THE TWENTY-FOURTH DUBROVNIK ECONOMIC CONFERENCE

Organized by the Croatian National Bank

Ivana Draženović, Marina Kunovac and Dominik Pripužić

Dynamics and Determinants of Migration – The Case of Croatia and Experience of New EU Member States

Hotel "Grand Villa Argentina"

Dubrovnik

June 3 – 5, 2018

Draft version

Please do not quote

Dynamics and Determinants of Migration -

The Case of Croatia and Experience of New EU Member States

Ivana Draženović†, Marina Kunovac†* and Dominik Pripužić†

Abstract

In this paper we analyze the emigration flows from Croatia and other new EU Member States to the core EU countries after their EU accession. In order to properly assess the magnitude and dynamics of the recent emigration wave, we construct the series of indirect emigration flows, resorting to the national statistical offices of the selected core EU destination countries. We compare the Croatian experience with that of other new EU Member States and show that the intensity of Croatia's emigration flows after the EU accession is proportional to the Romanian and Bulgarian cases, which experienced relatively strongest outflows. Finally, we empirically analyze the economic and non-economic drivers of emigration from NMS to the core EU in the 2000-2016 period. Results of that analysis point that both economic factors (measured by different GDP and labour market indicators) and non-economic factors (capturing the EU accession, the level of corruption in the economy and the demographic characteristics of the origin country population) are relevant for migration decisions.

Keywords: Emigration, EU accession, New Member States; Gravity model

JEL Classification: J61, E65, C33

May 2018

† Croatian National Bank, Economic Analysis Department. E-mail: ivana.drazenovic@hnb.hr; marina.kunovac@hnb.hr; dominik.pripuzic@hnb.hr.
*Corresponding author
The authors are particularly grateful to Gordi Sušić, Vedran Šošić, Teo Matković, Maja Bukovšak, Nina Ranilović, Davor Kunovac, Marko Mrkalj, Ervin Duraković, Karlo Kotarac and Alan Bobetko for their valuable comments. The views expressed are those of the authors and do not necessarily represent those of the Croatian National Bank. Preliminary version.

1. Introduction

In mid-2013 Croatia joined the European Union (EU) and as a Member State (MS) gained the access to the EU single market. By becoming a part of the single market, the country benefits from "four freedoms" – a free movement of goods, services, capital and labour, which enable more efficient reallocation of domestic factors of production, resulting in new business and trade opportunities and ultimately increasing MS growth prospects. Country also gains access to EU funds, financial tools set up to implement the regional policy of the European Union, with a primary aim to reduce regional disparities in income, wealth and opportunities.[1]

However, one of the direct effects of the EU accession and related reallocation of domestic factors of production was also a significant migration outflow from Croatia to the EU. Global financial crisis had hit Croatia hard and the impacts of deep and protracted recession was still lingering by the time the country joined the EU. Judging by the experience of other new EU Member States after the accession, it should come as no surprise that one of the immediate consequences of Croatia joining the single market is an outflow of domestic workers to core EU countries, characterised by much higher income levels.

Such developments raised emigration related issues to the forefront of the public debate in Croatia. Based on a mixture of anecdotal evidence, *ad hoc* surveys and social networks posts, media predominantly engaged in painting and propagating the bleak picture of the "Croatian exodus". At the same time, the proper estimates of the magnitude and nature of this emigration wave is largely unknown, due to inaccurate migration statistics.[2]

Therefore, in this paper we try to assess the characteristics of recent Croatian emigration wave to the EU countries. We present a comprehensive analysis of dynamics and the main determinants of migration from Croatia to core EU countries following the EU accession, comparing Croatian case with experience of other new member states.[3]

[1] Through four national programs, Croatia, for example, has been allocated EUR 10,7 billion from European Strategic Investment Funds over the period 2014-2020 (above 3% of GDP annually), to be invested in various areas, from research and innovation to employment, education and training, social inclusion, public administration and civil society as well as infrastructure and environmental protection.

[2] Official migration statistics collected by the Croatian Bureau of Statistics are published with a disclaimer that the numbers of emigrants are based on the self-reporting of emigration by emigrants themselves, a process clearly discouraged by a relatively burdensome procedure, that results in a loss of domestic social security benefits.

[3] Due to data availability, core EU countries are represented by 11 countries: Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxembourg, Netherlands, Sweden and United Kingdom. New EU Member States are represented by 10 countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.

Although there is significant bulk of literature covering CEE migration patterns after EU accession, up to our knowledge, the impact of free mobility of labour on Croatian migration flows was not systematically analyzed until now. Several authors implement the partial analysis of emigration flows from Croatia following the EU accession. Šonje (2018) estimates family emigration by using primary school enrolment data and shows that in 2009-2016 period around 50 thousands young citizens with children left Croatia. Croatian employment service uses annual employer's survey to examine the extent of migration among employed, and shows that in 2016 around 20 thousands of employed persons emigrated from Croatia. Finally, Jurić (2017) implements a detailed on line survey among Croatian emigrants in Germany and shows that although economic factors are relevant for emigration decision, there is a prevalence of non economic factors as the most important motives of emigration for Croatian emigrants. In addition, an overall analysis of emigration trends from Croatia is given in Župarić-Ilijć (2016). Author emphasized that Croatian net migration balance significantly worsened with the onset of the global financial crisis and in particular after the accession to the EU, and argued that official Croatian migration data are underestimated and should be compared with destination country data but provided no such estimate. The only recent paper that quantifies potential migration flows from Croatia after the EU accession is Strielkowski W. et al. (2013) that applies vector error correction model on migration data from Croatia to Germany from 1993 until 2011 and extend the results to assess *ex ante* potential migration from Croatia to EU 15 after accession. Authors find that around 220 thousand residents from Croatia are expected to live in EU15 by 2016.[4] We extend this analysis in time, referring to the broader period, and analyzing the movements that were effectively observed after that Croatia joined the EU in 2013. The main contributions of our paper are threefold.

First, we construct indirect emigration flows from Croatia, following the EU accession. Currently, Croatian Bureau of Statistics (CBS) collects the data about migration flows from Croatian Ministry of Interior which records only persons that have registered the change in their country of usual residence with the Ministry. Following related literature contributions (Izquierdo, M. et al. (2014), Bertoli and Moraga (2013)) we assume that there are no clear incentives and benefits of registering in home country offices when emigrating, while on the

[4] Božić and Burić (2005) also analyze potential migration from Croatia, prior to the EU accession. Authors applied the Fassman-Hinterman micro-analytical model (developed in 1997 for the estimation of migration potential of Višegrad countries – Poland, Czech Republic, Slovakia, Hungary) to Croatia and concluded that Croatian medium-term migration potential is 460 thousand persons, probable migration potential is 92 thousand persons and the real migration potential is estimated at 14,700 persons.

other hand immigrants have an incentive to register when they arrive in the destination country, given that access to some basic social services in destination country (i.e. education and health) generally requires prior registration. Therefore, we assume that official emigration numbers from CBS could be underestimated and resort to the European Union destination countries national statistical offices to collect numbers of registered immigrants coming from Croatia. The differences are striking. Our indirect emigration estimates show that emigration from Croatia in the core EU countries following the EU accession is on average around 2.6 times higher compared to officially registered numbers in Croatia, with around 230 thousands people having left Croatia and settled in one of the analyzed core EU countries in 2013-2016 period.

Secondly, we show that although emigration flows in Croatia following the EU accession are sizeable, they are not an isolated case. Bulgaria and Romania also experienced proportionally similar population outflows since they became member states in 2007. CEE countries that joined the EU in 2004 also saw an increase in emigration rates towards the core EU countries, though to lower extent. Time series of indirect emigration flows from NMS show that higher emigration rates recorded after the EU accession persisted over the years. In other words, average emigration rate from NMS to the core EU countries in 2016 is on average equal or higher to the emigration rates in four years following the EU accession, which corroborates a strong persistency of the higher emigration rates.[5] Such trends raise several serious sustainability concerns for Croatia, which will become relevant in the medium term, since current population outflow to the core EU countries according to constructed indirect emigration flows is around 2% of population each year.

The third contribution of our paper refers to empirical analyses of main economic and non-economic determinants of migration flows from Croatia and other NMS to the core EU countries. We believe that their evaluation provides insights that are highly important for policymakers in order to shape and implement adequate and targeted policies to mitigate emigration flows. In our analysis of relevant migration determinants we employed a gravity model. Results obtained under alternative specifications and estimation strategies of gravity model show that the access to the single EU market (which resulted in an application of the principle of free movement of workers) was a main driver of migration flows in Croatia since 2013. However, current economic conditions and labour market indicators, together with demographic factors and prevalence of the corruption in the country also turned out significant

[5] That is 12 or 8 years following the EU accession.

in determination of migration flows between NMS and core EU countries, implying that there is a room for policymakers to alleviate the intensity of emigration pressures from Croatia.

The remainder of the paper is structured as follows: In Section 2 we describe in a detail major characteristics of recent Croatian emigration flows, firstly by discussing Croatia's official emigration figures and secondly by comparing official data with data on indirect emigration from Croatia collected from national statistical offices of the core EU destination countries. In Section 3 we present a comparative overview of the emigration experiences of other new EU member states following their EU accession. In Section 4 we provide a basic overview of gravity models and their applicability in studying migration issues and describe the variables used in the model. In Section 5 we present different specifications of the gravity models and discuss the results of the econometric analysis together with the robustness checks. In Section 6 we emphasized main conclusions.

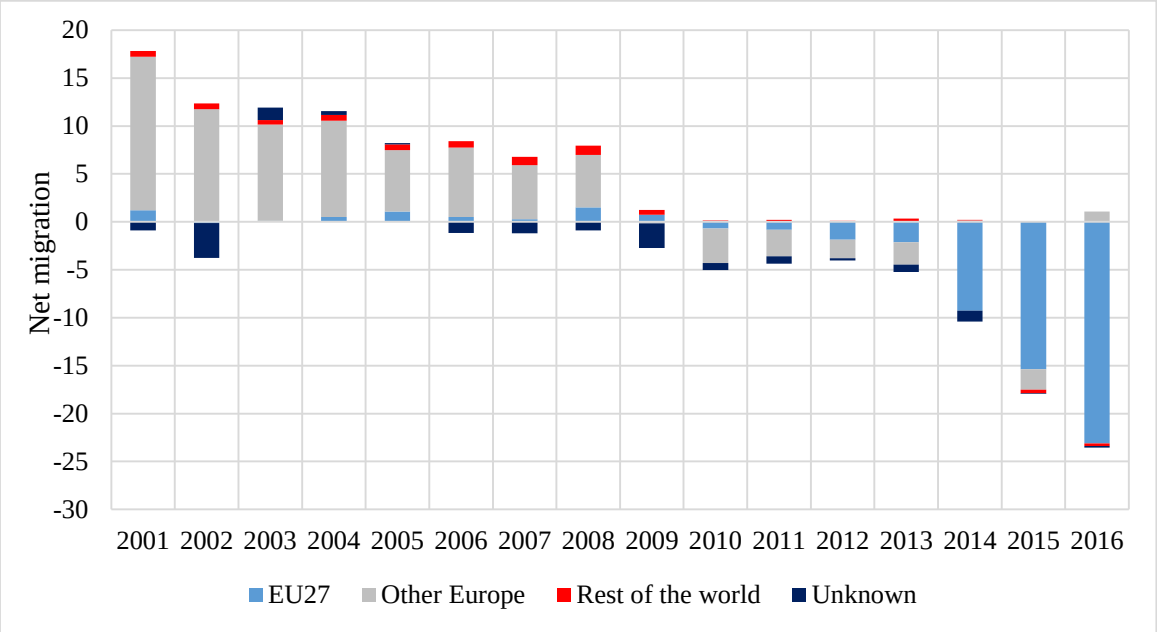
2. Demographic and geographical characteristics of Croatian emigrants

As a starting point, we take a deeper look at the official Croatian migration statistics, in order to improve our understanding of the migration dynamics in Croatia. Notwithstanding existent methodological issues, and taking into account that official Croatian migrations are under-reported, we believe that they could be systematically under-reported, which means that they still might contain some useful information about the underlying migration trends.

