

ANALYSIS OF CROSS-BORDER COMMUTERS' SPATIAL MOBILITY BETWEEN WESTERN REGIONS OF HUNGARY AND SLOVAKIA

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ABSTRACT:

Commuting, defined as daily traveling for employment purposes, has gradually grown in importance in the past decades in Eastern European countries. According to Eurostat, although the freedom of movement may have encouraged cross-border commuting in the EU, it accounted just for 0.9 % of the EU-28 workforce. Between the highest number of cross-border commuters, we can find Slovakian (147 thousand), and Hungarian (111 thousand) workers. We chose this topic because there has been a significant increase in the willingness to commute for economic reasons in recent years, and we want to explore the reasons of this. In the case of both examined countries, the inhabitants of the western regions are characterized by high willingness for cross-border commuting. Due to this reason, in our research, we conducted a questionnaire survey in the western regions of Hungary and Slovakia. The results indicate that there are similarities between Hungarian and Slovakian commuters. The regression analysis clearly showed that commuter satisfaction is most affected by the variety of jobs offered and the level of wages.

Key-words: Cross-border, Mobility, region, Regional differences, Spatial analysis

1. INTRODUCTION

Since 1990, there have been a number of important changes in the Hungarian and Slovak society, such as the transition from a centrally planned economy to a market economy, the introduction of parliamentary democracy, and integration into the European Union.

The transition has typically been characterized by a collapse of state-owned firms, which was only partially offset by an increase in private sector (Kolodko, 1994; Filep et al., 2013). While before the change of regime, local state bodies had the task of providing employment, they lost this role with the change of regime (Durán, 2001). One of the worst effects of regime change on people was the loss of their jobs (Sokol, 2001; Magda, 2013). According to Fialová and Schneider (2009) over the last three decades, employee habits have changed significantly, with many workers being forced to leave their homes and work in another region or even another country. For these reasons the commuting from eastern European countries to western Europe has become widespread (De Simone and Manchin, 2012). First time mostly in an illegal way, but after the European Union integration, in a

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legal way too (Fassmann and Münz, 2002). Commuting is an economically, socially, culturally, and environmentally important process for both the individual and society.

We choose this research topic for two main reasons. First of all, because cross-border commuting is popular and an important topic in scientific research nowadays. Secondly, these scientific literatures are mostly dealing with commuting between two western European countries (De Gijssels and Janssen, 2000; Medeiros, 2019; Buch et al., 2009) or the western and eastern European countries (Bujdosó et al. 2011; Bujdosó et al. 2015; Bagdi, 2018; Cavallaro and Dianin, 2020) and there is lack of examining the cross-border commuting between two eastern European countries. Although data and estimates indicate that the magnitude of this is significantly higher than the expectation.

The main objective of this study to analyse the characteristics of the labour force commuting along Slovakian-Hungarian cross-borders. The main purpose was to study commuters' behavior and identify the main reasons for spatial mobility in the western region of examined countries.

2. LITERATURE REVIEW

In the 1980s, unusual labour trends had emerged in the European labour market. These changes were followed by individual globalization processes, and with various changes in the world economy, labour began to move freely (Lipták, 2013).

The functioning of any market is based on the pursuit of balance between supply and demand, which is regulated by price. In the labour market, this relationship is between demand by the employer and supply by the employee (Lipták, 2019). In case of the labour market, the price is the wage that is created through a bargain between the employer and the employee (Kwiatkowski, 2011).

Work, which plays a key role in a person's life is present in our daily lives for a variety of reasons, because we need money to meet our needs, or because we love to do it, but it also helps to deepen our social relationships. According to the literature, most people work for financial reasons (Grund and Sliwka, 2007).

Commuting is one of the basic elements of modern society. With the improvement of transport, it has become possible for workplace and residence to be spatially separated (Rouwendal, 1998). With the strengthening of the spatial concentration of jobs, commuting became more and more important, the main direction of which has developed between the countryside and the city. Most studies in the scientific literature are related to commuting between rural areas and city centers (Green and Meyer, 1997; Green et al., 2019; Lavesson, 2016). The motivations of classical commuting are mainly the workplace as a commuting goal, so the commuter would not be able to get a job in his own place of residence, or only at the cost of great compromises. Thus, it is necessary to go to a geographically another settlement every day to work (Sharma, 2019). Commuting is shaped by economic, social, and geopolitical factors and this renders it a multivariate phenomenon.

