in 2017 either, even though the regulation includes a very strong financial incentive. The amount of the rehabilitation contribution is higher than the monthly wage costs and contributions of a part-time employee on minimum wage. Consequently, if an employer recruits a disabled person to work part-time for about the minimum wage, they have lower costs even if the work delivered by the person has no added value. In addition to saving the cost of the rehabilitation contribution, in most cases the employer is also entitled to a substantial tax benefit, which results in further savings.

How does all this translate to the number of jobs? Extrapolating the impact estimated for firms around the threshold and applying it to 2018, we estimate that the rehabilitation contribution generated about 20–25 thousand jobs for disabled employees. However, recent data of revenue from rehabilitation contribution suggest that the majority of the quota, about 65–70 per cent, is still unfilled. This means that in 2018 the number of disabled employees was about 75 thousand short of fulfilling the quota. Employers paid a huge amount, about 102 billion HUF in rehabilitation contributions into the national budget in 2019 because of failing to fill the quota.

1 From HUF 174 thousand annually to HUF 946 thousand annually per employee missing from the obligatory employment level.

2 We estimated the impact of the rehabilitation contribution using regression discontinuity design. It was accounted for that firms may adapt their headcounts to the regulation. As for headcount distribution across firms, there is aggregation below the minimum company size, suggesting that some firms choose to stay below the minimum company size in order to avoid paying rehabilitation contribution. After the adjustment of raw results, taking into account distortions due to this manipulation, it is still seen that the quota substantially increases the employment rate of disabled workers.

Figure K7.1.1: The average number of disabled employees by company size



Source: Authors' estimation based on the company tax return database of the tax authority. The dots represent the average number of disabled employees and the lines are quadratic polynomials fitted to the dots. Firms with a share of disabled employees over 40 per cent are excluded because they are assumed to offer sheltered (segregated) employment.

7.2 CHANGES IN DISABILITY BENEFITS AND THEIR IMPACTS

JUDIT KREKÓ & ÁGOTA SCHARLE

Since the regime change, the system of disability and rehabilitation benefits has undergone profound transformations. During the recession following the regime change, the number of beneficiaries doubled between 1990 and 2003 as a result of lenient regulation and by 2003 it had exceeded 713 thousand persons, which amounts to 12 per cent of the working-age population.[1]

Following the cautious and largely ineffective attempts to tighten up legislation starting in the late 1990s, the first noteworthy reform took place in 2008, which introduced assessment based on remaining work capacity and legislation to encourage rehabilitation and which also extended rehabilitation services (*Scharle,* 2008b). The next reform, in 2012, took a different approach to cutting the costs of the system: it focused on restricting access and reducing benefit levels (*Kovács,* 2019, *Nagy,* 2014).

The number of those receiving benefits based on their reduced work capacity (disability) fell dramatically, by over 60 per cent, to 290 thousand persons, that is below 5 per cent of the working age population, between 2003 and 2019. By international comparison, the proportion of beneficiaries of disability benefit relative to the active age population dropped from the top of the OECD ranking to its lower half (*OECD,* 2010, 2016). In terms of expenses as a share of the GDP, Hungary moved from the mid-range of the EU to the group of member states spending the least: expenses have halved since 2007 and fell to 1 per cent of the GDP, one of the lowest in the EU.

What is behind this profound change? The number of beneficiaries is mainly influenced by regulating the access to, and extent of, benefits as well as the demographic composition and the health of the population. In the following, first we provide a brief overview of the measures introduced in 2008 and 2012. (Changes in the most important disability cash benefits are summarised in *Table 7.2.1.*) Then, based on an analysis of administrative data, we present the trends in inflows and outflows of disability and rehabilitation benefits as well as the amount thereof.

We do not undertake to assess changes in the general health condition of the population. However, we calculate changes in the health indicators of new beneficiaries compared to those of the total population to show the evolution of targeting and rigour of disability benefits. Additionally, we also investigate the impact of demographic changes on inflows into benefits.

Cash benefits have to fulfil several, partly opposing objectives. The primary function of disability benefits is to provide a livelihood for those who have

1 *Köllő–Nacsa* (2004) and *Scharle* (2008a) report that the share of receiving disability pension is higher in regions where labour market conditions are unfavourable. *Bíró–Elek* (2020) shows that job loss significantly increases the probability of disability retirement, probably partly due to the impact of job loss on health and partly due to disability retirement being an alternative to unemployment.

partly or completely lost their income from work because of their health conditions. Nevertheless, benefits should also encourage beneficiaries to return to the labour market as soon as possible, using their remaining work capacity. In addition to cash benefits, rehabilitation services play a key role in this process, since they may support the restoration of work capacity, the finding of a job suitable for the health condition and preparation for this job.

Regulation faces a serious dilemma: several empirical studies (for example *Bound,* 1989, *Autor–Duggan,* 2003, *Scharle,* 2008b) report that low barriers to entry and excessive benefits significantly reduce labour supply, while an overly restrictive system is not able to fulfil its primary role of income support. When presenting the changes to the benefit system, this subchapter will also address the above aspects.

Reforms of the system of disability benefits in 2008

The stated purpose of reforming cash benefits in 2008 was, in line with international trends, to promote rehabilitation, the restoration of work capacity and exploiting the remaining work capacity to the fullest extent possible instead of focusing on disability, and also to encourage the labour market integration of recipients by strengthening the system of rehabilitation services (*OECD,* 2010, *Csillag–Scharle,* 2016).

A new, complex appraisal system was introduced on 1 January 2008, which is still in place (see *Box K7.2*). The new system has linked eligibility to the extent of total damage to health (instead of the reduction in work capacity), and assigned new thresholds to levels of severity. This did not necessarily imply tightening: assessment now focused on skills that can be developed, changes in occupational work capacity and the chances of rehabilitation. Accordingly, the other key element of the reform was the introduction of a rehabilitation benefit granted for up to three years, which considerably restricted the probability of becoming immediately eligible for a permanent disability benefit. Those with health damage of at least 50 per cent and assessed as rehabilitable were eligible for a rehabilitation benefit. They were also offered employment rehabilitation services and the law even stipulated that beneficiaries were to cooperate with the Public Employment Service (PES) although it did not specify any sanctions. Rehabilitation services were provided by the PES and non-profit service providers under contract within an EU-funded programme, at a larger scale than previously (*Adamecz-Völgyi et al,* 2018). The reform also maximised wages received for working in addition to receiving regular social benefits at 80 per cent of the minimum wage as opposed to the previous 80 per cent of earlier wages.

Reforms of disability and rehabilitation benefits in 2012

Reforms in 2012[2] profoundly transformed the system of cash benefits (*Table 7.2.1*). Disability and rehabilitation benefits were removed from the pension

2 Act CXCI of 2011 on the Benefits for Persons with Reduced Work Capacity.

system, while former benefit types (disability pension, accident disability pension, regular social benefit and bridging allowance as well as rehabilitation allowance) were replaced by the newly introduced disability and rehabilitation benefits. Recipients of former benefits, except for beneficiaries of rehabilitation benefits, were automatically transferred on 1 January 2012 to one of the new benefit types, while those aged over 62 were reclassified as old-age pensioners.

The stated objectives of the reforms in 2012 included giving more focus to rehabilitation and social welfare aspects in addition to medical assessment and to encouraging those able to return to the labour market to do so. Accordingly, those with a health condition of 31–60 per cent and employability that may be restored through rehabilitation (or who are able to work assisted by occupational rehabilitation) are granted a rehabilitation benefit for a maximum of three years. The amount of the rehabilitation benefit is substantially lower (up to HUF 50.3 thousand in 2020) than the rehabilitation allowance it replaced. Disability pension is only granted to those whose rehabilitation is not recommended.

In principle, all beneficiaries who may be rehabilitated are entitled to services enhancing their employability and supporting job search; however, access to and the quality of these services did not improve during the years following the reforms (and in some regions they may have even deteriorated). Rehabilitation services were provided by the National Office for Rehabilitation and Social Affairs between 2012 and 2015 and then, since its dissolution, they have been provided by three different types of institutions: Human Resource Development OP or Competitive Central Hungary OP offices in two or three cities in each county (49 offices altogether, whereas the Public Employment Service has 170 offices throughout the country), one or two rehabilitation counsellors of the Public Employment Service in each county and NGOs. NGOs tend to offer more personalised and more diverse services[3] but their funding is more uncertain: application requirements change annually and state subsidies are often disbursed after several months of delay (*Scharle,* 2016). They also have restricted capacities: for example in the project titled 'Rehabilitation – Value – Change' (Hungarian abbreviation: RÉV), implemented between 2014 and 2017, NGOs assisted a total of 3,500 persons to return to the labour market.

Employment rehabilitation is also provided by accredited employers; however, the subsidies granted for this (called transitional employment by the legislation) do not encourage either real rehabilitation or finding employment in the open labour market.[4]

As opposed to earlier reforms (and reforms introduced by other countries), reforms in 2012 both changed the requirements of claiming the new benefits and called for a revision of earlier benefits. The extent of health damage and entitlement to benefits were assessed through a complex appraisal in the case of disability pensioners below age 57 with health damage of less than 79 per cent (or a less than 100 percent reduction in work capacity according to cat-

3 NGOs provide various services that help job seekers and employers find one another and reduce the costs and prejudices of employers. They assess existing skills and motivations, prepare individual action plans, provide training or preparation for obtaining employment if needed, search for an appropriate job, provide initial training or sensitisation for future colleagues and assist with the difficulties after starting a new job.

4 Workers in transitional employment may stay up to three years in supported employment and then they have to find a job in the open labour market with the help of their employers within three years. However, failure to do this is not sanctioned by the law.

egories prior to 2008) and the recipients of regular social benefit below age 57. Beneficiaries had to declare until 31 March 2012 whether they wished to undergo the appraisal: if they failed to make a declaration or they did not request the appraisal, they lost their entitlement in May 2012. Based on data from CERS Admin3 database (see below), this obligation concerned about 200 thousand beneficiaries.

Table 7.2.1: The main insured[a] cash benefits for persons with reduced work capacity[b]

Benefit	Extent of health damage	Other entitlement conditions	Amount	Earnings limit[d]
1 January 2008 – 31 December 2011				
Disability pension, Group I	Over 79 per cent and needs assistance	Length of service (dependent on age)	Comparable to pension[c]	None
Disability pension, Group II	Over 79 per cent but needs no assistance	Length of service (dependent on age)	Comparable to pension[c]	None
Disability pension, Group III	50–79 per cent and is not possible to rehabilitate	Length of service (dependent on age)	Comparable to pension[c]	On net average wages: 90 per cent of the monthly average wage, which is the basis for disability pension, duly updated with pension increases (the average of six consecutive months); On gross average wages since January 2009: twice the amount of disability pension (the average of six consecutive months)
Regular social benefit	Min. 40 per cent	Half of the length of service required for disability pension	Fixed amount (HUF 27 thousand in 2011)	80 per cent of the minimum wage (the average of six consecutive months)
Bridging allowance	Min. 40 per cent	Half of the length of service required for disability pension; Maximum 5 years left until retirement age	75 per cent of old-age pension at the time of entitlement	80 per cent of the minimum wage (the average of six consecutive months)
Rehabilitation allowance	50–79 per cent	May be rehabilitated Min. 30 per cent reduction of wages Payable for a maximum of 3 years	120 per cent of disability pension in Group III	The allowance is reduced by 50 per cent if the wage reaches 90 per cent of the former average wage
Since 1 January 2012				
Disability benefit	Maximum 60 percent health condition[e]	Length of service; Rehabilitation not recommended	Dependent on former wages, length of service, health	150 per cent of the minimum wage (2012–2013: the average of three consecutive months, since 2014: over three consecutive months)
Rehabilitation benefit	Maximum 60 percent health condition	Length of service; Employability may be restored by rehabilitation	Dependent on former wages, length of service, health (HUF 30,470–50,780 in 2020)	2012: the cash benefit is suspended during gainful employment, 1 January 2013 – 30 April 2016: 20 hours weekly, without an earnings limit, Since 1 May 2016: 150 per cent of the minimum wage (over three consecutive months)

[a] The two most important non-insured benefits are the disability allowance and invalidity allowance. Persons with severe disabilities over 18 are entitled to the disability allowance, which has been HUF 20,982–25,825 since 2017. Persons with a permanent health damage of at least 70 per cent, incurred before the age of 25, who do not receive disability or rehabilitation benefits, are entitled to invalidity allowance. It is a flat rate benefit (HUF 38,670 since 1 January 2020).

[b] Prior to 1 January 2008, all of these benefits were available except for the rehabilitation allowance. Entitlement was linked to the extent of loss of work capacity and earning limits varied by benefit type. The table does not include the insured health damage benefit of miners, introduced in 1991, for persons with a health damage of at least 29 per cent incurred because of their work as miners.

[c] The amount depends on prior wages, length of service and the extent of reduction in work capacity and it is higher than the pension available in the case of identical length of service and former wages.

[d] It concerns gainful employment undertaken during the disbursement of the benefit and new beneficiaries. Beneficiaries who had already been entitled to it prior to the reforms, were typically subject to transitional or earlier legislation.

[e] Since 2012, health condition has been determined as a percentage of health instead of the extent of health damage. The minimum of 40 percent health damage, assessed prior to 2012, corresponds to a maximum of 60 percent health condition after 2012.