Looking at the big picture, we can see that prior to global financial crisis Croatia had a positive net migration balance. However, migration flows reversed at the onset of the global financial crisis (net migration balance turned negative). Until the EU accession, negative net migration remained relatively low and stable, with majority of migrants going to non-EU countries. After Croatia became a full member of the EU in July 2013 migration flows to EU clearly intensified (Figure 1.). Negative net migration balance increased five-fold in 2016, compared to the average balance in the years between the crisis and the EU accession.[6]

[6] At the time of writing this paper, 2016 is the last year for which CBS data are available.

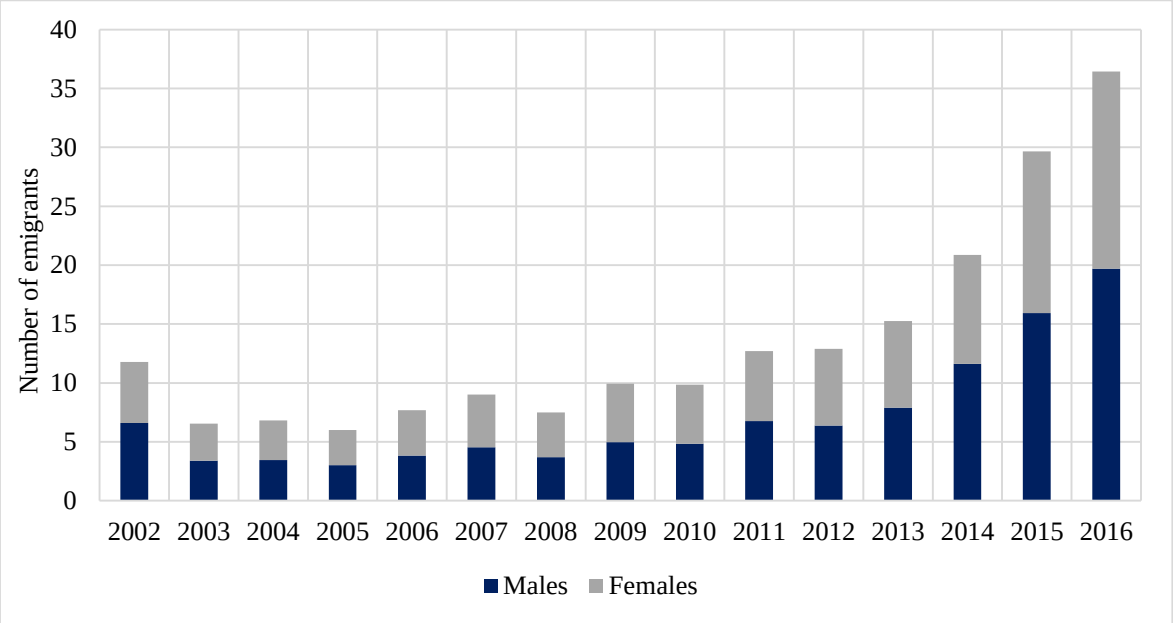
Figure 1. Net migration balance of Croatia between 2001 and 2016



Note: Net migration = Number of immigrants - number of emigrants, in thousands
Source: CBS

Available data also provide a basis for a simple demographic analysis of the Croatian emigrants. Numbers suggest that there is an almost equal share of male and female emigrants throughout the period, with the share of male emigrants slightly increasing at times of high migration, such as at the very beginning of the analyzed period (2002), or towards its end (2014-2016), when the EU emigration prevailed (Figure 2).

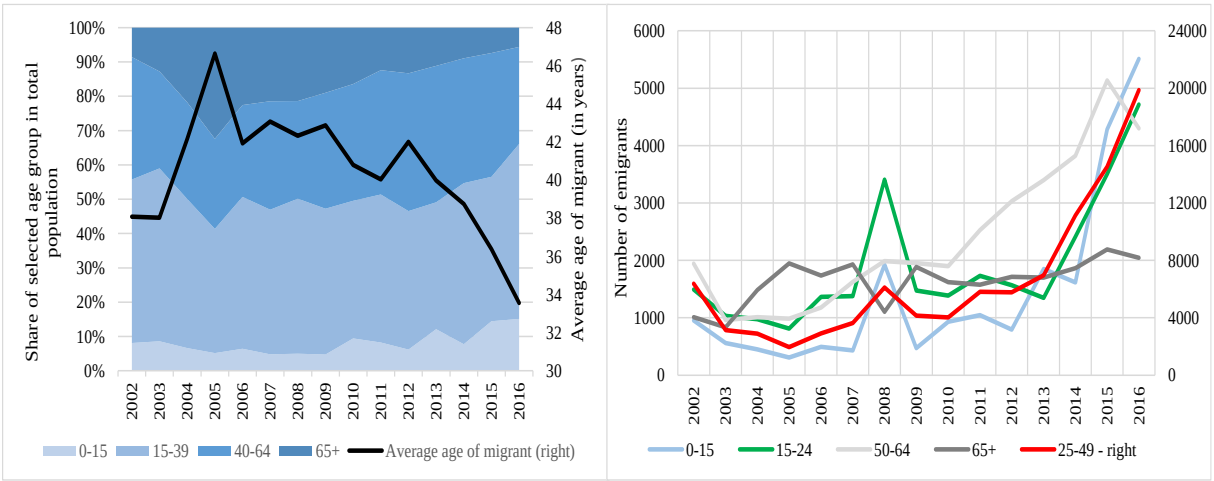
Figure 2. Structure of emigrants from Croatia by sex between 2002 and 2016



Note: In thousands
Source: CBS

Age structure of the emigrants suggests that there is a structural shift towards younger emigrants in the last emigration wave. Firstly, there is a striking increase in the number of youngest emigrants (Age 0-15), and secondly it appears that the average age of the migrants is acceleratingly decreasing. Our estimates show that the average age of emigrants in the period between 2001 and 2013 was 41.5 years, but dropped sharply over next three years and reached 33.6 years in 2016 (Figure 3.). These results are in line with Šonje (2018). The author estimates that in 2009-2016 period around 50 thousands young citizens with children left Croatia permanently. Estimations are based exclusively on households with children (obtained by comparison of expected and effective primary school enrolment) and are considered to represent irreversible emigration, based on assumption that child integration in system of destination countries strongly disincentives return migration. Another relatively interesting finding is a peculiar jump in emigration of people in the "pre-pension" age (50-64 years) that pre-dated the EU accession. Number of migrants in this age group started to rise in 2011 and increased steadily afterwards until 2016. This phenomenon could reflect a deteriorating prospects of older workforce in the crisis hit domestic labour market, combined with a gradual realization that public pensions, provided by the domestic pay-as-you-go system, characterized by the declining workers-to-pensioners ratio, probably won't sustain their desired level of standard of living after the retirement, but such hypothesis would have to be verified in future studies.

Figure 3. (a) Relative share of different age groups of emigrants and average age of emigrant between 2002 and 2016 (b) Number of emigrants by different age groups between 2002 and 2016

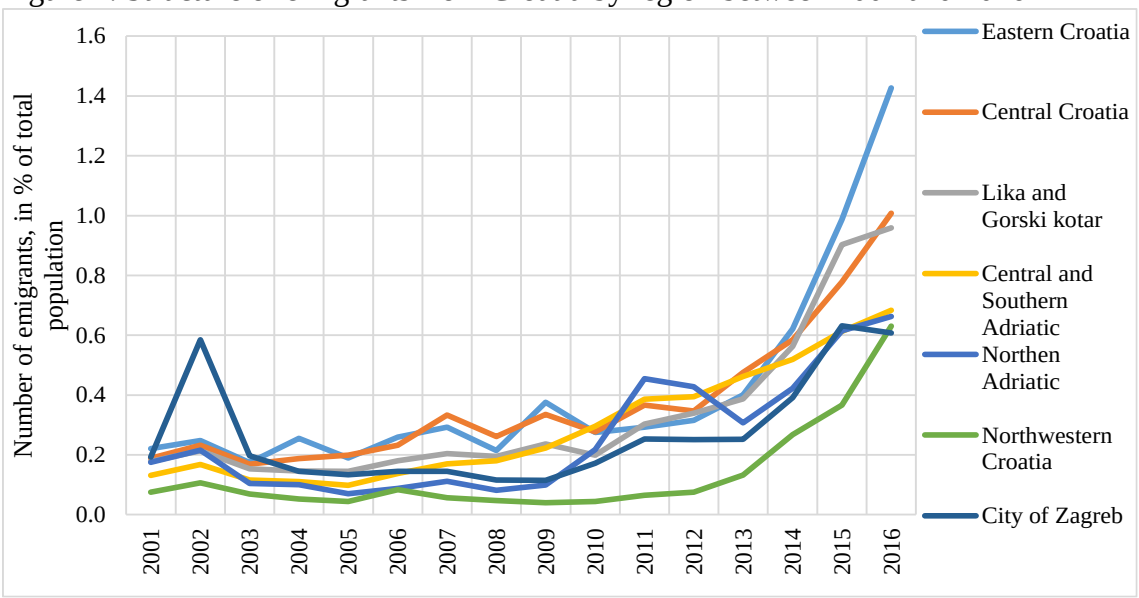


Source: CBS

Turning to the distribution of emigrants across Croatian regions, again there is a very clear compositional change, towards the end of the analyzed period, with a growing proportion of emigrants from less-developed regions. Following the relatively stable situation during the