The meeting of different economic systems can generate spatial movement and commuting processes, which can be fundamentally different from "traditional" commuting movements within a country (Bochkarev, 2019). The meeting of different economic systems is manifested first and foremost in the difference in prices and wages, which have the strongest impact on labour mobility (Paril et al., 2015; Dauth and Haller, 2020). However, the direction of spatial mobility is also affected by other differences, for example working conditions, social benefits differences, or shortage in professional qualifications of the labour force in the border area. In spite of differences in taxes, legal systems can also strengthen cross-border commuting (Jin, 2019).

The state border modifies the geographical features that affect the direction and distance of commuting. This modification may vary in magnitude and quality depending on the functions of the boundary. Strong spatial structural relations between the areas on both sides of the border reduce the distorting effects of the state border. At the same time, geographical features, like the meeting of peripheral areas, the difficult interoperability of the border, and few transit routes can prevent the development of cross-border commuting (Van der Veen and Evers, 1983). From 2004, when joining the European Union, this last barrier has also disappeared and the citizens of both examined countries were given the opportunity of free movement and to work freely. The principle of a common market in the European Union is the free movement of production factors. This means not only the free

movement of goods, services, and capital but also the free movement of labour. The Treaty of Rome, which established the European Economic Community, already provides the establishment of a common labour market. The main goal of the integration, which was based on economic interests, was to increase competitiveness in the regions with a coordinated labour market. According to European Union law, the free movement of workers means that nationals of any member state of the European Union can take up employment in another member state with the same conditions as the nationals of that particular member state. In particular, no discrimination based on nationality is allowed. There are several definitions of the term “cross-border commuter”. According to ETUC (2015) terminology, cross-border commuters are workers (including self-employed workers) who pursue their profession in one Member State and geographically reside in another (neighbouring) Member State. The second criterion is that cross-border commuters return to their place of residence abroad at least once a week.

The drivers of cross-border workers can be several. The social benefits may be one of the main reasons for commuting. According to the EC Regulation 883/2004, an individual is subject to the legislation of the country where he actually works as an employed or a self-employed person, independently of where he lives, so the country of work is responsible for his social benefits.

Summarizing the essence of the literature, it can be stated that employees who, for quantitative or structural reasons, are unable or unwilling to find a workplace in their place of residence decide for commuting. Commuting to workplaces in other settlements typically takes place within the border, but with the accession of eastern European countries to the European Union, the borders were opened for eastern workers. With the removal of geographical barriers to the free movement of labour, commuting has become available primarily to people living along the border. In our publication, we examine the characteristics of these commuters.

3. DATA AND METHODS

In the first part of own research, we compared the development of the western regions of both countries and their labour market characteristics based on secondary data. In our primary research, we conducted a quantitative (questionnaire) survey. In 2020, a total of 724 questionnaires were sent out using the snowball method, of which 342 evaluable responses were returned by October 2020, of which 205 were Slovak respondents and 137 were Hungarian. The selection of commuters was assisted by regional employment offices, our former university students, and the university partner contacts. When handing out the questionnaire, we asked everyone that if they had an acquaintance who they knew was a commuter, then give our questionnaire to them.



Fig. 1. Research area (own editing by using ArcGIS software).

The criteria for selecting the respondents were that the commuter must work in the Hungarian or Slovak labour market. The questionnaire consists of 3 main parts: 1) demographic information; 2) travel information, travel time, distance; 3) reasons for commuting, satisfaction, factors affecting commuting, etc.

The official classification of research area were the European Union NUTS 2 level regions: from Slovakia Bratislavský kraj, Zápádne Slovensko, and from Hungary Közép-Dunántúl, Nyugat-Dunántúl regions (see **Fig. 1**). These geographic regions are located along the Slovak-Hungarian-Austrian-Czech border. These regions have been the focus of research because they are characterized by a high degree of development and a high level of foreign capital investment. These geographic regions attract many workers from the whole country, many of whom take part in cross-border commuting.

The data obtained during the questionnaire survey were analysed using regression analysis by SPSS.21. In the following, the main results of our own research are presented, first, we introduce secondary comparative research, after the results of our questionnaire survey.