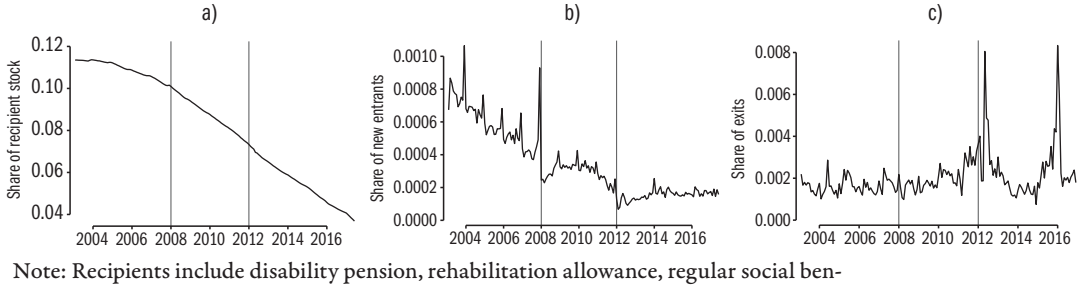
Changes in the share of benefit recipients among persons with reduced work capacity

In this section we describe the accessibility of cash benefits for persons with reduced work capacity (RWC) using the Admin3 database, compiled by the Databank of the Centre for Economic and Regional Studies (CERS), which contains anonymised, individual-level data of 50 per cent of the Hungarian population between 2003 and 2017.[5] Data on entry into disability and rehabilitation benefits are available until June 2017 for the age group 20–60.

Figure 7.2.1 presents the share of the age group 20–60 receiving or entering benefits for reduced work capacity as well as the share of those exiting the benefits (the number of benefits terminated in a given month relative to the number of beneficiaries of the previous month). The vertical lines mark the reforms in 2008 and 2012. The analysis only includes insured disability and rehabilitation benefits.

5 A brief description of the database is provided in the Annex of this *In Focus* volume, for more detail see *Sebők* (2019).

Figure 7.2.1: Recipients of insurance based disability benefits a) stock b) inflow c) outflow



Note: Recipients include disability pension, rehabilitation allowance, regular social benefit, bridging allowance and the health damage benefit of miners until December 2011 and disability and rehabilitation benefits as well as the phasing out of rehabilitation allowance from 2012 onwards. The stock and inflow are shown relative to the population of age 20–60, while the outflow is shown as a share of the previous month's beneficiaries.
Source: Authors' calculation based on Admin3.

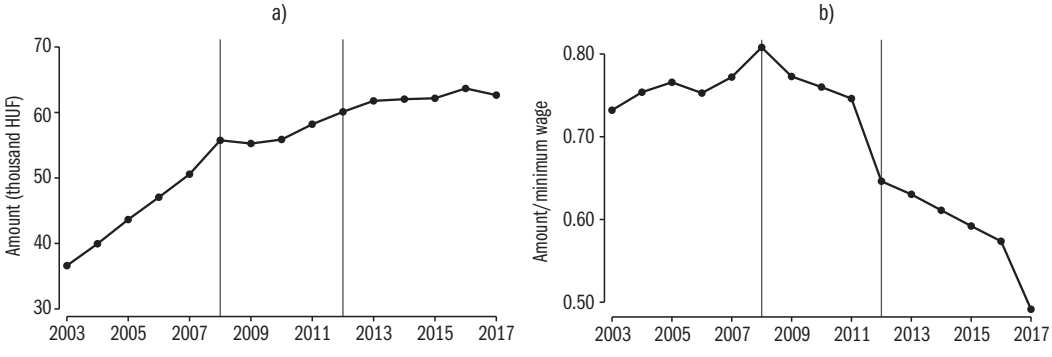
In the period between 2003 and 2017, the share of beneficiaries fell steadily. In the period until 2008, inflow gradually declined primarily because of

a drop in the inflow into regular social benefit. It is also discernible that before the 2008 reform, expecting a tightening of the assessment system, many brought forward and submitted their claims for disability pension before the amendment.

The reform in 2008 primarily caused a sharp decrease in the number of entrants, while the number of exits did not change significantly. As a result of the reform in 2012, the number of entrants diminished substantially and the number of exits surged, therefore the number of beneficiaries dropped considerably. The number of exiters was especially high in May 2012, when beneficiaries not requesting the complex assessment lost their entitlement. A similarly massive wave of exit happened in 2016: the entitlement of many beneficiaries who were granted a rehabilitation benefit for three years expired in that year.

After the reform in 2008 the average amount of benefits (relative to the effective minimum wage) did not change substantially (*Figure 7.2.2*). Abolishing the 13th pension in 2009 resulted in a drop in disability pension levels. Following the 2012 reform, several factors contributed to the decrease in benefits relative to the minimum wage. On the one hand, rehabilitation benefit as opposed to rehabilitation allowance prior to 2012 was particularly low. On the other hand, the amount of benefits followed neither the 20 percent increase in the minimum wage in 2012, nor the increases of the following years.

Figure 7.2.2: The average amount of benefits in HUF (a) and relative to the minimum wage (b)



Note: The figure presents the annual averages of benefits.
Source: Authors' calculation based on Admin3.

Health indicators of new entrants to disability and rehabilitation benefits relative to the total population

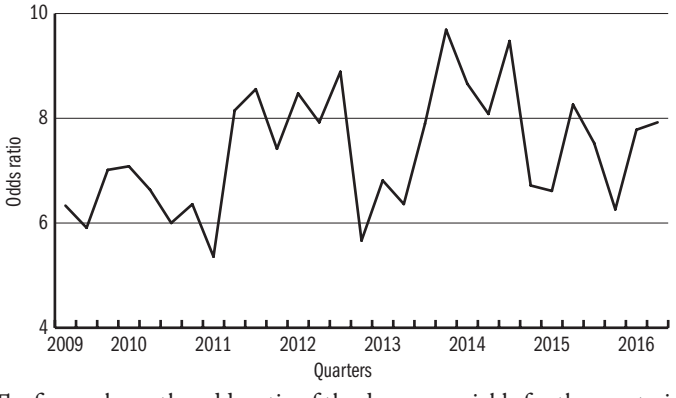
In the following, we will compare the health condition of working age new beneficiaries to the similar age group of the active population. The relative health condition of entrants provides information on the targeting of benefits and also on what role the changing regulation had in decreasing the share of beneficiaries.

The following figures indicate changes in the health indicators of entrants to disability or rehabilitation benefits of those aged 20–60 compared with the total population aged 20–60. The following health indicators are included: expenditure on prescription-only medicines (both own spending and social security subsidies), number of outpatient and inpatient visits financed by social security as well as visits to the general practitioner over the 12 months preceding entry. (Visits to the general practitioner exclude the month immediately preceding the entry to disability benefit so that the administrative visits related to the complex assessment procedure do not distort results.) In addition, the death rate in the first year after entry was also included. Although this indicator may also be affected by the period of receiving the benefit, we considered it to be mainly determined by the health condition prior to entry to the benefit.

Since healthcare data are available from Admin3 from 2009 onwards, comparison was only possible to undertake for the period between January 2010 and June 2017, which primarily reveals how the reform in 2012 influenced the relative health condition of entrants.

Figure 7.2.3. shows the odds ratio of death of entrants within a year after entry, controlled for gender and age, in the population aged 20–60 during the period 2009–2016. Entrants to the benefit are 6–10 times more likely to die within a year than persons of the same age and gender not entering the benefit scheme, and their relative mortality has slightly increased since 2009.

Figure 7.2.3: Mortality of entrants to disability benefits, controlled for gender and age relative to the total population aged 20–60 (at 12 months after entry), 2009–2016

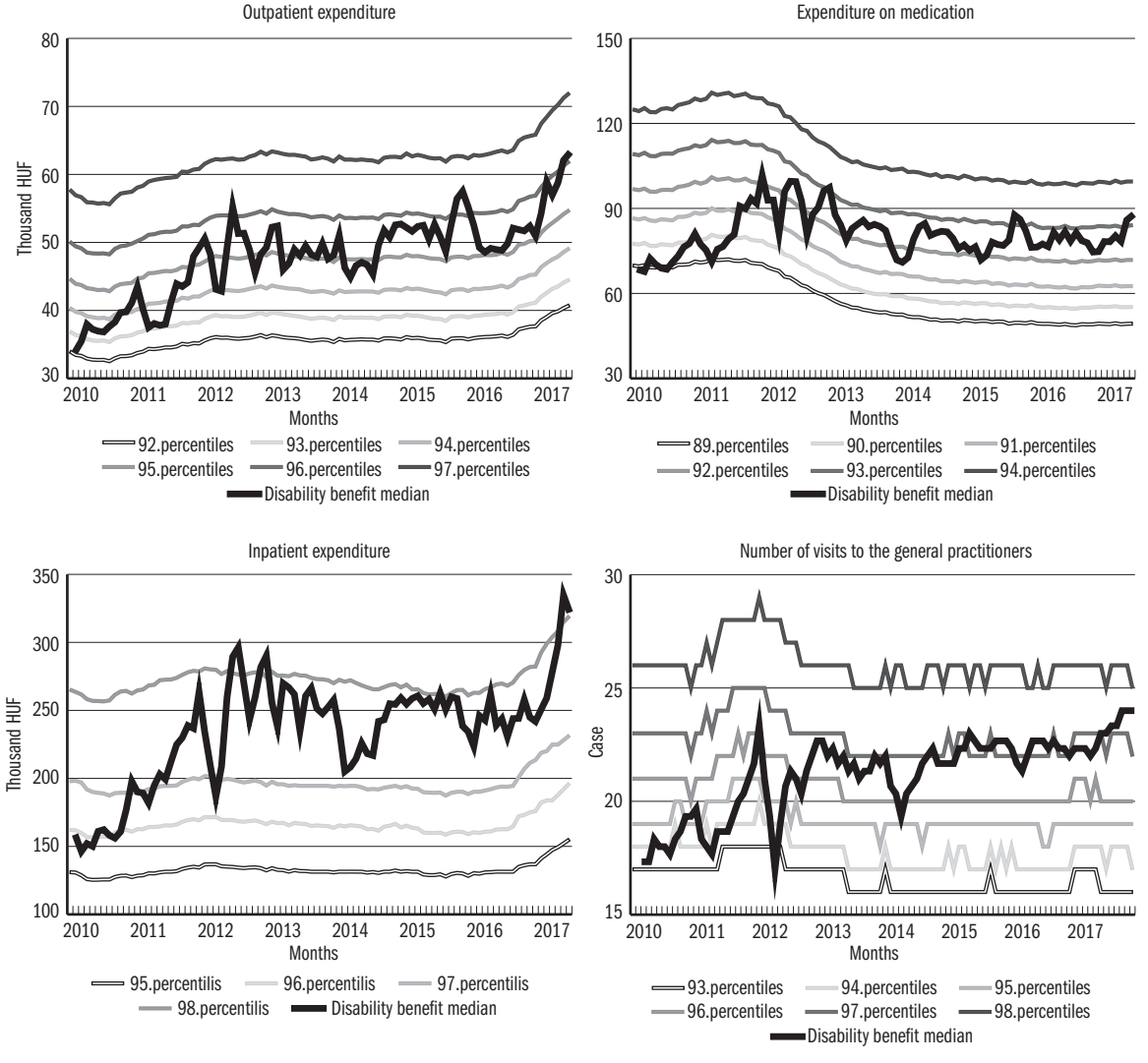


Note: The figure shows the odds ratio of the dummy variable for those entering the benefit, from a logit model on mortality with a one-year lag in the population aged 20–60. The logit model includes those aged between 20–60 years broken down by 10-year age groups and gender as an explanatory variable.
Source: Authors' calculation based on Admin3.

Figure 7.2.4 reveals that entrants to the disability benefit are in the top 5–10 percentile in terms of health indicators. There is a slow deterioration between 2010 and 2016, while most of the increases took place before 2012. All this

suggests that benefits became more targeted: the decreasing share of recipients of rehabilitation and disability benefits is partly due to the reforms in 2008 and 2012, which granted benefit access to those of relatively poorer health.

Figure 7.2.4.: Median healthcare expenditure of disability benefit entrants over the past 12 months relative to the percentiles of the total population aged 20–60



Note: Changes in the age and gender composition of entrants were controlled for. The raw figures are very similar to the figures above.
Source: Authors' calculation based on Admin3.

Essentially there may be two factors behind the deterioration of the relative health of beneficiaries, which cannot be disentangled on the basis of available

data. One explanation may be that the appraisal has become stricter, that is the minimum damage to health required for granting the benefit has been raised. In addition to stricter appraisal, declining demand may also have contributed to a reduced inflow. The decrease in the rate of benefits to wages (the replacement ratio) may have discouraged many potential applicants from claiming a benefit. In addition to the lower amount of the benefit, one factor which may have also contributed to the drop in claims is that the limit on earnings from employment in addition to receiving a benefit was lowered for those with high prior wages.[6]

In order to assess the impact of demographic changes on inflows, the population aged 20–60 was divided into five-year age groups. We assessed how high the inflow would be in 2016 if the odds of entry in 2016, broken down by age groups, were calculated based on the age composition of 2003. The results indicate that with the age composition of 2003 of the population aged 20–60 the number of new entrants in 2016 would be 4 per cent higher, revealing that demographic changes had a marginal impact on the drop in the inflow between 2003 and 2016.