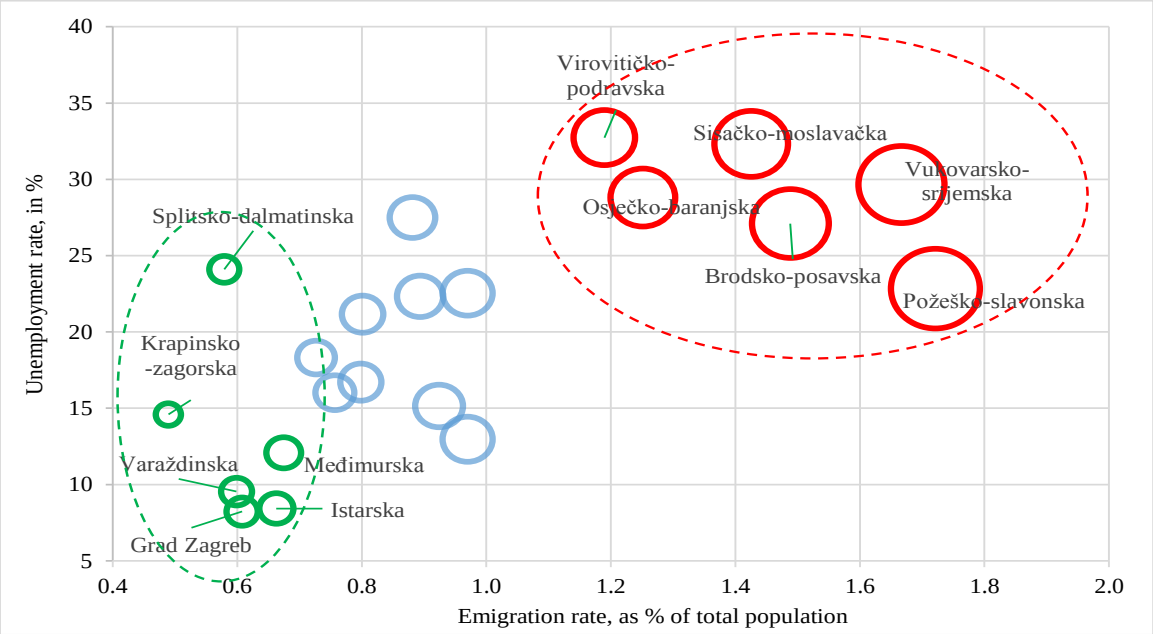
2000s, with an average share of emigrants in domestic population around 0.15%, deep and prolonged domestic recession, pushed up the emigration more or less gradually in almost all regions, and kept it slightly elevated (0.25%), compared to the pre-crisis levels. After the EU accession, there was a rapid and pronounced growth of emigration from all regions, albeit at a different pace. Emigration flows were much stronger in the regions with highest unemployment. As a result, by looking at the share of migrants in their population in 2016, Croatian regions can be broadly divided in two groups: one with the ratio of migrants to domestic population close to or above 1% (Eastern Croatia, Central Croatia, Lika and Gorski Kotar), and other, economically more advanced regions with the ratio of around 0.66% (Figure 4.). Therefore, even though emigration is a country-wide problem, the intensity of emigration flows is a much stronger phenomenon in the economically less developed regions (Figure 5.).

Figure 4. Structure of emigrants from Croatia by region between 2001 and 2016



Notes: Eastern Croatia encompasses Virovitičko-podravska, Požeško-slavonska, Brodsko-posavska, Osječko-baranjska and Vukovarsko-srijemska counties. Central Croatia encompasses Zagrebačka, Sisačko-moslavačka, Karlovačka and Bjelovarsko-bilogorska counties. Lika and Gorski kotar encompass Primorsko-goranska and Ličko-senjska counties. Central and Southern Adriatic encompass Zadarska, Šibensko-kninska, Splitsko-dalmatinska and Dubrovačko-neretvanska counties. Northen Adriatic refers to Istarska County. Northwestern Croatia encompass Krapinsko-zagorska, Varaždinska, Međimurska and Koprivničko-križevačka counties.
Source: CBS

Figure 5. Unemployment rate and share of emigrants by county in 2016

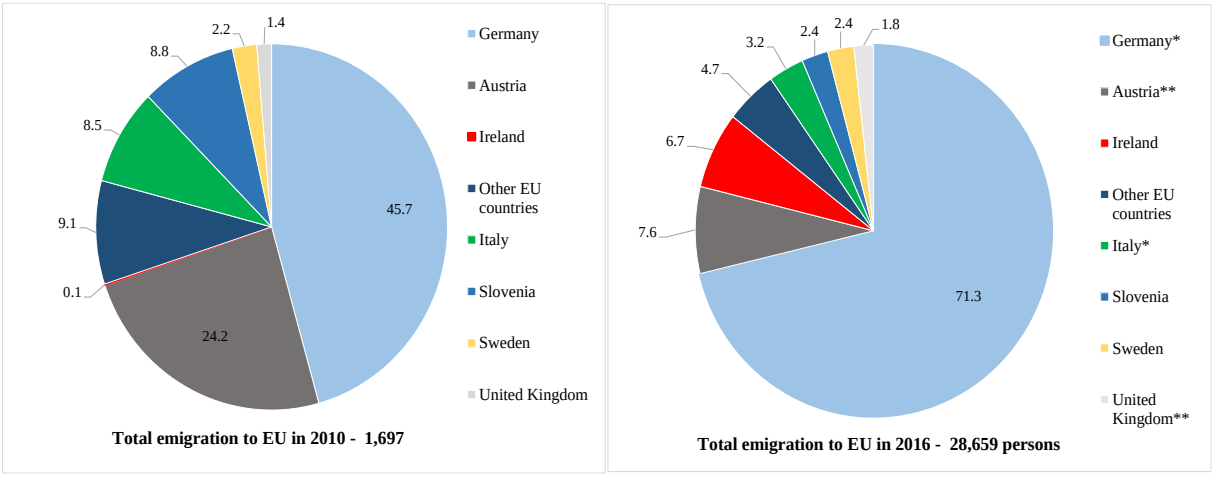


Note: The size of the circles correspond to the emigration rate, as % of total population of the county
Source: CBS

Finally, CBS data show that slightly more than 85% of emigrants from Croatia after the EU accession was directed to three EU countries; Germany, Austria and Ireland. Figure 6. compares main emigration destinations of Croatians in the EU before and after Croatian accession. Although total emigration flows towards the EU increased significantly, the composition of main destinations remained almost unchanged compared to the period before accession. The only exception is Ireland, since emigration to Ireland before the EU accession was almost nonexistent in Croatia, while in 2016 Ireland become third biggest destination for Croatian emigrants. In addition, the EU accession caused a change in relative position between Germany and Austria, two main emigration destinations, with even more emigrants going to Germany. This is a direct consequence of Austria's decision to extend the application of transitional provisions for Croatian citizens until June 2018. After 2018 we expect that share of Croatians heading towards Austria to increase, unless Austria prolongs the application of transitional provisions until 2020.[7]

[7] Prolongation of application of transitional provisions in the period from June 2018 until June 2020 is possible only in the case of serious disturbances for the Austrian labour market that would otherwise occur.

Figure 6. (a) Main EU emigration destinations for Croatians in 2010, (b) Main EU emigration destinations for Croatians in 2016



Note: *Germany and Italy lifted transitional provisions for Croatia in 2015. ** UK and Austria are applying transitional provisions until June 2018, with possible extension until 2020.
Source: CBS

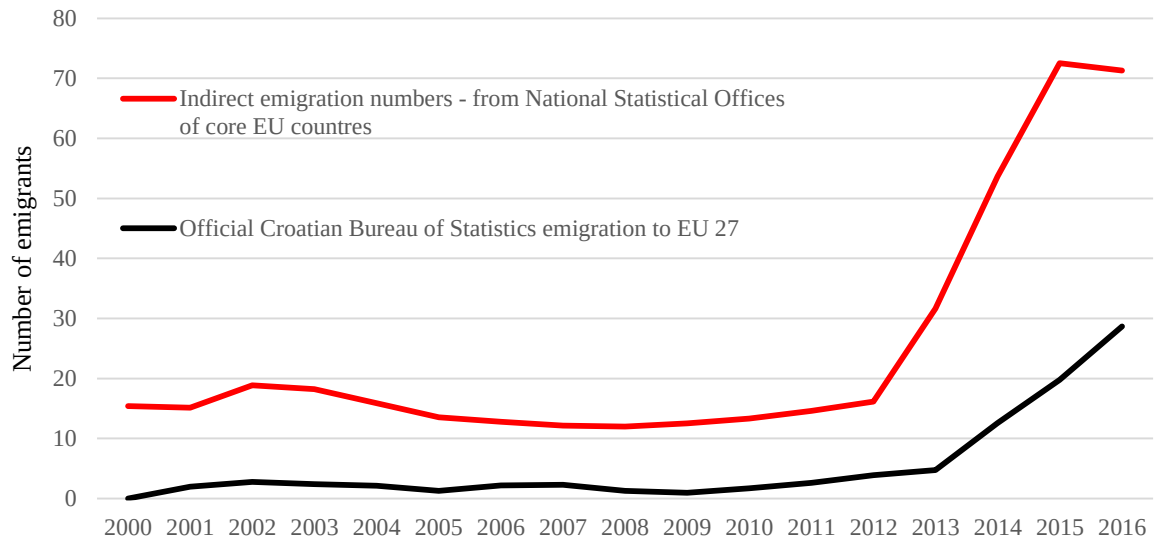
Croatian Bureau of Statistics detailed data about emigration presented so far are useful to analyze some main characteristics of Croatian emigrants. However, as previously explained in the Introduction, official number of emigrants published by the Croatian Bureau of Statistics is based on the people who voluntarily registered their departure with the authorities, while standard migration theory predicts that migrants are much more likely to register in the country of destination than in the country of origin.[8] Therefore, in addition, we construct an indirect emigration flow taking as a starting point the immigration statistics from national statistical offices of the following core EU countries: Germany, Denmark, Austria, Ireland, Belgium, Netherlands, Italy, Finland, Sweden, Luxembourg and United Kingdom. For UK and Ireland immigration statistics are not available, so we use individually appointed national insurance numbers (NINo) in the UK and personal public service numbers (PPS) in Ireland that are commonly used in the literature (Hazans and Philips (2011)). We analyze the period from 2000 until 2016 and for each year in the sample, we consult official immigration statistics of the selected core EU countries and take the number of immigrants coming from Croatia. Where available, we take the number of immigrants from Croatia according to the country of birth principle or country of previous residence principle. Our preferred choice is statistics that register immigrants according to the country of birth principle (as in Germany and Denmark)

[8] Illustrative case in point is a Polish example. Following the EU accession Poland experienced a strong emigration flows. At some point policymakers realized that the official statistics grossly underestimate the extent of emigration. As a result, research project has been initiated in Poland in order to properly estimate the true numbers. The upgraded and consolidated sources raised the official emigration numbers by a factor ten (Statistics Poland, 2011).

or country of previous residence principle (as in Netherlands, Italy, UK and Belgium), given that immigration flows registered according to citizenship principle (as in Sweden, Finland, Luxembourg and Austria) could be inaccurate since they also include migrants from Bosnia and Herzegovina (and other countries) having Croatian (or dual) citizenship.[9] According to Jurić (2017) survey of Croatian emigrants to Germany, around 20% of emigrants registered as Croatian citizens emigrated from Bosnia and Herzegovina. Jurić based its survey on Croatian emigrants in Germany, while in our sample, data for Germany are based on country of birth principle. However, given the dual citizenship issue, indirect emigration flows constructed resorting to the national statistical offices of core EU countries should be interpret as an upper bound for emigration outflows from Croatia. Detailed information about the construction of indirect emigration flow is given in Appendix A.