4. RESULTS AND DISCUSSION

In the first part of own studies, we analyse the main macro-economic and labour market characteristics of the studied regions, from the accession to the European Union until 2020.

After the 2004 EU integration commuting abroad has changed significantly in case of the examined regions. While initially, it was mainly characteristic for the inhabitants of the Zápádne Slovensko region, by 2019 this ratio had almost equalized between the Nyugat-Dunántúli and Zápádne Slovensko regions. In 2019, 36 600 people commuted from the Zápádne Slovensko region, compared to 38 400 people in the Western Transdanubia region. Based on the data, it can be stated that commuter activity is significant in the western region of both examined countries (see **Fig. 2**).

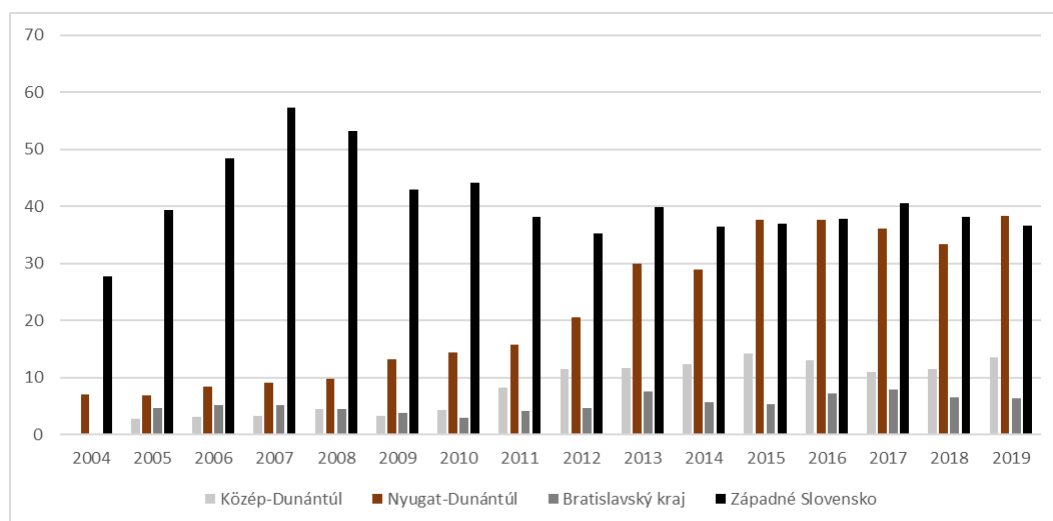


Fig. 2. International commuting in examined regions, NUTS 2, thousand people (own compilation based on Eurostat data).

European Union statistics did not detail which member states are the main destinations for commuters in these regions, but it can be concluded from international researches (Michniak, 2016) that Slovak commuters commute mainly to Austria and the Czech Republic, while Hungarian commuters commute to Austria (Hardi and Uszkai, 2017).

In the following part of the research, we will present the most important results of the questionnaire survey. In case of the research, we tried to get a more accurate picture of the

characteristics of commuters. We searched for statistical correlations between the answers received, and we tried to prove our hypothesis:

There is a positive relationship between the level of wages and cross-border commuting.

The following **Table 1** shows the main demographic data of the respondents, males having the highest proportion of respondents in both countries, with 135 males responding in Slovakia and only 70 responses from females. Out of the Hungarian respondents, 98 were males and 39 were females. In terms of age composition, more than half of the respondents were under the age of 50 in both countries, the difference is that there were more commuters over the age of 60 among Slovak respondents. In terms of education, the proportion of people with secondary education was highest in both countries, in case of the Slovak respondents, it was 49.8 percent, while in case of the Hungarian respondents it was 57.7 percent.

It can be observed from the differences that the proportion of Hungarian commuters with a primary school education is 6 percent higher than of Slovak commuters. In both countries, the proportion of university graduates was below 10 percent, meaning that workers with university degree are less likely to take part in cross-border commuting, as they are more likely to find a suitable job for them in their region of residence.

Table 1.

Main demographic characteristics of respondents.