Employability of beneficiaries of disability and rehabilitation benefits

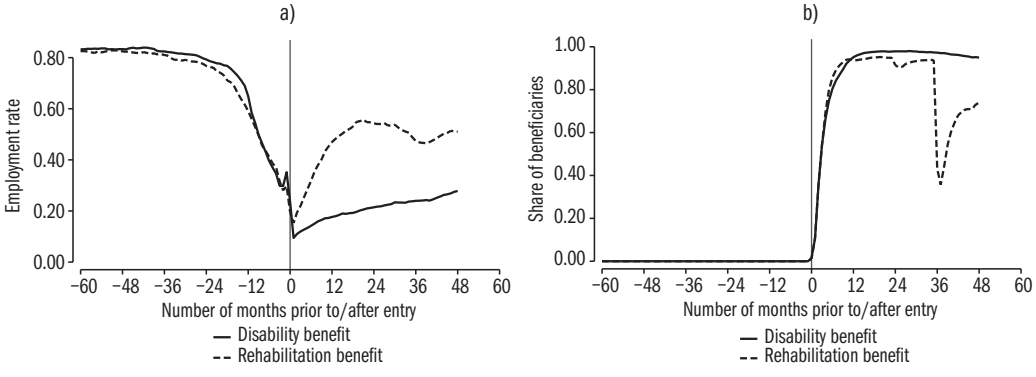
In the following, the employment probabilities of recipients of disability and rehabilitation benefits are discussed. Those entering rehabilitation benefit between 2012 and 2014 returned to the labour market sooner than those entering disability benefit (*Figure 7.2.5*). However, the share of employees is still only about 50 per cent among them three years after entry, even though the stated objective of the rehabilitation benefit is to reintegrate beneficiaries into the labour market within three years. However, the right-hand panel of the figure reveals that a large proportion of those entering the benefit still receive disability or rehabilitation benefits, either because they were transferred to disability benefit or because they were repeatedly granted rehabilitation benefit. On the whole, the proportion of entrants to rehabilitation benefit is small and has been decreasing: between 2012 and 2017 the share of entrants to rehabilitation benefits among beneficiaries fell from about 25 per cent to 15 per cent.

The left-hand side of *Figure 7.2.6* shows that proportionately more of those entering the benefit after the reforms in 2012 are in employment than those entering in 2008. However, trends in the employment rate relative to the population aged 20–60 show that the employment lag of entrants to disability and rehabilitation benefits did not decrease significantly after the reforms in 2012 (part b) of *Figure 7.2.6*).[7]

6 For those entering disability benefit after 1 January 2012 the limit has been 150 per cent of the minimum wage, while until 2012 it was dependent on prior wages.

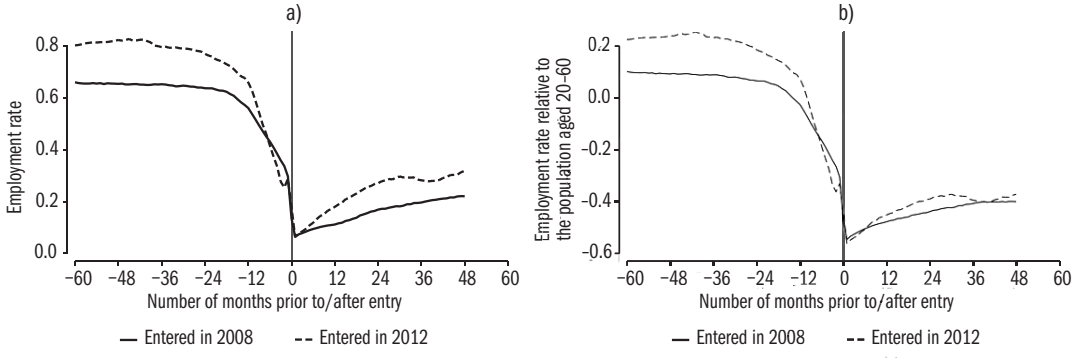
7 Examined by regression analysis, the probability of employment 12, 24 and 36 months after entry is not significantly different for those entering in 2008 and in 2012, even when controlling for gender, age and region.

Figure 7.2.5: The employment rate (a) and the share of beneficiaries (b) among those entering rehabilitation and disability benefit during 2012–2013 over time following entry



Note: Those with a gross wage over HUF 10,000 in the given month qualify as employees. On the horizontal axis, entry indicates the start of entitlement, which does not necessarily coincide with the start of disbursement.
Source: Authors' calculation based on Admin3.

Figure 7.2.6: Employment of those entering the disability and rehabilitation benefits in 2008 and 2012 among recipients (a) relative to the population aged 20–60 (b)



Note: Those with a gross wage over HUF 10,000 in the given month qualify as employees. On the horizontal axis, entry indicates the start of entitlement, which does not necessarily coincide with the start of disbursement. The right-hand panel shows the difference from the employment rate of the population aged 20–60.
Source: Authors' calculation based on Admin3.

Summary

While the Hungarian system of disability and rehabilitation benefits was one of the most generous in Europe in the early 2000's, today it has one of the lowest expenditures; the share of beneficiaries in the working age population is less than half of the figure in the early 2000's. The stricter assessment and the lower replacement rate of benefits reduced inflows through both the demand and supply side and the reform in 2012 terminated the entitlement of numerous beneficiaries. The targeting of the benefits increased, while the abuse of

the benefit system and the impact of disability benefits reducing labour supply probably declined considerably. However, it is unclear as to what extent the system guarantees decent living conditions during rehabilitation and to what extent it is able to support the use of remaining work capacity, rehabilitation and return to the labour market. Only a small proportion of beneficiaries are found rehabilitable in the complex assessment and the activating, rehabilitating elements of the system have not been appropriately expanded.

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K7.2 Assessing work capacity and measuring the size of the disabled population

BOLDMAA BAT-ERDENE, JUDIT KREKÓ & ÁGOTA SCHARLE

The appraisal of work capacity depends on objective and subjective factors, which may also be related to the institutional environment, thus it is impossible to determine the number of people with reduced work capacity (disabilities) unequivocally.

In *household surveys* it is usually the self-declaration of respondents that determine who has reduced work capacity. However, a clear division between fully and partly reduced work capacity is impossible to establish: it differs from one person and culture to another and it also changes over time as to which category one assigns a condition (*Kreider–Pepper,* 2007). The way of formulating the question may also influence the answer: precisely what and how much detail has to be provided in the answer or if there is a reference given compared to which respondents have to evaluate their condition. For example according to *Kapteyn et al* (2007), when responding to general questions, the proportion of the disabled within the total population is higher in the Netherlands than in the United States but the difference is considerably smaller if respondents have to assess themselves in relation to particular conditions.

It is also of significance whether respondents receive a benefit based on their condition: recipients tend to exaggerate their condition in order to justify their entitlement to the benefit. Consequently, entitlement conditions may also affect self-assessment on reduced work capacity (*Banks et al*, 2004).

Finally, some studies report that people not in employment are more likely to assess themselves as having a long-term illness, in this way providing an explanation for the lack of a job – this is termed justification bias (*Black et al,* 2017).

Administrative databases usually only provide information either on the work capacity assessed when granting entitlement or on the type of benefit granted. Both data are subject to regulations, therefore changes in the regulations may cause a break in time series statistics on people with disabilities.

Due to the above factors, even the results of surveys using identical approaches or administrative data can only be compared to a limited degree across countries. Cultural differences and dissimilarities between disability benefits may cause differences in both data sources, which distort comparison. Cross-country differences in the prevalence of reduced work capacity may of course be due to intrinsic reasons as well: better healthcare and stricter occupational safety regulations may reduce the risks of disability, while better integration and rehabilitation policies can help improve work capacity even for those with serious health impairment.

The importance of the assessment method is well illustrated by the two best known European harmonised household surveys, which also assess reduced work capacity: the Labour Force Survey (LFS) of 2011 of the European Union and the annual EU–SILC. The former asks about health problems that limit *work capacity*, whereas the latter asks more generally about being limited in their *everyday activities* by a permanent health problem. Statistics based on SILC present the population with reduced work capacity as larger and also report their employment rate higher, since it also includes those restricted by their health condition in everyday activities but not constrained in their job (*Geiger et al,* 2017).

In Hungary, one of the requirements of entitlement to disability benefits, allowances linked to employment (for example social contribution tax allowance) and exemption from paying the rehabilitation contribution is an official appraisal issued by a rehabilitation committee (currently the departments of rehabilitation and medical examiners of local government offices). Since 1 January 2012 one has been entitled to disability benefits if their health status is of 60 per cent or below according to the complex appraisal of a rehabilitation committee.[1] Health status is determined by the reha-

1 For the official definition of reduced work capacity see Act CXCI of 2011 on the Benefits for Disabled Persons and on the Amendment of Certain Other Acts.

bilitation committee, which includes at least two medical examiners, at least one rehabilitation expert and at least one social welfare expert, in this way in addition to medical considerations they also take into account to what extent the health status is compatible with the former job and qualifications of the claimant and their chances of employment rehabilitation. Another requirement of receiving disability and rehabilitation benefits is sufficient length of service.[2]

In terms of the rehabilitation contribution a person is considered disabled (i.e. with reduced work capacity) if their state of health is of 60 per cent or below, based on the complex appraisal of the rehabilitation committee,[3] or if they receive a non-insured benefit, disability allowance or the personal annuity of the blind.

Measuring the level of employment in the disabled population is complicated by the lack of publicly accessible data on the number of people qualifying as such on the basis of an official appraisal. The Hungarian State Treasury publishes data on the number of recipients of invalidity allowance and rehabilitation benefit. However, there is no data available about the current number of disabled workers who are not granted a benefit due to the lack of sufficient length of service or because of wages higher than the upper limit. In addition, there may be those who would qualify as disabled based on their health but who do not apply for the complex appraisal. This might be because someone receives another allowance, for example parental leave benefit or is in employment and would not be entitled to disability benefits due to the wage limit and he or she is not aware of the labour market advantages of being qualified as a worker with reduced work capacity. Another reason may be the wish to avoid possible stigmatisation resulting from reduced work capacity or if (perceived) discrimination against disabled workers is stronger than the labour market advantages arising from the status. Data from the Labour Force Survey of the Central Statistical Office indicate that about 50–65 per cent of working age disabled people receive some kind of disability benefit.

2 Between 2008 and 2011, regulations determined the extent of health impairment instead of the remaining state of health and defined reduced work capacity as a minimum of 40 per cent health damage. Preceding 2008, the indicator was the reduction in work capacity and a reduced work capacity status entailed a minimum of 50 per cent reduction in work capacity.

3 Or their health damage is over 40 per cent based on an expert opinion, opinion of a competent medical authority, official certificate issued when the certification procedure was in effect (if their health damage was assessed during 2008–2011); or the reduction in their work capacity is of 50–100 per cent and was assessed during the effectiveness of the related expert opinion (if their health damage was assessed during 2008–2011).

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8 HEALTH SHOCKS IN CHILDHOOD AND YOUTH AND EDUCATIONAL ATTAINMENT

8.1 THE EFFECT OF HOSPITALISATION ON THE SCHOOL PERFORMANCE OF CHILDREN

ZOLTÁN HERMANN & DÁNIEL HORN

There is a close correlation between the state of health and educational attainment. The two factors have a mutual effect on each other. Individuals with more human capital and a higher educational attainment are usually healthier, and healthier individuals usually perform better in school, have better results, and are able to collect more human capital. The two factors have a two-way relationship, which is well documented; both have an effect on the other. See the summaries of *Currie* (2009) and *Eide–Showalter* (2011).

In this subchapter, our aim is not to uncover the entirety of the causal link between the two, but rather, to document how negative health shocks occurring in school-age children in Hungary are related to subsequent school performance. More specifically, our focus of analysis is how hospitalisation during the 7th and 8th grades of lower secondary education affects mathematics and reading literacy test scores at the end of 8th grade, early school leaving, and the chances for further, upper-secondary education.

Since we observe the indicator of the state of health in the available data before the competency tests are taken, our analysis is rather more focused on the impact of health on human capital than on the reverse. But since these two factors change continually, and interact throughout the career path, our findings cannot rule out a reverse causal link, either.

In the literature, most studies examine the long-term, and not the short-term effect of health on education (see the summary of C*urrie–Almond,* 2011, and *framed piece K8.1*), as it is more useful from a public policy perspective, and in the case of early shocks, it also makes interventions possible. According to the unanimous conclusion of studies, early negative health shocks have an important and measurable negative effect on subsequent educational attainment and other adulthood outcomes. Unfortunately, the data currently available to us does not yet enable us to analyse the long-term effects; however, we are able to examine the short-term effect of school-age health shocks on school performance. Considering that school results are closely correlated to further education and labour market outcomes (*Hermann et al.,* 2019), the examined health shocks are expected to also have a longer-term effect on students' school performance and labour market outcomes.

The analysis is based on the Admin3 linked public administration panel database compiled by the databank of the Centre for Economic and Regional

Studies (KRTK).[1] The database contains individual anonymised administrative data on the basis of a 50 percent sample of the population of Hungary of 2003, for the period between 2003–2017. The data of the competency test are available from 2008, and the data regarding healthcare service use are available from 2009.

We measure the educational outcomes through various indicators. The first one is the score achieved on the National Assessment of Basic Competencies (NABC) in 8th grade in mathematics and reading literacy, controlling for the levels of the 6th grade mathematics and reading literacy tests. This "value-added" type measurement method brings us closer to a causal understanding of the results, since we can control for health shocks that occurred before 6th grade, and for other factors that may influence the test scores. Thus, we see the effect of 7th or 8th grade hospitalisation only on the test score changes that occurred between 6th and 8th grade.

The second indicator measures early school leaving. We examine whether a student appears in the Public Education Information System (KIR) at the end of 9th grade. If we cannot find a student's data in the KIR, we consider them an early school leaver. Those who appear in the data at the end of 9th grade are given a value of 1, and those who do not, are given a value of 0.

Finally, we measure the chances for further education among those who are not early school leavers. We analyse first the chance of gaining admission into a general secondary school (the academic track), then the overall chance for studying in a general secondary or in a vocational secondary school (the two tracks offering a secondary school diploma). We observe the secondary school type in 10th grade. For the analysis, we use the data of the 8th grade NABC cohorts from 2012–2015. Our estimates regarding test score value added and early school leaving apply to the 2012–2015 cohort, and our estimates regarding school type apply to 8th grade students who graduated in 2012 or 2013.