Comparison between constructed indirect emigration flow from Croatia based on data published by national statistical offices of the core EU countries and official Croatian Bureau of Statistics data are represented in the Figure 7. [10,11]

Figure 7. Indirect emigration flow from Croatia to the core EU countries, compared to the official emigration numbers to EU 27 countries



[9] For Ireland personal public service number the principle for registration of immigrants is not denoted.

[10] According to the Croatian Bureau of Statistics, national statistical offices of the selected core EU countries represent broadly around 90% of total emigration to the European Union from Croatia over the entire sample period, which makes them valid and representative indicator of total emigration flows towards the EU.

[11] We have also estimated total emigration flows from Croatia, by putting together (1) indirectly constructed emigration flows to the core EU countries and (2) Central Bureau of Statistics official emigration data for all other emigration destinations, i.e "the rest of the world". The same approach is followed in order to construct approximation of total immigration flows in Croatia. Calculation details of total net emigration are given in Appendix B. According to our discretional combination of different data sources, net emigration from Croatia is estimated to be around 155 thousands person in 2013-2016 period.

Note: Official Croatian Bureau of Statistics emigration number for emigration in EU 27. Core EU countries are represented by 11 countries, due to data availability: Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxembourg, Netherlands, Sweden and United Kingdom, in thousands.
Source: CBS, national statistical offices of the core EU countries

The differences in emigration outflows between two sources are striking. According to the indirect estimates of emigration, 230 thousands persons emigrated from Croatia to the core EU countries in the period from 2013-2016. On the other hand, official data point to the 61 thousand emigrants in 2013-2016 period that were directed towards the selected core EU countries, and 102 thousands of emigrants in total during the same time period. However, the difference between mirror statistics of Croatia and core EU destination countries is expected to decrease in the future. According to some media reports[12] Croatian Bureau of Statistics estimated that in 2017 around 80 thousand persons emigrated from Croatia, which is very close to the official numbers of mirror statistics of the core EU destination countries in 2015 and 2016. This could reflect the fact that by the end-2016 Croatian Tax Administration encouraged Croatian migrants to change their residency status with authorities in order to avoid double taxation of their income.[13] The threat of double taxation of income probably incentivized migrants to be more prompt in registering their departure and changing residence in their origin country offices.[14]

Overall, the discrepancies between mirror statistics of origin and destination countries are common in migration statistics and most other countries are also faced with similar challenges. Thus, in our analysis we will adopt the same principle for other NMS: Bulgaria, Romania, Poland, Czech Republic, Slovakia, Slovenia, Hungary, Latvia, Lithuania and Estonia and construct indirect emigration flows for these countries referring to the immigration statistics of national statistical offices of the core EU countries.

3. Migration flows in other New EU Member States after the EU accession

In this section, by looking into the emigration experience of other new EU members, we tried to gain additional insight about some additional characteristics of emigration flows caused by

[12] https://www.jutarnji.hr/vijesti/hrvatska/kolinda-opet-kritizirala-vladu-rekli-su-da-pretjerujem-kad-sam-rekla-da-smo-u-izvanrednom-stanju-nema-se-vise-vremena-treba-nam-konkretan-plan/7250496/

[13] At the beggining of 2017 Croatian government adopted the Ordinance for the implementation of the General Tax Act ("Official Gazette" n 30/17) that clarified the process of determination of residency status for tax purposes and induced migrants to register their change of residency within authorities to avoid double income taxation.

[14] CBS is constantly working on improving migration data sources, so part of the observed developments might reflect underlying methodological changes. For example, in 2011 CBS changed its definition of migrants from people who registered their departure/arrival to people who are absent from their usual place of residence in one year period.

the EU accession, such as the average structure of emigrants (according to main demographic attributes), stability of the flows, number of years after the accession needed to reach the plateau, likely duration of emigration wave and possible reversal points.

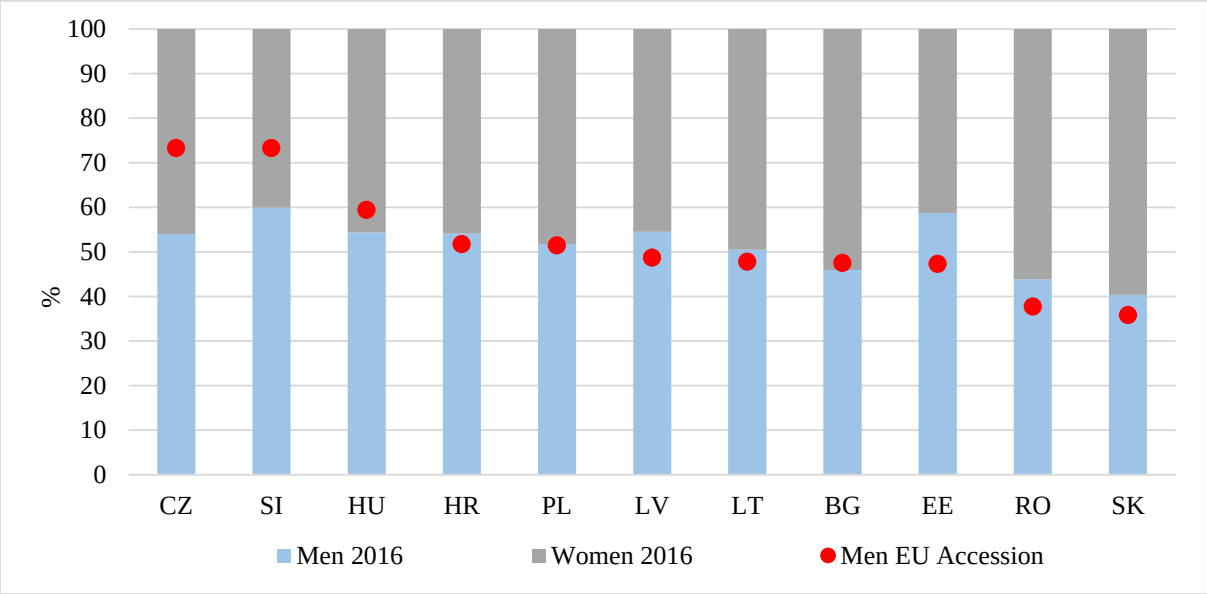
Accession of the Central and Eastern European countries to the EU can be considered as a kind of a large scale natural migration experiment. There was a huge difference between the level of economic development between the old EU member states and countries of Central and Eastern Europe. Yet, due to the "iron curtain" which separated these countries, there was basically no free migration between these two areas, the only exception being to a certain extent former Yugoslavia. Even though the countries of the Central and Eastern Europe underwent significant liberalisation in the 1990s, proper opening of the gates happened only after the accession to the EU.

Several studies (Fouarge and Ester, 2007; Zaiceva and Zimmermann, 2008; and Drinkwater, 2003) confirmed that the proportion of individuals intending to emigrate after the 2004 enlargement was larger in the new Member States than in the old Member States, contrary to the situation before the enlargement when there was a higher incentive to migrate in the old member states. This clearly shows that the EU accession had a direct increasing effect on the propensity of people to emigrate in countries that were newcomers to the single market.

Detailed migration data from national statistical offices of the new EU Member States, allow us to analyze the main attributes of emigrants from NMS in order to look for some substantial differences or similarities in migration flows between countries. According to Figure 8., new MS recorded on average balanced male/female emigration flows. For most countries in the sample, (Hungary, Croatia, Poland, Bulgaria and Baltics) equality between male and female migration outflows is present before and after the EU accession. On other hand, imbalances that existed prior to the EU accession dissipated with the intensification of migration flows after the EU accession.[15]

[15] For example in Czech Republic share of males decreased from 70% of total emigration flows prior to the EU accession to 54% of total emigration flows in 2016.

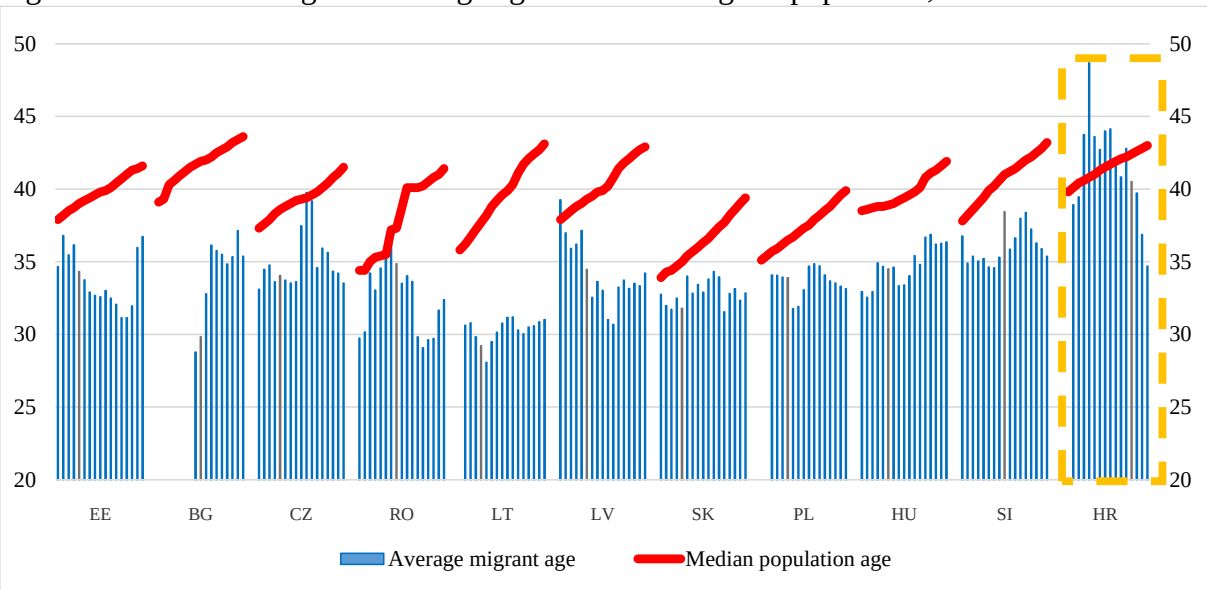
Figure 8. New MS emigrants by sex in 2016 and in year of the EU accession



Sources: CBS, national statistical offices and Eurostat

Data about the age structure of emigrants does not follow any singular path across countries. For some countries in the sample the average age of emigrant increased after the EU accession while for others it decreased. However, for all countries in the sample, the average age of emigrant in 2016 is similar, ranging broadly from low to mid-thirties. At the same time, Figure 9. shows that the median age of total population is rapidly increasing, which in most countries widens the gap between the average population and average emigrant age. This situation makes the emigration outflows of relatively younger citizens even more concerning in terms of long-term sustainability of social services (such as public pensions and health).