	Slovakia		Hungary	
	Frequency	Percent	Frequency	Percent
Gender				
Male	135	65,9	98	71,5
Female	70	34,1	39	28,5
Age				
18-25	32	15,6	29	21,2
26-35	76	37,1	48	35,0
36-45	44	21,5	35	25,5
46-60	31	15,1	16	11,7
60+	22	10,7	9	6,6
Educational level				
Primary school	84	41,0	47	34,3
Secondary school	102	49,8	79	57,7
University	19	9,3	11	8,0
How many years commuting				
0-2 year	44	21,5	35	25,5
2-5 year	73	35,6	46	33,6
6-10 year	61	29,8	39	28,5
more than 10 years	27	13,2	17	12,4

Table 2 shows the average one-way commuting distance between workplace geographic locations at different distances and the residence place. Based on the answers received, it can be stated that the interviewed commuters are willing to commute for a geographically longer distance for better working conditions and benefits. 44.9 percent of Slovak cross-border commuters commute 36-50 kilometers per day between their place of residence and their Hungarian workplace, while 44.5

percent of Hungarian commuters commute 36-50 kilometers between their place of residence and their Slovakian workplace. 31.7 percent of Slovak commuters commute beyond 50 kilometers daily, while in the case of Hungarian respondents this proportion is 28.5 percent. The received results show similar results to international studies (Carlsson et al., 2018; Gunko and Nefedova, 2017; Ahlfeldt and Wendland, 2016), meaning that cross-border commuters are willing to commute for more than 50 kilometers per day for better job conditions.

Table 2.

The distance of commuting, km.

	Slovakia		Hungary	
	Frequency	Percent	Frequency	Percent
0-20 km	18	8,8	13	9,5
21-35	30	14,6	24	17,5
36-50	92	44,9	61	44,5
50+	65	31,7	39	28,5
Total	205	100	137	100

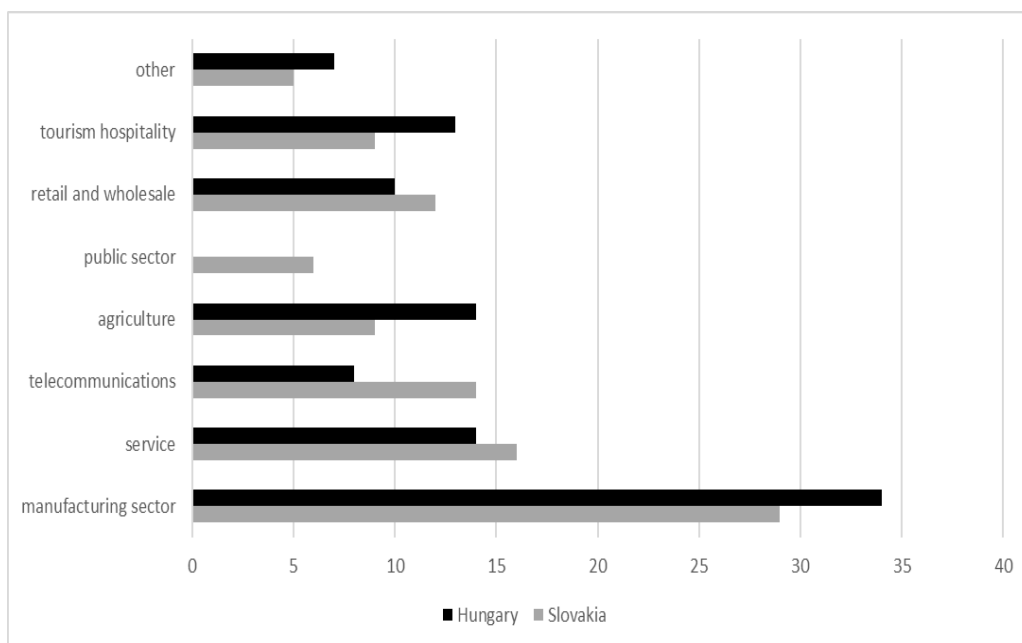


Fig. 3. Type of examined commuters' workplace, percent

Based on the data in **Fig. 3**, it can be stated that commuters work mostly in the manufacturing sector. 29 percent of Slovak respondents and 34 percent of Hungarian respondents work in the manufacturing sector. In most cases, manufacturing jobs are related to the automotive industry, the two most important multinational companies in the examined regions are Volkswagen in Bratislava and Audi in Győr. Both companies have a significant number of commuter workers.