In our analysis, we measure the state of health through the number of days spent in hospital. Since our goal is to observe health shocks, we have adjusted the values of the variable so that we can observe high and very high values. We have aggregated the data to an annual level for the 12 months preceding the competency tests (from June to May of the following year), and we have created a three-tier variable where 0 is the reference category, 1 represents a high value, and 2 represents a very high value. The distribution of the variables is rather skewed, as the vast majority of students did not spend any time in hospital. A hospital stay of 1–3 days was considered a high value, and a hospital stay of at least four days a very high value.[2]

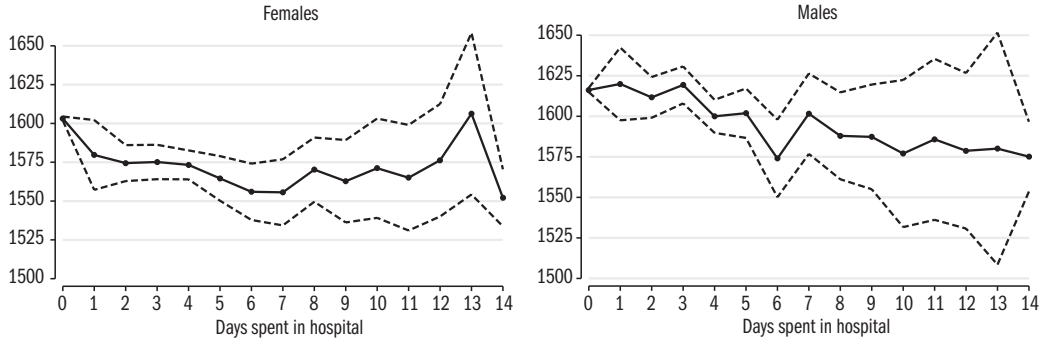
Figure 8.1.1 shows very clearly that the number of days spent in hospital in the 8th grade are negatively correlated with the end of year mathematics test scores. Females who spent any number of days in hospital have achieved substantially lower test scores than those who were not hospitalised in the given

1 You can find a brief description of the database in the Appendix of *In Focus*, and more details in the study of *Sebők* (2019).

2 The three categories constitute 92.5, 2.8 and 4.7 percent of the 8th grade sample, respectively.

year. Although the sign of correlation seems to reverse in the case of students who were hospitalised for more than a week, at this point, the accuracy of the estimate is actually very low, as there were very few such students (less than 1 percent of the population spent more than a week in hospital). For males, the negative correlation becomes visible only at more than three days. That is, the performance of those who were hospitalised for only a few days, was not worse than that of those who were not hospitalised.

Figure 8.1.1: Mathematics test scores and the number of days spent in hospital in the 8th grade, by gender



Note: Students who spent more than 14 days in hospital were sorted into the group 14. The dashed curves represent the 95 percent confidence interval.
Source: Authors' own calculations based on the Admin3 database.

In order to remove the effect of the most important confounding variables (that are presumably correlated with the state of health as well as test scores), linear regressions were estimated. In the estimations, we have, in each case, controlled for the educational attainment of the student's parents, the number of books available in the home, age at the start of school, the sex of the student, the year the NABC test was carried out, and the school of the student (fixed effect).

In the estimations, in addition to these, we have considered not only the health shocks of the given year, but also of the previous year (7th grade). That is, the 8th grade coefficients can be interpreted in the following way: to what extent did the results of the students who experienced a health shock only in the given year differ from those who did not experience such a shock. Similarly, the 7th grade coefficients can be interpreted in the following way: to what extent was the performance of the students who were hospitalised during the year preceding the observation worse than the performance of their peers.

Our findings suggest that hospitalisation significantly lowers end-of-8th-grade test scores (*Table 8.1.1*). If a student was hospitalised in a given year or in the preceding year, even for 1 day only, their scores were expected to be 4–8 points less than the scores of students with otherwise similar characteristics who were not hospitalised. As a comparison, in the estimations below,

the children of parents with a secondary school diploma scored an average of 67 points higher than the children of parents who did not have a secondary school diploma. Thus, the effect of about a tenth of this difference is not large, but not negligible, either.

Table 8.1.1: The effect of the time spent in hospital on outcomes

			Further education		
Time spent in hospital (school type in 10th grade)	Added value: mathematics	Added value: reading	still in school at the end of 9th grade	general secondary school	general or vocational secondary school
	(1)	(2)	(3)	(4)	(5)
High (1–3 days, 8th grade)	-6.556***	-7.451***	-0.00503	-0.00534	0.00751
	(2.002)	(1.863)	(0.00316)	(0.0108)	(0.00826)
Very high (more than four days, 8th grade)	-6.562***	-4.736***	-0.00824***	-0.0163**	-0.00870
	(1.602)	(1.474)	(0.00251)	(0.00819)	(0.00707)
High (1–3 days, 7th grade)	-3.924*	-0.912	-0.00238	0.0165	0.00534
	(2.077)	(1.930)	(0.00322)	(0.0114)	(0.00907)
Very high (more than four days, 7th grade)	-4.477***	-4.484***	-0.00788***	-0.0194**	-0.0134*
	(1.636)	(1.517)	(0.00264)	(0.00824)	(0.00719)
Number of observations	154,159	154,261	163,583	64,921	64,921
R^2	0.660	0.702	0.073	0.365	0.361

Note: Robust, standard errors clustered on the location level in brackets.
$^{***}p < 0{,}01$, $^{**}p < 0{,}05$, $^{*}p < 0{,}1$.
Source: Authors' own calculations based on the Admin3 database.

Very high values of the main independent variable have a significant effect on early school leaving in 9th grade, both in the case of 8th grade and 7th grade hospitalisation. This effect is rather small, under 1 percentage point, but since only 3.7 percent of the students in the sample leave school early after 9th grade, it is far from negligible.

Similarly, to early school leaving, the chances for further education were also affected by longer hospital stays only. Students who spent at least four days in hospital in 8th or 7th grade have 1.5–2 percentage points smaller chance of further education in a general secondary school. This effect is not negligible, as an average of 39 percent of the students in the sample continue their education in general grammar schools after the 8th grade. The same coefficients were not, or were only marginally significant for the general or vocational secondary school outcome.

Table 8.1.2 shows the coefficients of the above estimation for mathematics added value and for early school leaving, by the educational attainment of the mother. In the case of mathematics test scores, hospitalisation has a significant negative effect at low and high educational attainment levels alike, but it is particularly significant in the case of mothers with a high (secondary school diploma or tertiary) educational attainment level: for such students, any length of hospitalisation significantly reduces the expected end-of-year 8th grade test scores, by 6–9 points.

Table 8.1.2: The effect of the length of the hospital stay on the mathematics added value, by the attainment level of the mother

	Elementary school at most	Vocational school	Secondary school diploma	Tertiary
Added value: mathematics				
High (1–3 days, 8th grade)	-8.426	-3.345	-6.230*	-8.814**
	(5.826)	(4.228)	(3.737)	(3.796)
Very high (more than four days, 8th grade)	-1.038	-0.608	-8.776***	-7.627**
	(4.490)	(3.090)	(2.918)	(3.308)
High (1–3 days, 7th grade)	-14.93**	3.326	-7.367*	-3.599
	(6.529)	(4.094)	(3.835)	(4.301)
Very high (more than 4 days, 7th grade)	-4.681	-3.627	-4.092	-3.461
	(4.870)	(3.150)	(2.888)	(3.581)
Number of observations	24,670	40,202	46,213	37,485
R^2	0.525	0.589	0.634	0.677
Early school leaving: still in school at the end of 9th grade				
High (1–3 days, 8th grade)	-0.0365***	-0.00523	0.00122	0.00635
	(0.0129)	(0.00650)	(0.00478)	(0.00407)
Very high (more than four days, 8th grade)	-0.0254***	-0.00887*	-0.00162	-0.00289
	(0.00883)	(0.00481)	(0.00397)	(0.00426)
High (1–3 days, 7th grade)	-0.0128	-0.000344	0.000619	0.00642
	(0.0140)	(0.00685)	(0.00517)	(0.00418)
Very high (more than 4 days, 7th grade)	-0.0166*	-0.00883*	-0.00879**	-0.00205
	(0.00979)	(0.00491)	(0.00440)	(0.00421)
Number of observations	26,919	42,168	48,233	39,201
R^2	0.151	0.099	0.091	0.115

Note: Robust, standard errors clustered on the location level in brackets. Average early school leaving rates by the mother's educational attainment: elementary school at most: 8.4 percent, vocational school: 3.4 percent, secondary school diploma: 2.3 percent, tertiary: 1.9 percent.

$^{***}p < 0{,}01$, $^{**}p < 0{,}05$, $^{*}p < 0{,}1$.

Source: Authors' own calculations based on the Admin3 database.

Unlike with test scores, in the case of early school leaving, hospitalisation has a larger effect on the children of mothers with a lower educational attainment level; but significantly negative coefficients can be found in the case of higher educational attainment levels as well. The children of mothers with at most elementary school, have a 2.5–3.5 percentage points higher chance of leaving school early in 9th grade if they were hospitalised in 8th grade. This can be considered large relative to the average 8.4 percent early school leaving rate within the given group. The 0.8 percentage points higher early school leaving rate of the children of mothers with vocational school (in the case of a 'very high' length of hospitalisation) is of a similar magnitude, relative to the average 3.4 percent early school leaving rate of the group.

Conclusions

Overall, hospitalisation has a significant and not negligible effect on the educational outcomes of students. Students who were hospitalised scored 4–8 points less at mathematics and reading literacy tests at the end of 8th grade. This effect size is not large, but not negligible, either, and most prevalent in the case of the children of mothers with a high educational attainment level (secondary school diploma or tertiary). We find similar effects in the case of early school leaving in 9th grade, where, in the case of students who had spent at least four days in hospital, we found an effect that is smaller than 1 percentage point but still highly significant. This average effect stems from the results of children of mothers with a low educational attainment level: elementary school at most or vocational school. For the children of mothers with elementary school, hospitalisation may increase the chance of early school leaving by 2.5–3.5 percentage points, and for the children of mothers with vocational school, it may increase it by 0.8 percentage points, which can be considered quite large, compared to the average 8.3 and 3.4 percent respective early school leaving rates within their groups. Hospitalisation also has an effect on the chances of further education in a general secondary school. Students who spent at least four days in hospital have 1.5–2 percentage points smaller chance of further education in a general grammar school. Hospitalisation has no effect on further education in other school types offering a secondary school diploma.

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K8.1 An overview of the literature on the subsequent impacts of childhood shocks

ÁGNES SZABÓ-MORVAI

Health is best thought of as an element of human capital that is tightly connected to the other two elements: cognitive (thinking) abilities and non-cognitive characteristics (personality, values, etc.). The three elements develop in interaction with and complementing one another. For example, a better state of health measured in the preceding period, *ceteris paribus*, is linked to higher cognitive abilities in the following period (*Heckman,* 2007). At the same time, human capital is connected to the environment that surrounds the individual, and defines the individual's academic and economic performance and decisions; and vice versa. The earlier in life any positive or negative environmental impacts or interventions occur, the greater impact they will have on human capital. The economic literature examining these interactions and correlations has grown rather large in the past twenty years (*Currie,* 2009, *Almond et al,* 2018, *Currie–Almond,* 2011).

According to the fetal programming hypothesis, environmental impacts start influencing the development of human capital at conception, and the fetal period has a fundamental impact on the future human capital (*Almond–Currie,* 2011). The tobacco consumption and stress levels of the mother, nutrient intake, and any adverse environmental factors (water and air pollution) have long-term effects on the postnatal development of the child. An insufficient nutrient intake suffered during this period may cause obesity, cardiovascular issues or diabetes in adulthood (*Ibid*). Increased maternal stress may have a detrimental effect on the child's cognitive abilities and academic achievements (*Aizer et al,* 2016). External detrimental factors suffered during the fetal period – as has become clear after the examination of those who were in their fetal period during the Spanish flu or the Chernobyl disaster – may cause significant disadvantages to individuals in terms of educational attainment and the labour market (*Almond,* 2006, *Almond et al,* 2009).

As the impacts of the fetal period influence the health characteristics measured at birth (such as birth weight) to a great extent, many studies use these as condensed indicators of the fetal state of health. The state of health at birth, measured by the birth weight, fundamentally impacts the state of health, educational attainment and economic situation of the individual in adulthood. A low birth weight lowers academic achievements and the probability of employment, and increases the body mass index and the likelihood of coronary heart disease in adulthood (*Behrman–Rosenzweig,* 2004, *Heckman,* 2007).

Further detrimental environmental factors suffered as a young child also impact the entire lifespan of the individual. The development of cognitive abilities is mostly completed by the age of 10 (*McLeod–Kaiser,* 2004), and the cognitive, emotional and health characteristics established by the age of 10 provide more than half of the reasons for differences in weight gain and health issues that can be observed in adulthood (*Conti–Heckman,* 2010). The family environment is a central childhood influence. It includes parenting style, bedtime stories, talking to the child, emotional richness or the lack of emotions, and the physical environment. Among the influences of the family environment, emotional safety is a pivotal one that plays a key role in the development of the child's brain (*Shonkoff,* 2010). The mental health or drug use of the mother have a major influence on the mental development of the child and on the probability of future behavioural issues (*Frank–Meara,* 2009). Beyond these, the other factors most commonly investigated by the literature are the impacts of pollution, infections and nutrition. Air pollution suffered in early childhood, for example, has a substantial detrimental effect on the results of school tests and on labour market income (*Isen et al,* 2017, *Lavy et al,* 2014).

The extremely rich web of correlations that surrounds an individual's human capital becomes evident even through the few examples presented here. This summary highlights how public policy decisions that influence vastly different fields are

connected to one another through human capital. For example, through the literature presented here, an insight can be gained into how an environmental scheme that results in cleaner air may influence economic growth substantially through a strengthened human capital stock.