Figure 9. New MS emigrants average age and median age of population, 2000-2016



Sources: CBS, national statistical offices and Eurostat; authors' calculations

Comparison of top emigration destination for emigrants coming from NMS reveals that Germany is ranked among top 3 emigration destinations for all countries in the sample. Similar to Croatian main emigration destinations, Austria and United Kingdom are second most frequent EU emigrant's destinations for emigrants from NMS in 2016 (Table 1.).[16]

Table 1. Main EU emigration destinations for NMS in 2016 (in % of total EU emigration)

Origin Country	**Top 3 emigration destinations in EU, as % of total EU emigration**		
Bulgaria	na	na	na
Croatia	Germany, 71%	Austria, 8%	Ireland, 7%
Czech Republic	Slovakia, 60%	Germany, 9%	Poland, 6%
Estonia	Finland, 63%	United Kingdom, 8%	Germany, 7%
Hungary	Germany, 32%	Austria, 27%	United Kingdom, 17%
Latvia	na	na	na
Lithuania	United Kingdom, 60%	Ireland, 11%	Germany, 10%
Poland	Germany, 43%	United Kingdom, 28%	Netherlands, 8%
Romania*	Spain, 24%	Germany, 17%	Italy, 16%
Slovakia	Czech Republic, 38%	Austria, 27%	Germany, 10%
Slovenia	Germany, 27%	Austria, 27%	Croatia, 12%

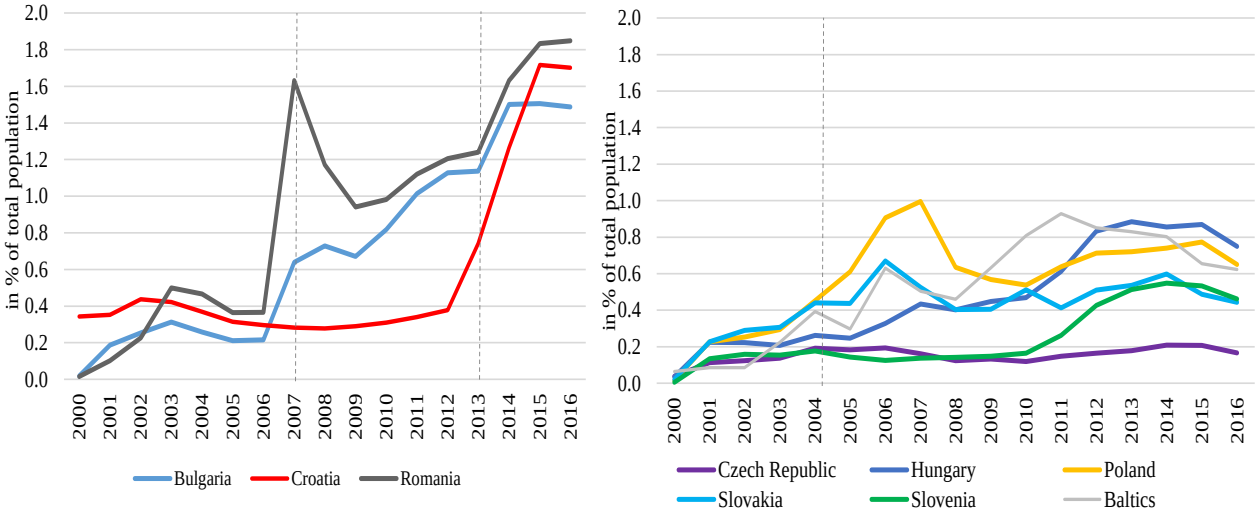
*percentage of total emigration
Sources: CBS, national statistical offices and Eurostat

Given that similar core EU countries dominate as a main emigration destinations to Europe for NMS, this corroborates our decision to construct the indirect emigration flows for NMS by resorting to the national statistical offices of core EU countries, as we did for Croatia. Thus, in remaining part of this Section we use data about indirect emigration flows from NMS to the core EU countries and employ it to compare dynamics and intensity of migration outflows between different NMS.

[16] Nevertheless, there are some peculiarities among main emigration destinations between NMS. Finland was main destination for emigrants from Estonia, and Spain for emigrants from Romania in 2016 reflecting their cultural and historical linkages.

Comparison of the indirect emigration flows from other NMS to the core EU countries shows that intensity of emigration flows from Croatia following the EU accession is not isolated in size given the experience of other economically less developed Member States (Bulgaria and Romania), but also that emigration flows from NMS following the EU accession in 2004 were significantly lower (Figure 10.). Another important pattern arises from the analysis of NMS emigration flows, since it is visible that rise in average migration rate towards the core EU countries following EU accession is not a temporary, one-off reaction to accession to the common EU market. According to Figure 11., average emigration rate in 2016 is equal to, or higher than average emigration rate in four years following the EU accession, pointing to the persistence of intensive emigration flows.[17]

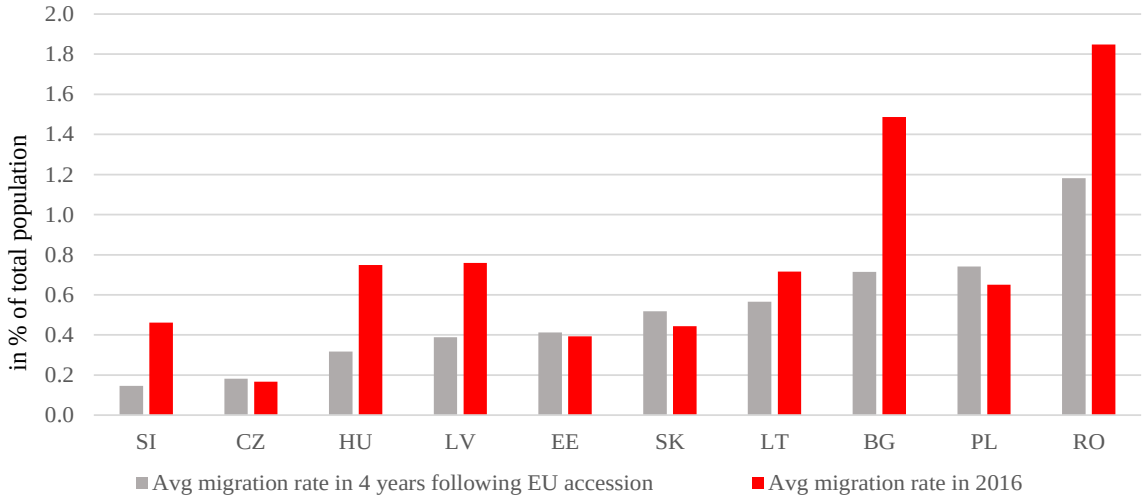
Figure 10. Indirect emigration flows from NMS to the core EU countries



Note: Dashed lines denote the years of EU accession.
Source: National statistical offices of the core EU countries

[17] However, all member states but Croatia gained the access to the common EU market prior to the onset of the global crisis. Only Croatia joined the EU after six consecutive years of economic distress. This could have created an additional pressure on migration outflows from Croatia. However, proper evaluation of this phenomena will be possible only with some time delay.

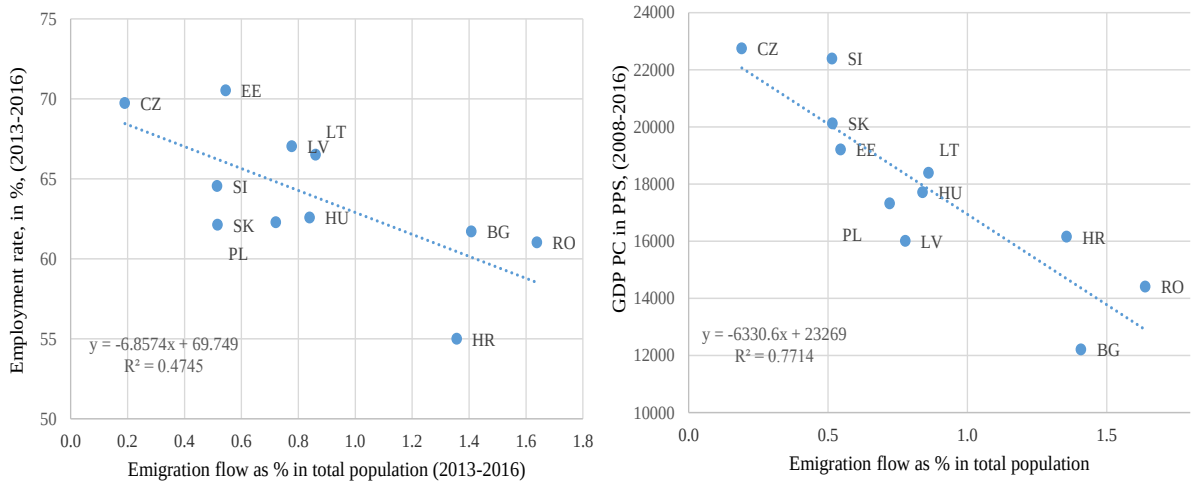
Figure 11. Indirect emigration flows of NMS in time



Source: National statistical offices of the core EU countries

A careful consideration must also be given to the influence of economic cycle on emigration. Persistence of increased emigration flows from NMS to core EU countries in a decade following the EU accession could reflect the impact of economic crisis that started in 2009 on emigration decisions. Figure 12., panel (a) and (b) show that economic conditions are indeed related to intensity of emigration.

Figure 12. (a) and (b) Average emigration flow, as % in total population from 2011 to 2016, compared to average unemployment rate (a) and average GDP PC in PPS (b).



Source: Eurostat and national statistical offices of the core EU countries

The NMS had rather different crisis and post-crisis experiences. Poland experienced no recession but faced sizable emigration flows, some countries recovered rather quickly after the initial shock (the Baltics, Slovakia), while others experienced double-dip recession (Slovenia) or a very deep and prolonged recession (Croatia). In addition, economic slack had a global

nature, i.e. the worsening of economic conditions was not restricted only to NMS but was also present in the most of the core EU countries thus altering to some extent the relative benefits between origin and destination countries. As a result, simple comparison of various economic performance indicators and intensity of emigration flows can provide only partial and limited insight about the relative importance of different economic and non-economic determinants of migration flows. In the next Section we thus resorted to formal econometric analysis using gravity model to examine the main determinants of emigration in Croatia and other new EU Member States to the core EU countries in 2000-2016 period.

4. Gravity model of migration

Application of Newtonian physics in economics started with Tinbergen (1962) that used gravity model to explain international trade flows. Flowerdew and Salt (1979) introduced gravity model in the context of migration analysis, which soon become widely used to analyze different migration determinants. However, some authors claim that first application of gravity model to explain migration patterns goes back to Ravenstein who used it to analyze migration patterns in 19th century UK (Anderson, 2011).