The manufacturing sector is followed by service (17 percent) in case of the Slovak respondents, while service and agriculture were in the same proportion (14 percent) in case of the Hungarian commuters. It can be stated that commuters in the studied regions are most attracted by large, foreign-owned companies. These companies appeared in large numbers in the examined area after the

European Union integration of Hungary and Slovakia. These large foreign companies clearly have a positive impact on employment in these regions.

The difference in the figure is that in the public sector only Slovak commuters work in Hungary, while vice versa this is not typical, it probably has language barriers, because in the southern part of Slovakia many people speak the Hungarian language for historical reason. The public sector is typically the sector where one needs to know the official language of the country on a high level.

The same difference between the responses can be said for the agricultural sector. While 14% of Hungarian respondents work in the Slovak agricultural sector, on the Slovak side this proportion is only 9%. The reason for the discrepancy can be found in the fact that the regions of southern Slovakia were already regions engaged in agricultural production even before the 2000s. Many of the Hungarian employees who went to work in Slovakia even before joining the European Union, still work in agriculture, while those who went from the mid-2000s are working mostly in the manufacturing industry.

Question regarding commuting satisfaction was answered by all the respondents independently from their travel distance (see Fig. 4). Commuters were simply asked if they were satisfied with their daily work commute. The possible choices were on Likert-scale: very unsatisfied, unsatisfied, satisfied, and very satisfied. Concerning the commuting satisfaction, among the Slovakian respondents, only 7.8 percent were very unsatisfied, 13,7% were unsatisfied, 53.7 percent were satisfied and finally, 24.9 percent were very satisfied. In case of the Hungarian respondents this satisfaction level was above average too. Among the Hungarian respondents only 12.4 percent were very unsatisfied, 16.1 percent were unsatisfied, 52.6 percent were satisfied and finally, 19 percent were very satisfied. Summarizing the responses, it can be said that the commuter workers interviewed are satisfied with the commuting employment.

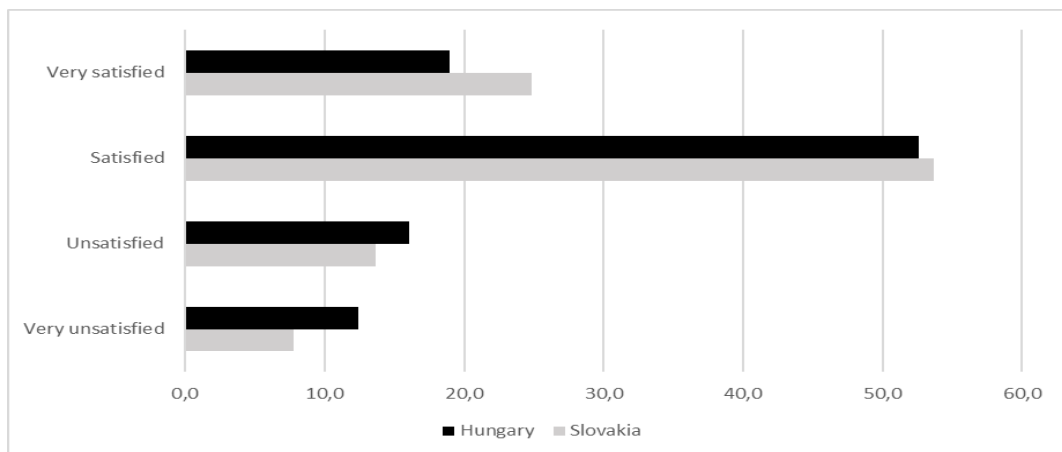


Fig. 4. The satisfaction level of examined commuters, percent

We analysed in the research which factors have the greatest impact on commuter satisfaction. Based on scientific literature and personal interviews, we examined 9 factors (Fig. 5) that we believe may have an impact on commuting (*higher wages, old-age pension, medical treatment, family benefits, sickness, maternity and paternity benefits, unemployment benefits and labour market reintegration, taxes, the variety of jobs offered, knowledge of the language spoken in the country*) These factors were taken as independent variables, while dependent variables were commuters' satisfaction.

One of the main objectives of the research was to identify the affecting factors of commuting. A Multiple regression analysis was conducted to identify the best predictors of the dependent variable and to show the proportion of variance in the dependent variable explained by the independent variables. The commuters from the two countries were evaluated separately.



Fig. 5. The conceptual framework of the factors affecting commuting.

Table 3.