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8.2 TEENAGE MOTHERHOOD AND THE LABOUR MARKET

ANNA ADAMECZ-VÖLGYI

Teenage motherhood is a crucial channel of the intergenerational transmission of poverty (*Bonell,* 2004). Mothers having their first child below age 20 reach lower educational attainment, are less likely to be employed and earn less throughout their life course, and have poorer health even in old age than those delaying motherhood beyond age 20. Education decreases the prevalence of teenage motherhood. *Adamecz-Völgyi–Scharle* (2020), for example, found that increasing the school leaving age from 16 to 18 in Hungary decreased the probability of teenage motherhood among Roma women. While the literature documents the relationship between education and teenage motherhood, we know much less about how labour market conditions affect adolescent childbearing.

Teenage motherhood and unemployment

In human capital theory (*Becker,* 1960), the costs and benefits of childbearing would drive whether and when women decide to have children. Among others, one substantial cost of teenage motherhood is its negative effect on a mothers' future labour market possibilities. The magnitude of this alternative cost is different for everybody and might also change depending on the actual state of the labour market. When the labour market is in good shape, for example, in an economic boom, this alternative cost is higher as women would have more to lose. Besides alternative costs, however, labour market conditions might also influence childbearing through the income effect (*Kearney–Levine,* 2012). Favourable labour market conditions might increase income and make childbearing more affordable.

This subsection looks at how labour market conditions affect teenage motherhood in Hungary. We are interested in whether high unemployment would be accompanied by a high prevalence of teenage motherhood due to decreasing the alternative costs of childbearing, or the other way round, whether high unemployment would go together with a low prevalence of teenage motherhood due to the income (or in other words, the budget constraint) channel. We are also looking at whether this relationship is heterogeneous by regional development (income).

The existing literature on the relationship between unemployment and teenage motherhood is inconclusive and is limited to the United States. *Colen et al.* (2006) support the alternative cost hypothesis by finding that the economic boom of the 1990s was responsible for the sharp drop in teenage motherhood among Afro-American women. On the contrary, *Kearney–Levine* (2012) and

Bullinger (2017) concluded that higher unemployment would decrease teenage motherhood and hence supported the income effect theory.

As we will show, there is a positive correlation between teenage motherhood and local unemployment rate: the prevalence of adolescent childbearing is higher in regions characterized by high unemployment than in regions having low unemployment. This correlation might show the effect of unemployment on teenage childbearing, but it might also be due to a selection mechanism. Regions suffering from high unemployment differ from those with low unemployment over several other domains besides the unemployment rate, such as demographics, education levels and others, and these characteristics might also affect teenage childbearing.

Methods and data

This article aims at separating the effect of unemployment from the selection mechanism by controlling for regional differences. I use region (*kistérség*) – level data from Hungary. I construct data on the regional prevalence of giving birth among women aged 15–19 from vital statistics microdata and create regional unemployment rates (registered unemployed women as the share of working-age women) using municipality level data on unemployment (T-STAR) and regional data on demographics. Alongside region fixed effect (FE) panel models, I also estimate hybrid panel models (*Schunck,* 2013). Hybrid models allow to deconstruct the variation in the prevalence of teenage motherhood to a first part that comes from changes in the unemployment rate within regions over time (*within effects*), and, to a second part that is due to inherent, time-invariant differences in unemployment rates across regions (*between effects*).

Results and conclusions

Table 8.2.1 shows the effect of unemployment on teenage motherhood. As mentioned above, there is a positive correlation between teenage motherhood and unemployment (Model 1). The effect of unemployment on teenage childbearing within regions is close to zero when we are controlling for time-invariant differences across regions (Model 2). However, between-region differences have a large effect on the prevalence of teenage motherhood: if the average unemployment rate goes up by 1 percentage point in a region, the number of live births per a thousand women aged 15–19 increases by 4.42 (Model 3).

In model 4, we are also controlling for between-region time-invariant differences, as well as the economic development of regions (captured by the average income tax base per a working-age inhabitant in 1995–2015 as a proxy for long-term income). In this case, the between-region relationship prevails (2.93^{***}) but the within-region relationship turns to negative (-0.38^{*}). These results suggest that the income effect of unemployment is more important

than its impact on the alternative costs of childbearing, as higher unemployment decreases the probability of teenage motherhood. This is especially true in less-developed regions. We split the sample into two subsamples: regions where the average income tax base is below average (Model 4a) and where it is above average (Model 4b). We only find a significant negative relationship (-0.57^{**}) between the unemployment rate and teenage motherhood on the subsample of less-developed regions, where the income tax base is below average, while among more-developed regions, the relationship disappears.

Table 8.2.1: The effect of unemployment on teenage motherhood

	Model 1	Model 2	Model 3	Model 4	Model 4a	Model 4b
The interpretation of the models	Correlation	Within effects	Within and between effects			
Model	Linear model	Fixed effect panel model	Hybrid panel models			
Sample of regions	All regions				Income tax base	
					lower 50%	upper 50%
Estimated coefficients						
Unemployment rate (β_1)	3.74^{***}	0.04	0.04	-0.38^{*}	-0.57^{**}	0.10
	(0.230)	(0.144)	(0.144)	(0.213)	(0.276)	(0.327)
Average regional unemployment rate in 1995–2015 (β_2)			4.42^{***}	2.93^{***}	3.36^{***}	1.22^{**}
			(0.269)	(0.403)	(0.567)	(0.477)
No. of observations	3675	3675	3675	3675	2016	1659
Control variables and region effects						
Region fixed effects (FE)		yes				
Region random effects (RE)			yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes	yes	yes
Other control variables				yes	yes	yes

Robust clustered standard errors in parenthesis. Significance on *** 1%, ** 5%, * 10% levels.

Unemployment rate: the share of registered unemployed women among working-age women. Hybrid panel model: $y_{it} = \beta_0 + \beta_1(x_{it} - \bar{x}_i) + \beta_2\bar{x}_i + \beta_3\bar{c}_i + \beta_4 d_{it} + u_i + h_t + \varepsilon_{it}$, where y_{it} is the number of live births per a thousand women aged 15–19, x_{it} is the unemployment rate, $\bar{c}_i$ is a vector of time-invariant regional characteristics, $d_{i,t}$ is a vector of time-variant regional characteristics, u_i region random effect (RE), h_t year fixed effect, and ε_{it} is a usual error term. Interpretation of the estimated β_1 coefficients: how a 1-percentage point change in the local unemployment rate decreases the number of live births per a thousand women aged 15–19. Other time-variant control variables in Model 4, 4a and 4b: population, the share of those above 64 in the population, live birth rate among women ages 20–45, abortion rates, regional linear time trend. Other time-invariant control variables in Model 4, 4a and 4b: average income tax base per a working-age inhabitant.

Source: Own estimation using vital statistics, population statistics and municipal level (T-STAR) data from 1995–2015, on region-level aggregates.

These findings show that teenage motherhood is a long-term problem; it is less responsive to short-term labour market processes. We find no evidence for high unemployment to increase the prevalence of teenage motherhood through its effects on alternative costs; on the contrary, it seems to decrease

adolescent childbearing through its income channel, especially in less-developed regions.

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9 THE FIRST WAVE OF THE CORONAVIRUS PANDEMIC

9.1 POLICY RESPONSES TO THE CORONAVIRUS PANDEMIC IN HUNGARY DURING THE FIRST HALF OF 2020

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From the early spring of 2020,[1] the Covid-19 epidemic and its consequences made policy-designers and decision-makers face a 1) *unique* and 2) *huge* challenge world- and Europe-wide.

1) The challenge was *unique* in the sense that, despite their advanced public health institutions and plans,[2] developed nations and especially European ones, including Hungary, have not had to face major epidemics of this kind for decades. While HIV has been and is a public health concern, it spreads more slowly and in a different way than Covid-19. To find an epidemic comparable in its health effects, nature and speed of spreading, we have to go back as far as the 1918 Spanish influenza (*Petersen et al.,* 2020). Thus, preparations notwithstanding, nobody could know for certain what such a plague entails in the social, economic, technological setting of the 21st century and what the adequate response in terms of a mix of policy measures should be.

2) As declared by prime ministers and heads of state in February and March in emotive speeches,[3] the challenge looked (and, indeed, culminated) in being *huge*. Based on early epidemiological estimates, on March the 11th the German chancellor, Angela Merkel talked about 60–70% of the population of her country catching the disease[4] and, based on the first Chinese data a case-fatality rate exceeding 1% looked quite possible.[5] Multiplying the two numbers resulted in an estimate of millions of people dying of the disease Europe-wide: an obviously politically not acceptable prediction that necessitated resolute measures to limit the incidence of the epidemic. Thus, in addition to health effects, far-reaching, draconian policy measures were also looming on the horizon. These were expected to have huge human-social effects as regards the necessary healthcare and other social capacities, but also as regards the economic downturn which would ensue. It was impossible to know beforehand to what extent this downturn would be an outcome of the pandemic itself (the number of those diseased, and the behavioral reaction of the public including a drop in aggregate demand), to what extent the outcome of the measures to curb and mitigate it (e.g. school closures, lock-down) and to what extent the outcome of the propagating changes in the world economy, including a drop in the demand for exports and tourism as well as breakdowns in the international supply chains.

1 Chinese authorities first reported the outbreak to the World Health Organization on the 31st of December; the new virus was named on the 11th of February; the disease was declared to be a pandemic on the 11th of March by the WHO; the first case in Hungary was reported on March 4th.

2 In the most recent, 2019 ranking of readiness of different countries to tackle a pandemic (the Global Health Security Index) all the EU Member States except Romania and Bulgaria ranked in the top quintile; the U.K. was the second best worldwide; Hungary ranked 35th.

3 Emmanuel Macron on March 16th, Angela Merkel on March 19th, Boris Johnson on March 23rd.

4 See: New York Times.

5 See: Nature.

All we can undertake in this short chapter, one that is necessarily closer in its genre to an essay than to a research paper, is that, limiting our scope to the first half of 2020, we enumerate the most important policy measures formulated in response to the epidemic in Hungary. We look at ones in the fields of public health, economic policy and the realm of the regulative-political respectively. Next we compare them with those introduced by other European governments. Finally, since we have no chance yet to produce any quantitative impact assessment, we formulate some tentative recommendations about what (labor) economists can do to help.

Policy responses to Covid-19 in Hungary

In order to slow down the spread of a pandemic that threatened an exponential take-off, the Hungarian government and Parliament passed a host of *public health measures*. These were meant to curb the contagion (whose nature was not yet perfectly known) and, since there was no way yet to cure the sick, to at least treat the symptoms of the disease. Some of these measures had been hardly ever applied on this scale before.

What were these measures? They included, from mid-March onwards: banning immigration and international travel, banning mass events, limiting access to restauration and entertainment; the production, purchase, and redirection of capacity and equipment necessary for urgent, ambulatory and inpatient care of patients; school closures, extra disinfection, protocols and regulations concerning staying-at-home quarantine of those suspected to be vectors of the virus, testing and the wearing of masks for potential carriers of the disease, and temporary rules concerning parking. At the end of March more general stay-at-home rules and age-specific time-slots for shopping were added, in addition to a campaign to inform the public. Many of these measures were revoked in April/May; in turn, for the summer, a framework for dynamically scoring the dangers of destinations/countries of origin for international travel was set up with matching testing and stay-at-home rules.[6]

Economic Policy measures. The government and Parliament introduced a widespread debt freeze, a rent and interest ceiling, a relief concerning taxes, contributions and administrative burdens for companies, targeted by size and industry; subsidies and deadlines were extended and a wage support scheme launched. The budget was re-written and, by direct and indirect means, certain local taxes were also left with the citizens. A report by the State Audit office tallies that HUF600 billion[7] was expended on outlays directly linked to the pandemic between the 11th of March and the 4th of May; ultimately the first "economic rescue package" announced on the 18th of March and the "action plan" announced on the 7th of April 2020 together redirected 18–20% of GDP (the latter, though, also included measures that have little to do with combatting Covid-19). Of this, 0.6% of GDP was directly spent on strength-

6 The up-to-date list of measures is to be found on this government webpage.

7 Approximately EUR 1.67 Billion.

ening healthcare.[8] Calculations by the Bruegel Institute though, suggest that most of this vast expenditure had nothing to do with the epidemic.[9]

These fiscal measures were complemented by steps taken by the National Bank of Hungary concerning access to cash, additional credit freezes and extensions and further measures concerning bank regulations and monetary policy meant to stimulate economic activity.[10]

Finally, Hungarian Covid policy included a *legal-political* dimension that enabled and complemented the measures already enumerated, as well as measures of vertical fiscal redistribution within the state. These are an important part of the picture. (*Greer et al.,* 2020). The keystone of this dimension of policy was the Act of Parliament that enabled the government to govern to a large extent by decree and limited the freedom of speech with regards to the spread of false information in connection with the epidemic.[11] While most of the Act lapsed after June the 18th, certain parts remained in force (*Halmai et al.,* 2020). 18 EU Member States published a press release implicitly criticizing the Act as too sweeping in scope.[12] A set of measures to the detriment of political parties and local governments are also easier to interpret as political rather than as anti-epidemic in purpose.[13]

Policy design and decision making. What was the process of designing and adopting this rapid sequence of measures? Alas, it is too early to attempt an analysis of how much these measures were designed and chosen based on foreign examples, how much they were based on (changing) scientific evidence, how much based on recommendations by the World Health Organization and other similar bodies, how much they were recommended by domestic experts,[14] and to what extent they reflected the limitations and opportunities offered by institutional, economic and social endowments unique to Hungary. Neither can we say how much meaningful consultation with stakeholders took place[15] or to what extent at least some of these measures were guided by direct political considerations.

Hungarian measures in an International/European comparative context

To what extent were the Hungarian anti-Covid measures different from how comparable countries tackled the crisis caused by the pandemic?