Notwithstanding their long history, gravity models have experienced a revival since early 2000s, due to much improved bilateral migration data (Ramos, 2016) and the emergence of statistical theories appropriate for studying spatial interaction. The reasons for the popularity of gravity models in migration analysis are trifold: intuitive consistency with migration theories; ease of estimation in its simplest form; goodness of fit in most applications. (Poot et al., 2016). Gravity models assume migration flows between the origin country *i* and destination country *j* are proportional to the product of their populations (which are in migration context used as proxies for the concept of mass from standard gravity model) and inversely proportional to the distance between them.

$$M_{ij} = \alpha_0 P_i^{\alpha_1} P_j^{\alpha_2} D_{ij}^{\alpha_3} \quad (1)$$

Gravity models in their original form are purely non-theoretical, so they are usually enriched with different variables capturing traditional pull and push factors of migration following human capital theory approach to migration developed by Sjaastad (1962) and Harris and Todaro (1970). The authors consider migration decision as a complex form of investment in human capital that is influenced by future expected income levels and relative probability of

employment opportunities between destination and origin countries.[18] More formal arguments for use of extended vector of explanatory variables in migration analysis can be derived from Random utility model introduced in migration literature by Borjas (1987) and Grogger and Hanson (2011) that provided micro foundations in context of migration analysis. Based on these considerations, gravity model used in this paper is augmented by additional set of explanatory variables covering different economic, demographic and educational factors, as well as the level of corruption incidence in the country.

The dependent variable is the flow of migrants from NMS to the core EU country in each year for 2000-2016 period. In order to trace accurately emigration flows, we rely on immigration statistics of the selected receiving countries as available from national statistical offices of the core EU countries as explained in Section 2.

Explanatory variables used in the analysis are related to traditional pull and push factors of migration presented in literature. Basic specification of our model contains GDP per capita in purchasing power parity of origin and destination country, relative size of populations between countries based on Eurostat data and geographical distance between capitals of destination and origin countries downloaded from CEPII's geo-distance database. Moreover, our basic specification contains also the variable capturing the effect of the EU accession. The variable is based on transitional provisions on the free movement of workers from new EU Member States following the EU enlargement in 2004, 2007 and 2013, as reported by European Commission. Following the EU enlargement, several core EU states decided to apply transitional provisions on the free movement of workers from NMS, and effectively postpone the full liberalization of their labour markets. Thus for each pair of origin and destination countries in the sample, the dummy variable associated to transitional provisions takes value 1 in the year that core EU country lifted its restrictions to free movement of workers coming from respective NMS.

In the extended version of our model we include additional variables accounting for some additional characteristics of origin and destination countries. Following Lamberty (2015) we use data from World Governance Index (WGI) database and include corruption index for origin and destination country as explanatory variables in our analysis, to evaluate if relative differences in corruption between countries are relevant factor in explaining observed

[18] Income levels are usually approximated by GDP per capita in PPP terms given that wage data are not comparable across countries.

emigration patterns. Among different WGI indexes, evaluating quality of governance and institutions from different aspects, we have opted for inclusion of corruption index in our main specification following Poprawe (2015) who shows that corruption increase emigration since it retards economic development of the country and creates unsecure life and economic environment. [19,20] We also evaluate impact of origin country population attributes on migration outflows. Following Sprenger (2013) we include the share of tertiary educated persons in total population of origin country to test whether higher emigration flows are associated with higher skill level. Impact of demographic characteristics of origin population on emigration flows is measured trough share of young people (persons aged 20-34) in total population of origin country as an approximation of potential emigration pool.

Finally, we include alternative variables for economic performance of the country. We find this relevant since Bertoli and Moraga (2013) and Beine et al. (2013) argue that relative difference in GDP per capita in purchasing power standard represents a difference in level of economic development between two countries, which is relevant for emigration decision, but that current and future economic prospects, not captured by relative GDP per capita in PPS, are also important. Authors argue that differences in GDP per capita in PPS are already captured by inclusion of origin and destination fixed effects. Additionally, economic distress that arises during the crisis period causes changes in future economic prospects are not timely reflected in level of GDP per capita in PPS. Therefore, in extended specification of our model we substitute GDP per capita in PPS with short-term indicators of economic activity - employment rate and output gap of origin and destination country.[21] These variables capture how changing growth prospects and labour market opportunities affect emigration across countries.[22]

[19] Vukovic (2017) shows that Croatian economy is permeated by corruption since political system is characterized by systematic corruption, on national and local level. Also, WGI corruption index data point to substantial gap in corruption incidence between most NMS and core EU countries in general.

[20] As a main alternative to the corruption index we could have used governance index from the same database. Estimation results obtained with governance index as independent variable are shown in Appendix C.

[21] We opt for exclusion of GDP per capita in PPS from extended model specification since inclusion of GDP PC in PPS and short term economic indicators could result in multicollinearity. Instead, differences in level of economic development are captured by origin and destination fixed effects.

[22] Changes in attractiveness of alternative destinations over time is defined as multilateral resistance to migration by Bertoli and Moraga (2013) analogous to Anderson and van Wincoop (2004) that define the concept of multilateral resistance to trade. Bertoli and Moraga (2013) stress that migration decisions do not depend on characteristics of origin and destination countries exclusively, but are also influenced by relative attractiveness of alternative destinations. Authors show that proper assessment of multilateral resistance to migration would require application of common correlated effects (CCE) estimator as proposed by Pasaren (2006). However, our dataset does not contain required longitudinal dimension necessary for application of CCE estimator.

Detailed descriptions of all variables and respective data sources are provided in Appendix A.

In order to evaluate the main determinants of migration flows from NMS into the core EU countries we apply Poisson pseudo maximum likelihood estimator. Numerous literature contributions examine the main drivers of migration by using fixed effects model as a baseline methodology.[23] However, fixed effect model does not allow for estimation of variables that are constant in time (such as distance between two countries). Moreover, Santos-Silva and Tenreyro (2006) in their paper show that parameters in log-linearized models estimated by OLS in presence of heteroscedasticity could lead to biased estimates. Authors alternatively propose application of Poisson pseudo maximum likelihood (PPML) estimator and argue that PPML estimator is more suitable, given its consistency in presence of heteroscedasticity. Moreover, PPML estimator will allow to properly account for zero migration flows between two countries since dependent variable in PPML is not in logarithm but is assumed to take positive integer values. Given this advantages of PPML estimator over standard panel fixed effects estimator we transform our basic gravity model from equation (1) and extend it by additional explanatory variables:

$$m_{ijt} = \beta \log(X_{it}) + \gamma \log(Y_{jt}) + \delta_i + \vartheta_j + \varepsilon_{ijt} \qquad (2)$$

where m_{ijt} represents migration from origin country i into destination country j in a year t, $X_{it}$is a vector of explanatory variables characteristic for origin country economic, political, geographical and demographic factors, Y_{jt} is vector of explanatory variables representing destination country characteristics in time and $\delta_i \; and \; \vartheta_j$ are respectively origin and destination country specific effects.

5. Results – main determinants of migration

The main results of the estimation of equation (2) using PPML estimator are presented in Table 2. According to the results of the baseline model, population and distance parameters are in line with gravity model predictions. An increase in distance between destination and origin country by 1% will decrease emigration flows by -1.5%, all other factors being equal, confirming theoretical predictions of standard gravity model implying that migration flows between two countries are inversely proportional to the distance between them. This interesting result

[23] Detailed overview about different estimation strategies and models used in assessment of impact of EU accession for CEE countries in 2004 is given in European Integration Consortium Final Report (2009).

suggests that importance of transportation and information costs that are approximated with physical distance between countries still remains relevant in migration decision irrespective of decrease in transportation costs and development of internet compared to rather different world around the time of pioneer application of gravity models in migration analysis in late 1970s. Positive coefficient associated to the relative difference between population of destination and origin country suggests that bigger countries in terms of population have more intensive migration flows. However this result is not statistically significant. Secondly, our baseline model shows GDP per capita in PPS in destination country increases migration flows directed toward the country, confirming the theories arguing that positive difference in level of economic conditions will increase emigration flows from origin to destination country. Estimated parameters show that an increase in GDP per capita in PPS in destination country by 1% will lead to an increase in emigration flows from origin to destination country by 2.2%, assuming all other factors remain unchanged. On other hand, the coefficients associated to GDP PC in PPS in origin country are not statistically significant.

Finally, the variable transitional provisions, measuring the impact of the accession to the principle of free movement of persons across borders going from new EU Member States (origin countries) into the core EU (destination countries) is statistically significant and large in its value, increasing migration flow by 40%.[24]

[24] Changes in the predicted emigration flow for dummy variable representing transitional provisions are calulated according to the formula $e^{\beta_{tp}}$-1.

Table 2. Determinants of emigration flows from new EU Member States to the core EU countries between 2000 and 2016, Poisson pseudo maximum likelihood estimator.

	Model 1 (Baseline)	Model 2
distance	-1.48***	-1.54***
	(0.00)	(0.00)
population	-1.41	5.85***
	(0.35)	(0.00)
gdp pc in pps (origin)	0.27	
	(0.46)	
gdp pc in pps (destination)	2.15**	
	(0.01)	
transitional provisions	0.34***	0.46***
	(0.00)	(0.00)
employment rate (origin)		-5.04***
		(0.00)
employment rate (destination)		8.15***
		(0.00)
output gap (origin)		3.07
		(0.2)
output gap (destination)		2.03**
		(0.04)
corruption index (origin)		-1.66***
		(0.00)
corruption index (destination)		2.46*
		(0.09)
share of youth (20-34) origin		0.19
		(0.8)
share of tertiary educated (origin)		0.58*
		(0.07)
cons	0.23	5.51

Note: *, ** and *** refer to 10%, 5% and 1% statistical significance levels, respectively. P-values are in parenthesis. All specifications include origin and destination fixed effects dummies. Parameters associated to output gap for origin and destination country are multiplied by 100 since the output gap enters the model specification in levels instead of being transformed into logarithms, due to negative values.
Source: authors' elaboration based on national statistical offices of the core EU countries immigration data and on the data presented in Section 4 and Appendix A.

The results of extended model specification (Model 2) show that short-term economic indicators represented by different labour market indicators and cyclical position of the economy of origin and destination countries are statistically significant and thus affecting emigration decision. An increase in employment opportunities in destination country by 1% will increase emigration flows from origin to destination countries for 8.2%, all other factors being equal. At the same time, an increase in employment opportunities in origin country by 1% will decrease emigration flows by 5%. Results indicate that cyclical position of the economy is also important for migration decisions. An improvement in cyclical position of destination

country by 1 percentage point (i.e. positive output gap) will increase emigration flows from origin to destination countries by 3%, if all other factors remain constant.

Moreover, we find importance of the level of education of the workforce in the origin country, since the coefficient associated to the variable denoting the share of tertiary educated in total population of origin country assumes positive, significant value. The estimates imply that an increase in share of tertiary educated in origin population will increase migration flows from origin country by 0.6%. The share of young population in origin country is also found to be positively correlated with intensity of migration from origin country but the results are not statistically significant. Finally, difference in corruption between destination and origin countries is also significant for emigration decision. An increase in corruption index in origin country by 1% (an increase in WGI corruption index represents a decrease of level of corruption in the economy, given the construction of corruption index) will lead to lower emigration from origin country by 1.7%. At the same time, an increase in corruption index of destination country by 1% (implying lower corruption level in destination country) will increase emigration flows from origin to destination country on average by 2.5%, all other factors being equal.