Model summary of regression analysis, Hungary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,666 ^a	,443	,404	,693	,443	11,241	9	127	,000	1,829

a. Predictors: (Constant), languageknowledge, medicaltreatment, wages, unemploymentbenefits, oldagepension, taxes, familybenefits, sickmatpatbenefits, varietyofjobs

b. Dependent Variable: satisfaction

Table 3, shows that R-squared of 0.443 which implied that nine predictor variables explained about 44.3 percent of the variance on cross-border commuting of Hungarian workers. The ANOVA results show that F-statistics (11.241) and the p-value was highly significant (.000) at the .05 level of significance.

Table 4, shows the standardized regression coefficients (Beta). Beta gives an indication of the contribution of each independent variable in predicting the dependent variable. This table showed that the largest beta coefficient is 0.323 (p <.05) which was for a variety of offered jobs. It means that such variables made the strongest contribution in explaining the dependent variable (commuter's satisfaction). Similarly, wages (0.301), old-age pension benefits (0.226), unemployment benefits (0.189) and family benefits (0.156) were among the significant predictors of commuting. The beta value for sickness, maternity and paternity benefits, medical treatment, taxes, and knowledge of the language spoken in the country did not contribute significantly.

The obtained results show that Hungarian commuters are most attracted to Slovak job opportunities. In Slovakia, after the accession to the European Union, the number of foreign direct investment increased significantly, these were mostly large automotive companies located in the western regions, e.g., a Volkswagen, Citroen, Land Rover. Thus, a number of attractive jobs have been created that have also attracted the attention of foreign commuters. In addition, wages and several social benefits, e.g., the old-age pension make the Slovak labour market attractive for Hungarian commuters.

In the following part of empirical research, we examine which factors affect the satisfaction of Slovakian cross-border commuters. Table 5 shows that R-squared of 0.256 which implied that nine predictor variables explained about 25.6 percent of the variance on cross-border commuting of Slovakian workers. The ANOVA results show that F-statistics (7.440) and the p-value was highly significant (.000) at the .05 level of significance.

Table 4.

The coefficient selected factors affecting of Hungarian commuter's satisfaction.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1,175	,546		2,152	,033
varietyofjobs	,324	,076	,323	4,285	,000
unemploymentbenefits	,177	,074	,189	2,382	,019
oldagepension	,214	,071	,226	3,003	,003
sickmatpatbenefits	,066	,052	,087	1,269	,207
familybenefits	,125	,058	,156	2,157	,033
languageknowledge	,086	,056	,109	1,547	,124
taxes	,017	,063	,021	,274	,785
wages	-,224	,055	,301	4,049	,000
medicaltreatment	-,278	,066	-,334	-4,221	,459

a. Dependent Variable: satisfaction

Table 5.

Model summary of regression analysis, Slovakia.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,506 ^a	,256	,221	,738	,256	7,440	9	195	,000	2,034

a. Predictors: (Constant), languageknowledge, medicaltreatment, wages, unemploymentbenefits, oldagepension, taxes, familybenefits, sickmatpatbenefits, varietyofjobs

b. Dependent Variable: satisfaction

Table 6 showed that the largest beta coefficient is 0.285 ($p < .05$) which was for wages and a variety of jobs (0.186, $p < .05$). It means that such variables made the strongest contribution in explaining the dependent variable (commuter's satisfaction). The beta value of other examined variables did not contribute significantly to the dependent variable.

Slovak commuters are clearly attracted to the Hungarian labour market because of higher salaries and a variety of job opportunities.

Comparing the responses of the Hungarian and Slovak commuter workers, we get similar opinions, thus the job opportunities and the level of salary are the most attractive in commuting for both parties. Based on this, it can be said that high wages and variety of job opportunities offered in the western region of the studied countries are the reasons for commuting. The results of own research are in line with the results of other similar scientific research (Wiesböck, 2016; Mayerhofer, 2004; Moritz, 2011; Novotná et al., 2013) according to which the main drives for cross-border commuting are higher salaries and other financial benefits.

The last question in the empirical research was, that what was the most negative experience of respondents during commuting. Most of the negative experiences met by Slovak commuters during their cross-border commuting were workplace conditions (22 percent), followed by fatigue (resulting from the combination of daily commuting and work, 18 percent), foreign culture (15 percent), and bureaucracy (13 percent). The bureaucracy received a relatively high percentage, which is due to the fact, that official administration in Hungary is very complicated and long. Hungarian commuters most often encountered discrimination (24 percent) in connection with their commuting work in Slovakia, followed by working conditions (18 percent) and working in a foreign culture (18 percent) as a negative factor.