At this point, in addition to news articles, blog entries and the first papers hastily written and with a narrow focus, published online, our attempt at a preliminary answer is based on four public policy databases. These are the following: the cross-country data about pandemic response published by the IMF,[16] the OECD[17] and Oxford University,[18] as well as the collection of some European fiscal responses tabulated by the Bruegel Institute.[19] An important limitation of all of these is that they are based on announced or codified norms, not their real-life implementation. The difference need not be innocuous: the

8 See: ÁSZ and IMF.
9 See: bruegel.org.
10 See: MNB.
11 Act XII of 2020 on defence against the Coronavirus.
12 See: government.nl.
13 See: Hungarian koronavirus site.
14 According to the Hungarian press they were recruited from among experts working for the National Center for Public Health as well as several Hungarian universities.
15 Building, e.g. on the proposals of the Chamber of Commerce.
16 See: IMF.
17 See: OECD.
18 See: bsg.ox.ac.uk.
19 See: bruegel.org.

quality of contact tracing, sanctions, or the true use of fiscal resources can be quite different from what can be parsed from the text of decrees.

Albeit differences of a few days in the timing of measures in March may have looked crucial (indeed days can have mattered in slowing down the spread),[20] by mid-April Oxford University's comparative composite indices (a *health containment index* and a *stringency index*) of country *public health* responses were no different from what other EU Member States were doing (with the notable exception of Sweden).[21] On April 15th, Hungary's *health containment index* was the EU median, and her *stringency index* was within 3 points of the median (on a 0–100 scale).[22]

The press highlighted particular measures introduced in many other countries but not in Hungary, such as for example the release/amnesty of as many at-risk prison inmates as possible.[23] But that does not change this big picture: Hungary chose public health measures of the kind and severity in line with the mainstream of its European peers. As mentioned above, the quality of the implementation of those measures we cannot yet compare.

As far as the *economic policy* measures, and especially as far as fiscal measures are concerned, the comparison is less straightforward. If we disregard the items of the April 2020 action plan that are very hard to link to Covid (such as additional expenditure on the building of the Paks nuclear power plant or railway development), the nature of the interventions is not that far from what other European governments did. The Bruegel Institute puts crisis fiscal measures into three bins: *immediate fiscal impulse*, *deferrals* that bring expenditure forward or put revenues off, and other *liquidity provisions and guarantees.* Under the latter the measures of the National Bank of Hungary were not accounted for, so let us disregard that category. As far as the first two are concerned though, they found that out of the 11 European countries under scrutiny[24] (plus the U.S.), Hungary spent the least on immediate fiscal impulse, a mere 0.4% of GDP. On the other hand, in terms of deferred fiscal measures, Hungary allocated 8.3% of GDP, being the fourth most generous in their sample.

The most important explanation for the low level of immediate budgetary expenditure in Hungary is that the government avoided any universal, non-conditional or automatic non-employment-related aid to individuals or families in need. Such measures were widespread worldwide; a version, raising the universal child allowance, was also proposed by independent economists for Hungary, to no avail.[25] This deficiency is the explanation as to why the value of the *economic support* index of the Oxford database for Hungary on April 15th was among the lowest (only Poland and Denmark obtaining even lower scores).

To compare the *legal-political* dimension of the Hungarian policy response to the epidemic to other European countries at this point would be rather hard and would require a legal studies / political science analysis beyond

20 Cf. the comparisons published by Politico at the end of March.

21 The time series of the indices by country are downloadable.

22 The ranking does not contain Malta but it does contain the United Kingdom. Own calculations based on the database referenced.

23 See: g7.hu.

24 Belgium, Denmark, France, Germany, Greece, Hungary, Italy, Holland, Portugal, Spain, UK.

25 See: valsagkezeles.blog.hu.

our scope here. All we can mention here is that in the *pandemic violations* index league table of the V-Dem Institute, measuring how much democracy was compromised during the epidemic, while the controversial empowering Act was in force, Hungary reached the worse value within the EU (0.3). Let us note though that this size of democratic backsliding during the crisis was certainly not the greatest if we also consider the wider world outside the EU (Belarus: 0.35; Serbia: 0.5).[26]

An OECD report finds that *policy design and decision making* was put under enormous pressure everywhere by the stakes, the uniqueness of the challenge as well as the timeline, including countries where policy making is traditionally more likely to be based on evidence than in Hungary. The response in this domain all over the developed world included: forming new, *ad hoc* policy units, the temporary/partial dropping, simplifying or digitalizing of preliminary impact assessment and stakeholder consultation and, in general, the relaxation of procedural requirements concerning the early phases of the policy cycle.[27]

Outcomes and causal mechanisms

Based on the public health outcomes (case numbers and Covid-related mortality in proportion to the population), on the 1st of July, 2020, with only 586 deaths caused by Covid-19, Hungary (population: just shy of ten million) was, along with the other three Visegrád nations, among the countries least ravaged by the first wave of the epidemic. 60 fatalities per million inhabitants was a bit above the same index for Czechia, Poland and Slovakia, but lower than Austria (78), let alone the EU as a whole (299). It is way too early to take stock of the indirect health effects (e.g. treatments deferred to free up healthcare capacities to fight Covid-19), let alone the psychological, social and economic effects of the pandemic and the countermeasures, the human capital and equity effects of closing down schools, including some positive side effects as well (a drop in the number of traffic accidents and burglaries) and compare them with the putative effects/of those policy measures in curbing the spread of the disease.[28] Of all these a few administrative input/output measures are there for us to reliably observe.[29]

As far as the short-run effects on the economy as a whole, those are reviewed by *Palócz–Matheika* (2020); the effects on the labor market are surveyed in *Subchapter 9.2.* of this volume.

The next step would indeed be to ask: what outcomes were caused by what exogeneous circumstance and especially which policy measure (or lack thereof)? If Hungary weathered the first wave relatively well, why exactly? Economists all over the world have already started to ask and answer questions like that – it is worth mentioning a promising recent paper in that vein (co-authored by the Hungarian *Dániel Prinz*), which used Google-search patterns as dependent

26 See: v-dem.net. The value of the index was less extreme from July on (0.1), but still remained the worst in the EU (tied with Bulgaria).

27 See: OECD.

28 Subchapter 5.1. covers the health effects of economic downturns, concentrating on the 2008 one, but those findings do not necessarily apply to what is a slump caused by very different shocks.

29 For example, the sum total of administrative indicators that can serve as a proxy for case numbers in non-Covid inpatient care dropped in March and April to almost half of the February level to rise back up to values similar to earlier years by August.

variable and different policy measures across U.S. states and explanatory variables to identify labor market effects of different policy interventions (*Kong–Prinz,* 2020). On the whole, though, it is way too early to expect to be able to optimize the mix of anti-Covid policy measures based on peer-reviewed econometric evidence of all relevant causal effects. This does not mean that health economics calculations cannot help the policy maker at all. They can be especially useful in judging the extremes: showing that certain measures are clearly too costly or, to the contrary, obviously worthwhile. Let me mention two papers serving those respective purposes as illustration. *Miles et al.* (2020) find that the *Quality-Adjusted Life Year gains that can be expected from* universal stay-at-home orders cost seven times as much as the threshold normally used to decide whether a medical treatment is cost-effective enough even under the scenario where stay-at-home is assumed the most efficacious intervention in slowing the spread. On the other end of the spectrum, *Martineau et al.* (2020) in their editorial article make a convincing case that compensating for vitamin D deficiency is a public health measure that is to be widely recommended, because even if it the treatment ultimately does not prove to be effective to help avoid or treat Covid-19 (randomized trials are ongoing), it is simple, cheap and has been proven to have plenty of other positive health effects.

But we have to face the fact that we do not yet have the data and not enough time has elapsed so far to carry out similar empirical work concerning the epidemic in Hungary.

Summary and a few closing thoughts

Our short survey showed that during the first half year of 2020 the policy response of the Hungarian government to the pandemic in comparison to other European states was mixed.

The picture consists of mostly timely *public health measures* generally in line with those adopted by other EU member states; a relatively frugal *economic policy response* that avoided unconditional aid to citizens and preferred measures of deferral to ones that increase long run public debt; and *political elements* that may look problematic to some.

The pandemic is not over yet by far though. When finishing this subchapter, the contours of a fall-winter second wave, exceeding the spring one in severity, can already be seen. Let us finish by considering this question: what can Hungarian economists do to assist the public policy making process of their country to best combat the second onslaught of this deadly, debilitating and socially costly disease in the next few months? Let me submit that there are at least three ways in which we can help.

First, economists can remind policy makers of the truisms that their profession has to offer that might be lost in the hasty process (consider the effects of a recent government decision to set a price ceiling for private Covid-testing).

Second, they can swiftly review and sift through the emerging empirical research done elsewhere concerning the effects of different policy measures, produced with more resources and from better data than available in Hungary and adapt, interpret and synthetize the best papers to contribute to better, more evidence-informed policy in Hungary.

Third, even if it is too early to build and test robust causal models, economists should describe and interpret the changing landscape of the Hungarian economy under the pandemic as it emerges – as they do in this book.

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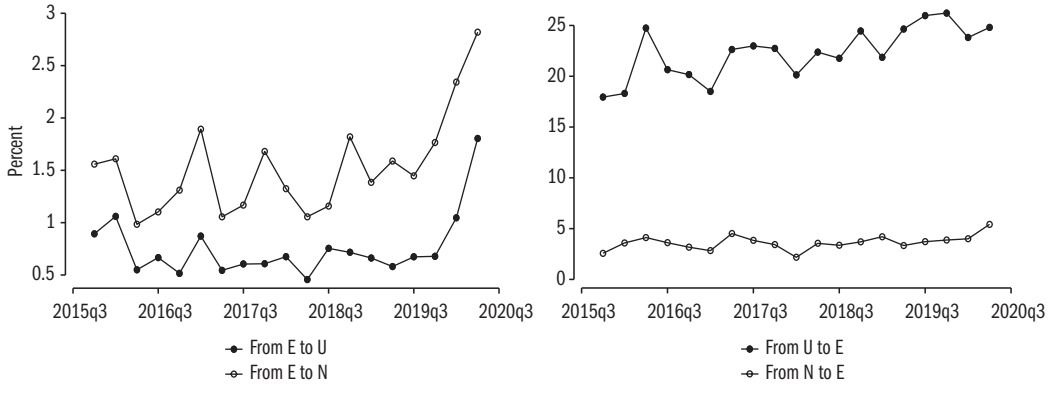
9.2 EMPLOYMENT DURING THE FIRST WAVE OF COVID-19

JÁNOS KÖLLŐ

In the spring of 2020, the Covid-19 epidemic reached Hungary and there had already before then been disruptions in international trade at the end of winter. Even though restrictions were only introduced in the second half of March, labour market data for the whole of the first quarter were alarming: the share of workers becoming unemployed or economically inactive rose substantially as seen in the left panel of *Figure 9.2.1*.

Figure 9.2.1: Flows between employment, unemployment, and inactivity, Q4 2015 – Q2 2020 (estimates of flows as a percentage of the base period stock)



E=employment, U=Unemployment, N=Inactivity.

Note: The initial value of the upper curve of the left-hand side figure shows that about 1.5 per cent of persons reported to be in employment in Q3 2015 were reported to be inactive in Q4 2015. The rest of the data should be interpreted similarly. The estimates of flows, harmonised with changes in stocks, were prepared by Zsombor Cseres-Gergely, using the method of raking, for which I sincerely thank him. For the detailed description of the method and its adoption for the Labour Force Survey of the Central Statistical Office, see *Cseres-Gergely* (2011).

Source: Labour Force Survey of the *Central Statistical Office*. Version maintained by the CERS Databank.

Outflows from employment continued to increase in the second quarter (April–June): the share of those who became inactive was nearly double the level recorded in the previous years, while the share of those who became unemployed more than doubled. These flows were not offset by inflows into employment, which remained in the range of fluctuation seen in the previous period (right-hand side of the figure).[1] Although the figure in itself provides a worrying picture, the more thorough analysis of data calls attention to changes even more pronounced than the one presented here.

1 I greatly appreciate that the Central Statistical Office, continuing a nearly 30-year-long practice, provided access to the relatively recent data of the Labour Force Survey. I also wish to thank Mónika Bálint for making the databases suitable for analysis and Zsombor Cseres-Gergely and György Molnár for their helpful advice. I assume full responsibility for the content.

Methodology

Before describing the consequences of the epidemic, some technical issues must be discussed. According to the Labour Force Survey (LFS) of the Central Statistical Office (CSO) *employees* are persons who, during the week prior to the survey, a) undertook at least one hour of gainful work or b) did not undertake an hour of work but were only temporarily away from their job. The latter has no importance in Hungary in "peacetime" but during the pandemic there may have been numerous people who were unable to work even though their employment relationship was maintained.[2] Therefore we also pay attention to the number of persons regarded as employees by the LFS who did not work at all during the week prior to the survey.

Persons without a job, who actively looked for a job during the month prior to the survey and would be able to enter a job in two weeks are regarded as *unemployed* by the LFS. This internationally accepted definition (in line with ILO and OECD guidance) also seems too strict during an epidemic, when many lose their jobs temporarily and, hoping to return, do not start searching for another job. Data on the *registered unemployed* included in the LFS also underestimate the severity of the problem because many of the unemployed hoping to return to their job and not entitled to benefits probably do not register themselves at the job centre. Thus, we also rely on broader definitions of unemployment.

The LFS also measures the number of hours worked during the reference week as well as usual weekly hours. The fact that a lot of people have to work less than usual during the pandemic cannot be ignored: this is taken into account by estimating full-time equivalent employment (FTE).[3] When evaluating changes, we also take into consideration that the number of public holidays per working days is different in some months of the first and second quarter and consequently it is appropriate to adjust the number of hours worked for calendar effect.