As a final step in our analysis, we compare results of extended model specification with the baseline model specification and confirm the relevance of gravity model predictions for migration flows. The importance of EU accession, measured trough transitional provisions dummy variable again proved statistically significant and large in its value, suggesting that the EU accession could raise emigration flows by 60%, if all other factors remain unchanged. Overall, baseline and extended model specification results show that the possibility of free movement of people across borders gained with the EU accession is the main trigger of intensification of emigration flows from NMS into the core EU countries. However, the new, higher level of emigration flows from NMS towards the core EU countries following the EU accession differs between countries ranging from 0.2% of population as in Czech Republic to almost 2% of population in Romania. According to the estimates of the gravity model, apart from the EU accession, significant determinants in explaining the magnitude of migration outflows are represented by the characteristics of origin country populations itself, economic development and performance of short term economic indicators and level of institutional quality assessed trough corruption incidence of both origin (NMS) and destination countries (the core EU).

5.1. Robustness checks

In addition to static estimation models, as a robustness check we also estimate dynamic model. We apply Arellano and Bond (1991) and Blundell and Bond (1998) generalized method of moments estimator that is suitable for datasets characterized by short-time periods and large cross sectional dimension with endogenous independent variable and in presence of fixed effects and heteroscedasticity and autocorrelation within observations. Inclusion of lagged dependent variable is also relevant for assessment of network effect on emigration decision; since lagged migration flow can be interpreted as network approximation. Controlling for network effect is important since networks offer support and additional information set for migrants reducing migration costs and associated risks (Beine, 2009). In line with previous model specifications, the dynamic model also contains origin dummies and destination dummies to take into account all unobservable time invariant origin and destination specific variables that were not captured by set of variables included in the model but are relevant for migration decision and intensity of migration flows. The results of dynamic model corroborate the main findings from the previous section. The estimates confirm the importance of gravity model variables in determination of emigration flows. Moreover, the EU accession assessed trough transitional provisions variable again resulted as sizable and significant, increasing average emigration flows by 30%. Finally, we confirm the importance of short-term economic conditions – employment opportunities in origin country and changes in cyclical economic position in destination country as determinants of migration flows. Contrary to the static model specification, the impacts of educational level of population in the origin country and degree of prevalence of corruption in the economy have expected signs, but are not statistically significant. The results of dynamic model specification are presented in Appendix C.

6. Conclusion

This paper aimed to clarify some basic facts about dynamics and main determinants of emigration from Croatia following the EU accession. To that purpose, extensive data analysis was conducted, capturing and comparing different emigration data sources. Further, application of panel gravity model applied to joint Croatian and other NMS indirect emigration data enabled us to detect and discuss the main determinates of emigration from Croatia and other NMS to the core EU countries and their importance in making decisions about emigration.

As a first contribution to the discussion of the issue of current emigration wave in Croatia, we use mirror statistics from core EU national statistical offices and compare them to the official emigration numbers of CBS. Construction of alternative emigration dataset using immigration data from national statistical offices of the core EU countries showed that emigration flows from Croatia following the EU accession are on average 2.6 times higher compared to official statistical data, amounting to 230 thousands of people leaving Croatia in the 2013-2016 period. Similar proportional population outflows were observed in less developed new Member States following their EU accession (Romania and Bulgaria), while new Member States from the initial wave of enlargement experienced less pronounced rise in their emigration flows.

Analysis of detailed migration data available at national statistical offices of the new EU Member States statistical offices showed that average characteristics of emigrants from NMS are similar across countries and point to the balanced emigration with respect to the sex. Main destination country for most countries in the sample was Germany. Finally, data also show that the average emigrant from NMS in 2016 was between 31 and 37 years old, pointing that emigration affects young part of the population. Emigration of mostly young citizens is indisputably a human capital loss for origin countries. However, long – term overall effects of emigration flows on origin countries should be interpreted with caution. Emigration leads to improvement of knowledge and skills of emigrants, given that their skills increase due to exposure to international competition, instead of being gradually deteriorated on low capacity domestic labour market. In case of reversed migration this can result in brain gain for origin economies. Moreover, effect of migration on labour market of origin countries is also twofold. According to the extensive migration literature (Thaut, 2009), employment opportunities and wages of those who stay in origin countries increase and unemployment rate decreases, causing the activation of long-term unemployed people. On other hand, labour market shortages in some sectors inevitably arise, and sustainability of public pensions and other social service are threatened. The overall effects will depend on synchronization of educational policies with origin country labour market requirements, overall degree of economic development and future economic performance in origin country.

In fact, the analysis of main determinants of migration showed the most significant factor in explaining emigration flows between NMS and the core EU countries is the accession to principle of free movement of workers obtained by EU accession that increased emigration flows in the range from 30% to 60%. However, estimation of the gravity model revealed that there exist other significant determinants in explaining migration outflows, such as: the

characteristics of origin country populations itself, economic development, performance of short-term economic indicators and level of institutional quality assessed trough the corruption incidence of both origin (NMS) and destination countries (the core EU). These findings imply that policies that promote broad and solid economic development can influence emigration flows which raises several implications for policymakers.

Emigration phenomena will probably have strong impact on Croatian economy in the medium-run. Accordingly, we would like to emphasise the importance of further research in this field. Potential research topics encompass the assessment of the impact of the last emigration wave on the potential growth prospects of the Croatian economy, the effect of increasing remittances on the Croatian economy, sustainability of the current setup of social policies (pension funds, health system, new infrastructure investment, existing infrastructure maintenance), required immigration flows in order to alleviate negative emigration consequences, and finally the implications of emigration flows for the conduct of monetary, fiscal and structural policy in the broadest sense.

Literature

Alvarez-Plata, P., Brücker, H. and Siliverstovs B. (2003): Potential Migration from Central and Eastern Europe into the EU-15 – An Update, Report for the European Commission, DG Employment, Social Affairs and Equal Opportunities, Brussels.

Anderson, James E., (2011): The Gravity Model, Annual Review of Economics, Annual Reviews, vol. 3(1), pp. 133-160, 09

Arellano, M., and Bond S. (1991): Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, Review of Economic Studies, 58, pp. 277-297.

Balan, M. and Vasile, V. (2013): Gravity model application to estimate Romanian migration size, Knowledge horizons – Volume 5, no. 2/2013

Beine, M., Bertoli, S., and Fernandez-Huertas Moraga, J. (2016): A practitioners' guide to gravity models of international migration, The World Economy, 39(4), pp.496-512

Beine, M., Bourgeon, P., and Bricongne, J.C. (2017): Aggregate Fluctuations and International Migration, CESifo Working Paper Series 4379, CESifo Group Munich

Beine, M., Docquier, F. and Ozden, C.(2009): Diasporas, Policy Research Working Paper Series4984, The World Bank

Bertoli, S., Brücker, H. and Fernández-Huertas Moraga, J. (2013): The European Crisis and Migration to Germany: Expectations and the Diversion of Migration Flows, IZA Discussion Papers 7170, Institute for the Study of Labor (IZA).

Blundell, R., and S. Bond (1998): Initial conditions and moment restrictions in dynamic panel data models, Journal of Econometrics, 87, pp. 115-143

Borjas, G. J. (1987): Self-Selection and the Earnings of Immigrants The American Economic Review, Vol. 77, No. 4 (Sep., 1987), pp. 531-553

Božić, S. and Burić B. (2005): Migracijski potencijal Hrvatske – mikroanalitički aspekti. Migracijske i etničke teme, 21 (1-2), pp. 9-33

Brücker, H., Baas, T., Beleva, I., Bertoli, S., Boeri, T., Damelang, A., Duval, L., Hauptmann, A., Fihel, A., Huber, P., Iara, A., Ivlevs, A., Jahn, E. J., Kaczmarczyk, P., Landesmann, M. E., Mackiewicz-Lyziak, J., Makovec, M., Monti, P., Nowotny, K., Okolski, M., Richter, S., Upward, R., Vidovic, H., Wolf, K., Wolfeil, N., Wright, P., Zaiga, K. and Zylicz, A. (2009): Labour mobility within the EU in the context of enlargement and the functioning of the transitional arrangements, European Integration Consortium Final Report. Nuremberg

Dedeoğlu, D. and Deniz Genç, H. (2017): Turkish migration to Europe: a modified gravity model analysis, IZA Journal of Development and Migration, 7:17

Drinkwater, S., Levine, P., Lotti, E. and Pearlman, J. (2003): The Economic Impact of Migration: A Survey, University of Surrey, Discussion Papers in Economics, DP 01/03

Flowerdew, R. and Salt, J. (1979): Migration between labour market areas in Great Britain, 1970–1971, Journal Regional Studies, Volume 13, 1979 - Issue 2

Fouarge, D. and Ester, P. (2007): Factors determining international and regional Migration in Europe. European Foundation for the Improvement of Living and Working Conditions, Dublin.

Galgóczi, B. and Leschke, J. (2014): Post-Enlargement Intra-EU Labour Mobility Under Stress Test, Intereconomics 49 (3), pp. 152–158.

Grogger, J. and Hanson, G.H. (2011), "Income Maximization and the selection and sorting of international Migrants, Journal of Development Economics, 95(1), pp. 42-54.

Harris, J. R. and Todaro, M. P. (1970): Migration, Unemployment and Development. A Two-Sector Analysis. The American Economic Review 60 (1), pp. 126–142.

Hazans, M. and Philips, K. (2011): The Post-Enlargement Migration Experience in the Baltic Labor Markets, IZA DP No. 5878

Holland, D. and Paluchowski, P. (2013): Geographical labour mobility in the context of the crisis, European Employment Observatory, National Institute of Economic and Social Research

Hrvatski zavod za zapošljavanje (2017.): Anketa poslodavaca 2017. [online], available at: http://www.hzz.hr/UserDocsImages/Anketa_poslodavaca_2017_HZZ.pdf

Izquierdo, M., Jimeno, J. F. and Lacuesta, F. (2014): The Impact of the Crisis on Migration Flows in Spain, Intereconomics 49 (3), pp. 144–151.

Jauer, J., Liebig, T., Martin, J. P. and Puhani, P. (2014): Migration as an Adjustment Mechanism in the Crisis? A Comparison of Europe and the United States, OECD Social, Employment and Migration Working Papers 155, OECD Publishing.

Jurić, T. (2017): Suvremeno iseljavanje Hrvata u Njemačku: karakteristike i motivi, Migracijske i etničke teme, 24 (3), pp. 337-371.

Kaczmarczyk, P. (2014): EU Enlargement and Intra-EU Mobility – Lessons to Be Drawn from the Post-2004 Migration of Poles, Intereconomics 49 (3), pp. 128–136.

Lamberty, L. (2015): Explaining Baltic Migration After EU Accession: Determinants and Consequences, [online], available at: https://www.ehl.lu.se/media/ehl/snee/papers/lamberty.pdf

Mayda, A.M. (2010): International Migration. A Panel Data Analysis of the Determinants of Bilateral Flows, Journal of Population Economics 23 62 (4), pp. 1249–1274.

Mayer, T. and Zignago, S. (2011): Notes on CEPII's Distances Measures. The GeoDist Database.