Table 6.

The coefficient selected factors affecting of Slovakian commuter's satisfaction.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1,254	,515		2,435	,016
oldagepension	-,035	,050	-,046	-,693	,489
sickmatpatbenefits	,088	,070	,090	1,267	,207
medicaltreatment	-,047	,048	-,063	-,965	,336
wages	,278	,069	,285	4,017	,000
unemploymentbenefits	-,024	,047	-,033	-,510	,611
varietyofjobs	,189	,079	,186	2,383	,018
familybenefits	-,063	,059	-,082	-1,078	,283
taxes	,054	,068	,057	,794	,428
languageknowledge	,072	,053	,098	1,360	,175

a. Dependent Variable: satisfaction

5. CONCLUSIONS

Geographic labour mobility covers both migrations as well as cross-border commuting. Our analysis provides some new information in terms of research into cross-border commuting, focusing on labour spatial mobility between Hungary and Slovakia.

One of the biggest advantages of the European Union is the free movement. After the integration of the Eastern European countries into the EU, it has become possible for the citizens of these countries to participate freely in the EU labour markets. Initial commuting to western countries has now changed and commuting has also become a significant factor among neighbouring Eastern European countries. Labour market trends over the past decade have influenced commuting trends. Our research has shown that commuting plays an important role in the western region of Slovakia and Hungary, and both countries have a number of advantages that make them attractive.

Based on the answers to the satisfaction question the Hungarian and Slovak commuters are also satisfied with their current workplace.

Based on the results of our research, it can be said that while Slovakia is attractive to Hungarian commuters in terms of variety of offered job positions, wages, and other social benefits (e.g. old-age pension, family benefits, etc.), Slovak commuters come to Hungary because of the higher wages and variety of offered job positions. In both countries, the inflow of foreign direct investment has made it possible to create quality jobs with high salary level, and these, especially in industrial jobs, are the most attractive for the inhabitants of both examined regions. The results presented here support the economic motivation of commuters, as shown in previous literature (van Ommeren et al., 2000; Clark, et al. 2003; Filep et al., 2010).

In terms of sectoral participation, we found significant differences in the public sector and agriculture, which are justified by the historical past of both countries. On one hand, there are many Hungarian-speaking Slovak citizens in southern Slovakia, who can easily find a job in the Hungarian public sector. While working in the agriculture sector is more dominant among Hungarian commuters who have been working on farms in southern Slovakia for a long time, as the south-western part of Slovakia is historically a region for agricultural production.

In the course of our research, it was also proved that commuting has not only positive but also negative effects, most negative effects mentioned discrimination, fatigue, and the bureaucracy of the country.

Our view is that free movement and commuting can help reduce labour market imbalances, so commuting will play an increasing role in the future.

Similarly, to most research, we also encountered obstacles during our own research. The first such obstacle was that research participants were from the western region of both countries, which means that no relevant conclusions can be drawn for all Hungarian-Slovakian cross-border commuting. The other limiting factor was that we had difficulties in finding a reliable respondent. This was partly due to the fact, that many people refused to respond because of the coronavirus, and partly because we were researching a very specialized segment of employees, which also made it difficult to find them. Thus, in many cases, we relied on our university contacts to find respondents.

The crisis caused by the coronavirus has rearranged the world of labour market, it has also had a major impact on cross-border commuting, as restrictive measures have been introduced due to the coronavirus, which has suspended the geographically free movement through the borders, risking the daily commuting. In the second wave of the coronavirus, we have found that border controls are becoming more stringent, and the previous lighter measures are being replaced by increasingly stringent controls that do not avoid commuter workers either. While in the past commuters were subject to milder requirements, nowadays they also have to meet several strict requirements (e.g. they have to be tested continuously, they cannot enter another country without a valid negative test), which make daily commuting difficult for them. In our opinion, it would be worthwhile to investigate later how the coronavirus affected commuter employment and whether it caused a decline in the number of commuters in the two regions.

Our results can primarily be used as the foundation of other studies. The results may serve as a guideline for other researchers, helping them determine the direction of their research when examining cross-border commuting in case of other countries.

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