The LFS is a *rotating panel* with each selected household participating in the survey for six consecutive quarters and then replaced by a randomly selected new cohort. We make use of this characteristic of the data (as we did in *Figure 9.2.1*), provided that the major labour market indicators are similar to data from the cross-sectional survey in each period of the panel (see Annex *9.2*).

The survey covers 40–50 thousand persons quarterly. Representativity is ensured by weighting. The weights may even change in the case of a given person (household) depending on the composition of the incoming and outgoing cohorts, on how the population aged 15–74 or 15–64 years (included in the estimation of economic activity) is changing, and on panel attrition – see *Mihályffy* (1995), *Molnár* (2005) and *Cseres-Gergely* (2011).[4]

Consideration should also be given to the *periods* compared. As seen in *Figure 9.2.1* about flows, the labour market situation already deteriorated in the

2 The proportion of employees based on definition b) is considerably higher in Western-Europe than in Eastern- or Southern-Europe. See *Bajnai et al.* (2008).

3 If in a micro-economy two out of four people work, one of them 40 hours a week and the other 20 hours a week, the employment rate is 50 per cent but FTE equals only to 1.5/4 = 37.5 per cent.

4 For example, weights used in the two quarters were identical only for four per cent of respondents interviewed both in the first and second quarter of 2020, which is probably because of the worsening difficulties of interviewing during the pandemic.

first quarter, probably strongly affected by the figures of the last two weeks of the quarter (the lockdown period). Therefore, in the following, the periods of *January–February*, *March* and *April–June* will be compared. March cannot be merged with the second quarter because using differing weights would cause major complications.

For the number of observations in the three periods, see *Table A9.2.1* of *Annex 9.2*. The figures suggest that the sample suitable for analysing labour market developments (working-age persons except full-time students) is not large, especially not in March, thus this month is excluded from tables presenting group breakdowns.

One may wonder, since the LFS only becomes representative when the entire quarterly sample is queried, whether the timing of interviews could affect results when comparing the periods January–February, March and April–June. If, for example, the inhabitants of an extraordinarily underperforming county or small villages were always included in the third month of a quarter (which is not the case), their absence in the first and presence in the second period would distort comparison over time and would paint a bleaker picture of employment than it actually is. Therefore, the comparison of entire quarters is also provided in footnotes.

Finally, when evaluating the figures, it must be taken into account that because of the limited size of the LFS the sampling error is rather large and values at the level of small groups are uncertain. We will only attach importance to substantial changes.

Employment

Employment based on the ILO–OECD definition decreased by 2.8 percentage points in April–June, compared to January–February (*Table 9.2.1*). The share of those who undertook at least an hour of actual work during the reference week fell even more sharply, by 5.7 percentage points (7.6 per cent). These figures reveal an even greater shock than the one in 2008–2010.[5]

Average working hours also fell by 3.5 hours a week. This was substantial even if the varying number of public holidays per weekdays is accounted for (by that measure weekly working time fell by 2.1 hours). After March, the proportion of employees who worked less than usual increased dramatically, from below ten per cent to over thirty per cent.

Full-time equivalent employment plummeted by 9.3 percentage points if calculated using raw data and by 6.6 percentage points (9 per cent!) if estimated using data adjusted for calendar effects.[6]

Table 9.2.1 ignores the effect of seasonality. This, we believe, is appropriate because since 1992 (the launch of the LFS) employment in the second quarter has always been higher than in the first quarter. If accounting for seasonality, the decrease in employment would appear to be even greater.

5 In the first four months of that crisis (between October 2008 and February 2009) the employment rate decreased by 2.2 percentage points, and the share of those who worked at least one hour fell by 2.6 percentage points (author's calculation based on the LFS.

6 The FTE adjusted for calendar effect fell by 5.5 percentage points (7.7 per cent) if entire quarters are compared. This is, however, distorted because the labour market situation had already deteriorated in March due to the lockdown introduced, therefore the whole of the first quarter cannot be regarded as a pre-pandemic period.

Table 9.2.1: Employment – Selected indicators
Population aged 15–64, not in education

	January–February	March	April–June
Employment			
Employed (percentage)	77.6	76.1	74.8
Worked at least one hour (percentage)	75.0	70.1	69.3
Hours worked			
Raw	37.6	36.5	34.1
Adjusted for calendar effect[a]	37.6	35.7	35.5
Worked less than usual (percentage)[b]	9.0	10.1	31.2
Full-time equivalent employment (FTE)			
Using raw work hours data	73.0	68.5	63.7
Using adjusted work hours data	73.0	67.9	66.4

[a] Considering that the monthly working time was 21.5 days on average in January–February, 22 days in March, and 20.67 days in April–June.
[b] Among employees as per the LFS definition, excluding the 3–4 per cent of employees with "highly variable" work hours.
Note: Observations were weighted by the appropriate quarterly weights.
Source: LFS. Version maintained by the *CERS* Databank.

Unemployment

Table 9.2.2 presents the proportion of the unemployed within the population included in the survey. It must be noted that it is not the standard unemployment rate but the unemployed to population ratio.[7] The unemployment rate as defined by ILO–OECD was 0.6 percentage point higher in the second quarter than in January–February, and although this is equal to a 20 percent rise, concerning the total population it is not a dramatic increase.

Table 9.2.2: The share of the unemployed by various indicators
Population aged 15–64, not in education = 100

	January–February	March	April–June
Actively looks for a job and would be able to start	3.1	2.9	3.7
Is not looking for a job but would like to work	3.8	4.8	5.1
Unemployed based on self-assessment	5.1	6.1	6.7
At least one of the above criteria applies	8.1	9.0	10.0
Registered unemployed	3.3	3.8	4.3
Registered unemployed or public works participant	5.2	5.5	5.7
Did not work for an hour or more during the week prior to the interview	25.0	29.9	30.7

Note: Observations were weighted by the appropriate quarterly weights.
Source: Version of the Labour Force Survey of the *Central Statistical Office* maintained by the CERS Databank.

When other unemployment definitions are applied, the increases in the ratios are larger: 1.3 percentage points for the passive unemployed (who are not looking for a job but wish to gain employment) and 1.6 percentage points for the self-identified unemployed. If including those unemployed according to

7 If P is the population, U is the number of the unemployed and E is the number of employees, the ratio used for the present analysis is U/P, while the unemployment rate is $U/(E + U)$. The indicator has been selected for an easier comparison of indicators based on varying definitions.

at least one of the first three criteria, there is an increase of 1.9 percentage points and by using this permissive definition the proportion reaches 10 per cent in the second quarter. LFS data show that there was only a slight change in the number of the registered unemployed and public works participants.

If, in the broadest sense, people who did not work at least one hour during the reference week are regarded as unemployed (either because they did not have a job or they had one but were unable to carry out work) a significant, 5-percentage-point (22.8 percent) increase is seen.[8]

Home office

The negative impact of the lockdown was mitigated by the possibility of working from home via the Internet. The LFS has been assessing the prevalence of telework on the basis of the following definition: a teleworker is someone who regularly or occasionally carries out his/her work at a location other than his/her workplace, using ICT tools (*CSO,* 2018). Trends in the share of workers performing telework in the four weeks preceding the survey are presented in *Table 9.2.3*. Whereas in January–February 2.5 per cent of employees worked remotely, their proportion rose to 16.5 per cent by the second quarter.

Table 9.2.3: The share of those working remotely during the four weeks preceding the survey (aged 15–64, not in education, working at least an hour during the reference week = 100)

	January–February	March	April–June
Regularly	1.0	1.5	6.9
Occasionally	1.5	4.1	9.6
Total	2.5	5.6	16.5

Note: Observations were weighted by the appropriate quarterly weights.
Source: Version of the LFS of the *Central Statistical Office* maintained by the CERS Databank.

Differences by groups

Table 9.2.4 summarises changes in employment based on the "one-hour work" criterion in major groups of society within the population aged 15–64 years and not in full-time education. Data from January–February and April–June is compared. Please note that paid leave had been fully used up by the middle of the second quarter at the latest and therefore it did not significantly affect the number of employees working zero hours.

The employment rate of women declined slightly more than that of men. Job loss monotonically decreased with age. Among teenage youth not in full-time education there was a 20 percent decrease in employment.[9] There are two educational attainment groups that stand out: among those with a general upper-secondary qualification but not in full time higher education there is a decrease considerably greater than the average, while among university graduates the

8 This figure is the complement of the employment rate included in the second line of figures in *Table 9.2.1* and only provides new information for readers unversed in subtraction. Here it is only included because of its relationship with various employment rates.

9 The second quarter figure, although low, is based on a sufficient number of observations (722).

decrease is much smaller than the average. Interestingly, there is no considerable difference between men (–10.1 percentage points) and women (–13.5 percentage points) with a Matura from general upper-secondary education.

Table 9.2.4: Changes in the employment rate by groups[a]
Population aged 15–64, not in education = 100

	January–February	April–June	Extent of change (percentage point)
	(per cent)		
Male	83.0	77.7	–5.3
Female	67.1	60.8	–6.3
15–19-year old	33.5	13.6	–19.9
20–29-year old	75.2	66.0	–9.2
30–39-year old	78.3	72.8	–5.5
40–49-year old	84.9	80.6	–4.3
50–59-year old	78.5	74.4	–4.1
60–64-year old	41.1	39.9	–1.2
Grade 0–7	29.7	24.4	–5.3
Completed 8 grades	54.3	46.7	–7.6
Vocational school[b]	76.4	71.2	–5.2
Gymnasium (upper-secondary)	76.6	64.7	–11.9
Vocational upper-secondary[c]	79.5	73.5	–6.0
College	82.0	77.6	–4.4
University	85.9	84.0	–1.9
School leavers[d]	57.7	25.3	–32.4
Roma[e]	45.6	43.8	–1.8
Roma, excluding public works	39.2	38.7	–0.5
Budapest	81.8	73.8	–8.0
Countryside	73.6	68.3	–5.3
Female with children aged 0–6	39.1	37.1	–2.0
Female without children aged 0–6	73.8	66.3	–7.5
Female with children aged 7–18	72.7	65.7	–7.0
Female without children aged 7–18	65.0	58.9	–6.1
Total sample	75.0	69.3	–5.7

[a] Employed: worked at least an hour during the week preceding the survey.
[b] Vocational education not ending in a Matura (secondary school leaving examination).
[c] Vocational education ending in a Matura (secondary school leaving examination).
[d] Were in full time education one year prior to the survey.
[e] Respondent identifying themselves as Roma primarily or secondly.
Note: Observations were weighted by the appropriate quarterly weights.
Source: LFS, Version maintanined by the *CERS* Databank.

The bottom half of *Table 9.2.4* presents data for groups in a critical situation or generally assumed to be in a critical situation. As for school leavers (who were in full-time education one year prior to the survey but not anymore at the time of the survey), a dramatic decline of 32.4 percentage points is reported.[10]

The two periods of the LFS analysed herein includes 674 and 656 cases of persons identifying primarily or secondly as Roma. Their overall employ-

10 There is a relatively large number of observations also in this case (976).

ment barely decreased, and their market-based employment (excluding public works) remained essentially stable, probably due to the relative lack of exposure of the civil engineering sector.

Budapest was more affected by the crisis than the rest of the country, even though the occupational and educational preconditions for introducing teleworking are more favourable here. These seem to have been counteracted by the prevalence of some strongly affected sectors, such as tourism, catering, non-food retail as well as personal and cultural services.

Table 9.2.4 also presents changes in the situation of women with young children: surprisingly, the employment of women with children younger than six years dropped only by two percentage points. It must be noted, however, that only 40 per cent of them are in employment, probably those who were able to secure childcare before and during the pandemic. The employment of women with school-age children or without children declined by around 7 percentage points.

Job loss by employer and occupational characteristics

The extent of job loss and the reduction of actual working time to zero, broken down by employer and occupational characteristics, can only be analysed in a panel settings. Our sample includes persons who were in employment in the base period and were also included in the survey in the following quarter. Due to panel attrition and changes in the number of respondents belonging to the relevant age range, data from these panels is not necessarily consistent with the cross-sectional findings. Weighting is also crucial, since the weights pertaining to individual participants of the panel are usually different in the reference and current period. For more details see *Table A9.2.2* of *Annex 9.2.* and the accompanying text.

A further dilemma is that the probability of job loss is also different in 'peacetime' across occupations, sectors, and company size: it is always higher for unskilled workers or project-based activities such as construction. For convenience, in this report data from 2020 are compared with corresponding data from 2019.

The aim is to see *how likely it was for those in employment in January–February and working at least one hour to drop from this category* in the second quarter. This is, in essence, estimating the odds of job loss within three months because those queried in January were included next in April and those queried February were included next in May in both years. Again, January and February 2020 are regarded as the last months of "peacetime" and job loss is determined on the basis of April–May observations.[11]

Based on the last but one line of the third column of figures in *Table 9.2.5,* the job loss rate, as defined above, was *five times as high* in 2020 than in 2019.

11 There are limitations to using LFS for reconstructing developments taking place over the period between two waves. Even if someone was in employment during waves t and $t + 1$, they may have been unemployed between the two interviews and if they became unemployed or changed jobs more than once, it is impossible to determine the length of unemployment. If only once, then it is possible to estimate based on the starting date of their employment ongoing in quarter $t + 1$. However, the number of status changes is not known.