Poot, J., Alimi, O., Cameron, M., and Mare, D. C.(2016): The gravity model of migration: the successful comeback of an ageing superstar in regional science, Investigaciones Regionales – Journal of Regional Research, 36 (2016) – pp 63-86

Poprawe, M. (2015): On the relationship between corruption and migration: empirical evidence from a gravity model of migration, Public Choice, 2015, vol. 163, issue 3, 337-354

Pravilnik o provedbi općeg poreznog zakona, NN 30/17 (Ordinance for the implementation of the General Tax Act)

Ramos, R. (2016): Gravity models: A tool for migration analysis. IZA World of Labor 2016, 239, [online], available at: https://wol.iza.org/articles/gravity-models-tool-for-migration-analysis

Roodman, D. (2009): How to do xtabond2: An introduction to difference and system GMM in Stata, The Stata Journal, (9), pp. 86-136.

Santos Silva, J. M., and Tenreyro S. (2006): The log of gravity, The Review of Economics and Statistics 88 (4), pp. 641-658.

Shepherd, B. (2016): The Gravity Model of International Trade: A User Guide, [online], available at: http://www.unescap.org/resources/gravity-model-international-trade-user-guide-updated-version

Sjaastad, L. A. (1962): The Costs and Returns of Human Migration, Journal of Political Economy, Vol. 70, No. 5, Oct., 1962

Sprenger, E. (2013): The Determinants of International Migration in the European Union: An Empirical Analysis, Working Papers 325, Leibniz Institut für Ost- und Südosteuropaforschung (Institute for East and Southeast European Studies)

Statistics Poland (2011): The concept of the international migration statistic system in Poland. [online], available at: https://stat.gov.pl/cps/rde/xbcr/gus/p_inter_migration_stat_system_in_poland.pdf

Strielkowski, W., Šárková, K. and Żornaczuk T., (2013): EU Enlargement and Migration: Scenarios of Croatian Accession, Romanian Journal of European Affairs, Vol. 13, No. 3.

Šonje V. (2018): Nepovratna emigracija: prva procjena, Ekonomski Lab, Arhivanalitika [online], available at: http://arhivanalitika.hr/blog/nepovratna-emigracija-prva-procjena/

Talijaš,A. (2018): " KOLINDA OPET KRITIZIRALA VLADU 'Rekli su da pretjerujem kad sam rekla da smo u izvanrednom stanju. Nema se više vremena, treba nam konkretan plan'." [online], available at:https://www.jutarnji.hr/vijesti/hrvatska/kolinda-opet-kritizirala-vladu-rekli-su-da-pretjerujem-kad-sam-rekla-da-smo-u-izvanrednom-stanju-nema-se-vise-vremena-treba-nam-konkretan-plan/7250496/

Thaut L. (2009): EU Integration & Emigration Consequences: The Case of Lithuania, International Migration Vol. 47 (1) 2009.

Tinbergen, J. (1962): Shaping the World Economy: Suggestions for an International Economic Policy, The Twentieth Century Fund, New York.

Vuković, V. (2017): The political economy of local government in Croatia: winning coalitions, corruption, and taxes, Public Sector Economics, Vol. 41, No 4. pp. 387-421

Zaiceva, A. and Zimmerman,n K.F.(2008): Scale, diversity, and determinants of labour migration in Europe, Oxford Review of Economic Policy, 24 (3), pp. 427–451.

Zimmermann, K. F. (2009): Labor Mobility and the Integration of European Labor Markets, Discussion Papers of DIW Berlin 862, DIW Berlin, German Institute for Economic Research

Župarić-Ilijć D. (2016): Iseljavanje iz Republike Hrvatske nakon ulaska u Europsku uniju. Friedrich Ebert Stiftung – Zagreb, [online], available at: http://www.fes-croatia.org/fileadmin/user_upload/FES_Iseljavanje_web.pdf

Appendix A

Table 3 Data sources and details, independent variables

Data Sources and details			
Variable	**Description**	**Source**	**Estimation details**
GDP PC in PPS	Gross domestic product at market prices, Current prices, PPS per capita	Eurostat online statistical database	destination and origin country, in log
Unemployment rate	Yearly unemployment rates, From 15 to 64 years, Percentage	Eurostat online statistical database	destination and origin country, in log
Population	Population on 1 January, Total	Eurostat online statistical database	relative values between destination and origin country, in log
Distance	Distance between two countris is calculated based on latitudes and longitudes of the most important cities/agglomerations (in terms of population). Mayer and Zignago (2011)	CEPII Database	in log
Youth population number	Population on 1 January, From 20 to 34 years	Eurostat online statistical database	origin country, as a share in total population, in log
Tertiary educated	Population by educational attainment level, From 15 to 64 years, Tertiary education (levels 5-8)	Eurostat online statistical database	origin country, as a share in total population, *1000, in log
Corruption index	Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. http://info.worldbank.org/governance/WGI/#doc	Worldwide Governance Indicators (WGI), The World Bank	destination and origin country, in log
Governance index	Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. http://info.worldbank.org/governance/WGI/#doc	Worldwide Governance Indicators (WGI), The World Bank	destination and origin country, in log
Output gap	Output Gaps (% of Potential Output), HP Filter	European Commission CIRCAB, II. Autum Forecast	destination and origin country
Employment rates	Yearly Employment rates, From 15 to 64 years, Percentage	Eurostat online statistical database	destination and origin country, in log
Transitional Provisions	Variable representing the access to common free EU market for BG and RO takes value 1 for FI, SE from 2007, for DK from 2009, for IT and IE from 2012 and for all other countries from 2014.	European Commission	Set of dummy variables
Transitional Provisions	Variable representing the access to common free EU market for HR takes value 1 for DK, FI, IR, SE from 2013, for BE, IT, DE, LU from 2015, while NL, AT and UK apply transitional provisions for HR during the entire sample period (sample is ending in 2016, while transitional provisions applied by NL, AT and UK should be lifted by June 2018)	European Commission	Set of dummy variables
Transitional Provisions	Variable representing the access to common free EU market for CZ, SK, SI, PL, HU, LV, LT, EE takes value 1 for UK, SE, IE from 2004, for IT, FI from 2006, for NL, LU from 2007, for BE, DK from 2009 and for AT, DE from 2011.	European Commission	Set of dummy variables

Table 4 Data sources and details, dependent variable

Data Sources and details			
Emigration flows	Data for IR, NL, FI, SE, IT, AT, LU, DK avaliable on line. Data for BE, UK, available on request. Data for DE integrated between online sources for 2013-2016 and customized request prior to 2013. Data for UK and IE refers to immigration numbers and not to official migration statistics .	National Statistical Offices websites of core EU countries:	for static model- emigration from origin country i into destination country j in time t, for dynamic model -share of emigrants in total population of origin country, in log
Data for Germany and Denmark are based on country of previous residence principle, data for Netherlands, Italy, United Kingdom and Belgium on country of birth principle, while data for Sweeden, Finland, Luxemburg and Austria are based on citizenship principle.			
Core EU countries are represented by 11 countries, due to data availability: Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxemburg, Netherlands, Sweden and United Kingdom. Usually Portugal, Greece, Portugal, Spain and France are also included in core EU countries. Required imigration data are not publicaly available on their website. Statistical office of Portugal delivered the data from our customized request. Since data are starting in 2008 we do not include them in main specifications. Upon conclusion of this paper we have not managed to recive requireded data from customized requests sent to other statistical offices.			

Appendix B

Table 5 Total migration flow in Croatia – approximation based on discretional combination of different data sources

Emigration from and to Croatia following the EU accession	**2013**	**2014**	**2015**	**2016**	**2013-2016**
(1) Emigration to core EU countries from National Statistical Offices of core EU countries	31655	53666	72528	71314	229163
(2) Emigration to "rest of the world" according to CBS	11220	9049	11116	9238	40623
(3) Total emigration = (1) + (2)	42875	62715	83644	80552	269786
(4) CNB total emigration	15262	20858	29651	36436	102207
(5) Emigration coefficient	2.8	3.0	2.8	2.2	2.6
(6) Immigration from core EU countries according to National Statistical Offices of core EU countries	14164	19346	23261	23422	80193
(7) Immigration from "rest of the world" according to CBS	8676	8540	8512	9705	35433
(8) Total immigration = (6) + (7)	22840	27886	31773	33127	115626
(9) CBS total immigration	10378	10638	11706	13985	46707
(10) Immigration coefficient	2.2	2.6	2.7	2.4	2.5
(11) Net emigration = (3) - (8)	20035	34829	51871	47425	154160
(12) CNB net emigration	4884	10220	17945	22451	55500
(13) Net emigration coefficient	4.1	3.4	2.9	2.1	2.8

Note: UK and Ireland not included in immigration numbers
Source: CBS and national statistical offices of the core EU countries

Appendix C

Table 6 Determinants of emigration flows from new EU Member States to the core EU countries between 2000 and 2016, dynamic estimation, Arellano- Bond GMM estimator.

	Model 3 Dynamic model (GMM)
distance	-0.49***
	(0.00)
population	0.29
	(0.59)
transitional provisions	0.25***
	(0.00)
employment rate (origin)	-2.01***
	(0.00)
employment rate (destination)	0.53
	(0.47)
output gap (origin)	3.72
	(0.36)
output gap (destination)	2.18***
	(0.00)
corruption index (origin)	-0.37
	(0.40)
corruption index (destination)	0.57
	(0.55)
share of youth (20-34) origin	-0.32
	(0.59)
share of tertiary educated (origin)	0.35
	(0.12)
ln(m t-1)	0.66***
	(0.00)
cons	7.4

Note: *, ** and *** refer to 10%, 5% and 1% statistical significance levels, respectively. P-values are in parenthesis. All specifications include origin and destination fixed effects dummies. Parameters associated to output gap for origin and destination country are multiplied by 100 since the output gap enters the model specification in levels instead of being transformed into logarithms, due to negative values.
Source: authors' elaboration based on national statistical offices of the core EU countries immigration data and on the data presented in Section 4 and Appendix A.

Table 7 Determinants of emigration flows from new EU Member States to the core EU countries between 2000 and 2016, Poisson pseudo maximum likelihood estimator. Extended specification Model 4

	Model 4 PPML
distance	-1.52***
	(0.00)
population	6.63***
	(0.00)
transitional provisions	0.42***
	(0.00)
unemployment rate (origin)	0.69***
	(0.00)
unemployment rate (destination)	-1.09***
	(0.00)
output gap (origin)	1.53
	(0.34)
output gap (destination)	2.52*
	(0.09)
governance index (origin)	-2.29***
	(0.00)
governance index (destination)	-2.71
	(0.40)
share of youth (20-34) origin	1.34
	(0.11)
share of tertiary educated (origin)	0.69**
	(0.01)
cons	42.2**

Note: *, ** and *** refer to 10%, 5% and 1% statistical significance levels, respectively. P-values are in parenthesis. All specifications include origin and destination fixed effects dummies. Parameters associated to output gap for origin and destination country are multiplied by 100 since the output gap enters the model specification in levels instead of being transformed into logarithms, due to negative values.
Source: authors' elaboration based on national statistical offices of the core EU countries immigration data and on the data presented in Section 4 and Appendix A.