Table 9.2.5: Odds of losing employment between January-February and April-May in 2019 and 2020[a]

Status in January–February	Probability of job loss[b] (percentage)		2020/2019 ratio
	2019	2020	
Occupation			
Management, small business owner	0.5	6.1	12.2
Graduate occupation	1.4	8.1	5.8
Technician, assistant	2.5	12.3	4.9
Office or administrative staff	2.4	11.1	4.6
Trade or service occupation	3.7	21.2	5.7
Skilled agricultural	2.5	8.4	3.4
Skilled worker	2.8	13.8	4.9
Operator, assembler	2.3	16.8	7.3
Elementary manual occupation	6.3	19.4	3.1
Sector			
Agriculture	2.5	6.8	2.7
Vehicle manufacturing	2.2	27.1	12.3
Other industry, energy	3.1	12.7	4.1
Municipal services	2.3	8.0	3.4
Construction	3.3	13.1	4.0
Trade	2.9	13.8	4.8
Transportation	2.4	11.4	4.8
Services	2.5	19.8	7.9
Public administration	4.1	10.0	2.4
Education	1.9	8.9	4.7
Healthcare	2.1	12.8	6.1
Company size			
1–10 employees or does not know but below 10	3.2	16.3	5.1
11–19 employees	3.4	17.1	5.0
20–49 employees	1.8	13.0	7.2
50–299 employees	2.1	10.2	4.9
300–499 employees	3.0	12.9	4.3
500–999 employees	2.1	10.9	4.8
1000 employees or more	2.4	13.3	5.5
Does not know but over 10 employees	4.6	16.3	3.5
Ownership			
Public	2.5	9.8	3.9
Municipal	3.9	14.9	3.8
Private	2.7	15.1	5.6
Other (co-operative, mixed, does not know)	4.3	16.3	3.8
Total sample	2.8	14.0	5.0
Number of persons observed	11,168	11,328	–

[a] Sample: was in employment at the time of the January–February survey and worked at least one hour.

[b] Job loss: was out of employment or did not work an hour at the time of the April–May survey.

Note: Observations were weighted by the weights of the reference period.

Source: LFS. Version maintained by the *CERS* Databank.

An even more dramatic deterioration was seen among workers in senior management positions (most of whom are self-employed and small business owners), motor industry, services, and machine operators, while a less significant deterioration was reported in agricultural occupations and in agriculture in general as well as among unskilled workers, municipal services and public administration. The deterioration was smaller in the public than in the private sector. In other sectors the increase ranged from four to six-fold, with no significant differences within the range.[12]

Differences in home office

Job loss due to the lockdown would probably have been more prevalent (and the spread of the pandemic much faster) if in certain occupations and sectors workers had not been able to transition to remote work (home office in most cases). Its share increased by 13.9 percentage points between January–February and April–June (*Table 9.2.6, see next page*).

Blue collars experienced a less than one percentage-point rise on average. However, 9–10 per cent of employees with a secondary school leaving certificate (Matura), 37.4 per cent of college graduates and half (52.9 per cent) of university graduates worked from home. There is a similar pattern according to occupations: more than half of workers in graduate jobs and one-fifth of managers, assistants, technicians and office staff worked from home, while only 1.7 per cent of manual workers were able to make use of that facility. Youth below twenty years of age but not in education as well as construction and manufacturing workers did not tend to work from home either. Transition to home office was of above average for women, residents of Budapest and those working in the public sector. Workers in services, especially in education, switched to remote work in far greater than average numbers, while in "material sectors" and healthcare they did so in numbers far below the average. These differences came as no surprise.

The level of remote work in the second quarter was estimated using multivariate regression, controlling for gender, age, educational attainment, sector, ownership and a binary variable for the size of the business site.[13] At one point, this produced a result which diverges from the picture provided by raw averages: private and mixed ownership firms were significantly more likely to provide for remote work for their employees (*ceteris paribus,* by 5 per cent and 6 per cent respectively) than state-owned and municipal institutions.

Summary and conclusion

The lockdown measures introduced during the first wave of the Covid-19 pandemic as well as supply and demand side disturbances affected the labour market even more seriously than the 2008–2010 crisis. As a result of dismissals and reduction in working hours, in the second quarter the number of employees

12 Please note that the odds of losing employment was one of the highest for unskilled workers among all occupations in 2020 but it was the same in 2019 (and probably in every year). Their labour market situation did not *deteriorate* as much as that of other occupations. Similarly, a higher-than-average ratio of jobs disappeared at small firms and in trade and catering during the first wave of the pandemic but the rate did not increase more than the average.

13 The results are available upon request.

Table 9.2.6: Fraction working at home occasionally or regularly[a]
Employed persons = 100

	January–February	April–June	Change (percentage points)
	(percentage)		
Gender			
Male	2.7	13.6	10.9
Female	2.5	20.2	17.7
Age			
15–19 years	0.0	3.4	3.4
20–29 years	1.5	15.1	13.6
30–39 years	3.7	19.9	16.2
40–49 years	2.5	17.2	14.7
50–59 years	2.7	14.0	11.3
60–64 years	1.9	13.4	11.5
Educational attainment			
Grade 0–7	0.0	0.0	0.0
Completed 8 grades	0.0	1.0	1.0
Vocational school[b]	0.1	1.2	1.1
Gymnasium (upper-secondary)	2.3	10.4	8.1
Vocational upper-secondary[c]	2.2	9.3	7.1
College	5.8	37.4	31.6
University	7.5	49.6	42.1
Occupation			
Manager	4.5	22.3	17.8
Graduate job	8.2	52.9	44.7
Technician, assistant	4.0	19.7	15.7
Office or administrative	3.0	21.0	18.0
Manual worker	0.4	1.7	1.3
Ownership			
Public	2.0	23.3	21.3
Municipal	0.2	13.8	13.6
Private	3.0	13.9	10.9
Other (co-operative, mixed, does not know)	3.1	21.0	17.9
Size of business site			
1–10 employees	3.2	14.0	10.8
Larger	2.4	17.3	14.9
Sector			
Agriculture	0.8	3.1	2.3
Motor industry	1.1	7.6	6.5
Other industry, energy	1.7	7.8	6.1
Municipal services	0.0	15.9	15.9
Construction	0.9	5.5	4.6
Trade	2.0	9.6	7.6
Transportation	1.6	8.4	6.8
Services	7.0	31.5	24.5
Public administration	1.1	14.6	13.5
Education	1.3	50.3	49.0
Healthcare	1.0	6.8	5.8
Settlement type			
Budapest	6.8	36.3	29.5
Countryside	1.6	11.9	10.3
Total sample	2.6	16.5	13.9

[a] Employee: worked at least one hour during the week preceding the survey.

[b] Vocational education not ending in a Matura (secondary school leaving examination).

[c] Vocational education ending in a Matura (secondary school leaving examination).

Note: Observations were weighted by the appropriate quarterly weights.

Source: LFS. Version maintained by the *CERS* Databank.

working at least one hour dropped by 7.6 per cent and full-time equivalent employment decreased by 9 per cent compared with January–February.

The usual labour market indicators (employment and unemployment rates) regularly published in the media underestimate the extent of the shock because of disregarding the nearly 6 percent decline in working time and because many dismissed workers may have hoped the lockdown would end, which reduced their willingness to look for a job or register as unemployed. The government failed to relax the ungenerous unemployment benefit regulations nearly unparalleled in the developed world (with a maximum duration of three months but much shorter on average), which may have contributed to an underestimation of joblesness. In addition, in some of the most affected sectors, for example in catering, culture and trade, workers are often employed informally and thus they are not entitled to benefits.

The crisis affected school leavers and working teenagers the most seriously. A far greater than average decrease was seen in the population with general upper-secondary (Gymnasium) qualification but not attending full-time higher education, while a much smaller than average decrease was reported for university graduates. The employment rate of the Roma hardly declined and their employment in the open labour market essentially remained the same. The crises had a stronger effect on Budapest than the rest of the country. Despite the closure of kindergartens and schools, the employment levels of women with and without school-age children were similar and that of women with children aged below six years dropped by a mere two percentage points.

The job loss rate was *five times as high* in 2020 than in 2019. A particularly sharp decline was reported for small business owners as well as in vehicle industry, services and among machine operators and a slighter drop was seen in agriculture, among unskilled workers, in municipal services and public administration.

The job loss rate was mitigated by the spread of telework: in January–February only 2.6 per cent of employees worked remotely but their share increased to 16.5 by the second quarter. It was primarily higher education graduates who were able to take advantage of this opportunity: in the second quarter, half of university graduates and those in professinal jobs, more than one-third of graduates from colleges worked from home, while only one-tenth of employees with an upper-secondary qualification and less than two per cent of manual workers did so. The opportunity of switching to remote work protected highly qualified white-collar workers both from job loss and from becoming infected, which (although resilience of the "elite" is desirable in itself), further aggravated social disparities.

Estimates presented in the Subchapter had to be made in a very brief time, since the data became available only a few days before the volume had to be submitted. It is impossible to exploit the extremely rich wealth of LFS data

or build and estimate a refined model within a few days. The Subchapter is to be regarded more as a "statistical flash report". There are several problems that cannot be investigated using the available data, for example it is not possible to determine what impact the tax benefits and reliefs granted by the government had on employment. To be able to do that, enterprise level or ideally linked employer-employee data would be needed, which we were unable to obtain in time. Additionally, dividing samples and analysing smaller groups were restricted by the limited size of the survey.

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Annex 9.2

Table A9.2.1: Observations in the LFS, 2020 (number of persons)

	January–February	March	April–June
Total	34,065	14,157	42,813
14–74 years	24,639	10,698	32,481
15–64 years	20,500	8,552	25,981
15–64 years, not in education[a]	18,353	7,755	23,870

[a] Not in full-time education.

Source: Version of the Labour Force Survey of the *Central Statistical Office* maintained by the CERS Databank.

Table A9.2.2 presents the employment rate of the population aged 15–64 years in samples from the first and second quarters of 2019 and 2020 as well as in the panels developed from them. In order to be able to compare the findings obtained from the samples available with data published by the Central Statistical Office, students are not excluded this time, the quarters are not split

and working time is not taken into account. It is evident that, except for one case, data estimated using the quarterly wave are not fully consistent with CSO published data. We are not aware of the source of the differences: they might be due to subsequent adjustment. (We also downloaded retrospective data in mid-October 2020.) The employment rates of panel participants are in each case lower than rates calculated from cross-sectional data, by one percentage point in 2019 and by a 0.3 percentage point in 2020. Nevertheless, changes between the first and second quarters are identical based on both cross-sectional data and panels. Finally, employment levels in the current period, estimated using current and base period weights, are identical or differ only to a very small extent. Allowing for these minor distortions, the panels are deemed suitable for use. The analysis relies on base period weights.

Table A9.2.2: The employment rate of the population aged 15–64 years in various samples[a]

	Quarterly waves	Panels		CSO-Stadat
		Base period weights	Reference period weights	
2019				
January–March	70.9	69.9	69.9	69.9
April–June	71.0	70.0	70.0	70.0
2020				
January–March	69.7	69.4	69.4	70.3
April–June	68.7	68.4	68.0	68.7

[a] For comparison with published data, samples now also include students.
Source: LFS. Version maintained by the *CERS* Databank and *HCSO*.

APPENDIX
ADMIN3 – PANEL OF LINKED ADMINISTRATIVE DATA

ANNA SEBŐK

In the summer of 2019, The Databank of the Centre for Economic and Regional Studies (KRTK) established Admin3, the third round of the Panel of Administrative Data. Admin3 was made by linking individual-level as well as firm-level data provided by the National Insurance Fund Administration, the Hungarian State Treasury, the Educational Authority, the Ministry of Finance, and the National Tax and Customs Administration. The dataset is a 50% random sample of the Hungarian population, containing health, education, labour market and unemployment data as well as numerous characteristics of Hungarian firms. The Admin3 is an anonymized dataset covering multiple years.

Admin3 (covering data from 2003 to 2017) has been created using a data-integrational method. First, a 50% sample was drawn from the people who held a Social Security Number in 2003 using the National Insurance Fund Administration's registry which virtually covers the entire Hungarian population. The result of this process is a list consisting of the Social Security Numbers and the Employment Tax Numbers. Then these two identifiers were hashed using an algorithm created specifically for the purpose of the actual data linking process by the National Infocommunications Services Company (NISC Ltd.). In the next step, the other data providers queried the data they possess about those in the sample, including the two identifiers hashed with the same algorithm. They then handed these over to the NISC Ltd. which later merged and anonymized them. Thus the dataset does not contain any natural identifier. After merging the individuals' data and dropping the original identifiers, the linked dataset was sent to the KRTK Databank in a raw format yet not suitable for research work. The data cleaning then began as a joint effort of the fellow workers of the KRTK Databank and those researchers who have been engaged with the different registries for a long time. The anonymized dataset is solely available for scientific research via safe server connection and under controlled conditions.

The following healthcare-related information is available on an individual level for the period of 2009–2017: Social Security Number registry (gender, birth year and month, as well as information on Social Security Number validity), district code of residence, data about the term of social insurance, public health care, general practitioner care, inpatient and outpatient care, mortality, prescription take-outs, monetary provisions (sick benefit, baby-care allowance, childcare benefit, sick-leave). Out of these, the following data have been used

in this volume: district code of residence, number of visits to the GP, number of cases and expenses[1] of outpatients' care, number of days and expenses[2] of hospitalization, number of prescriptions taken out and expenses[3] – in total and by the main Anatomical Therapeutical Category (ATC) groups – as well as mortality. It is important to bear in mind that the aggregation of data does not allow accurate recovery of aggregated healthcare statistics due to a slightly different dataset and the nature of sampling.

The section on labour market consists of data about the employee, referral of public employment and labour force on an individual level. The Hungarian Labour Market utilizes data about labour market status and wage income.

Social transfer includes data about pension payments, monetary provisions, unemployment, and labour force related programs, on an individual level.

The section on education contains data about the participation in higher educational training, higher educational relationship, public educational relationship, maturity exam and the National Assessment of Basic Competencies, on an individual level.

Information about firms comes from the corporation tax declaration and NES Wage Survey records, at a firm-level although linked to employees/individuals.

More details of the Admin3 are available in *Sebők* (2019).

1 Including laboratory care, except for CT and MRI diagnostics.

2 Including active and chronic care.

3 Expenses covered by social security and by the patient are both available.

Reference

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