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The determinants of regional migration in Croatia*

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Abstract

Migration has had a great impact on Croatia, especially after it joined the EU. Thus, several studies have focused on international migration compared to regional migration which is under investigation. This study sheds some light on the determinants of internal migration at the NUTS3 level in Croatia in the 2000-2019 period relying on a fixed effects panel estimation. The results show that regional migration in Croatia is in line with the stylized facts on migration. The living standard and (labour) productivity measures, along with employment and wages are the main economic drivers of migration inflows and outflows. However, regions with substantial tourism activity attract inflows and disincentivize outflows of people, while regions with a high share of agriculture, forestry, and fisheries in the value-added decrease internal migration inflows. Moreover, environmental protection results also being a significant determinant of regional migration.

Keywords: *internal migration, regional migration, labour productivity, Croatia*

JEL classification: *R23, J24, C23*

1. Introduction

The movement of population is essential for any economy. On an individual level, it allows people to achieve higher productivity, better wages, and living standards, as well as to meet their aspirations. On a societal level, migration enhances labour markets. If this is considered on an inside-the-borders level, then migration also helps adjust local markets asymmetries (Blanchard et al., 1992).

In the literature, there are two facets of migration. On the one hand, migration is examined at an international level (migration flows outside the country borders), while on the other hand, at an internal level (migration flows inside the country

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borders). The first has been more studied than the second, but only prevailing in the Croatian case. The voluminous (international) migration literature arose after WWII when wage and living standard differentials among countries became more prominent. Empirical works focussed on different migration patterns and outcomes, ranging from labour market outcomes (Card, 2001), innovation (Stephan and Levin, 2001), public finances (Coppel et al., 2000), and the housing market (Saiz, 2007). The literature that discusses internal (regional) migration is much less extensive and often country-specific. It is so because significant internal migration patterns are evident only in countries that face distinctive regional disparities in employment opportunities and/or living standards (Bonifazi, 2015), and in countries that are affected by civil unrest and/or conflicts (Lichtenheld and Schon, 2021), and in countries that exhibit environmental degradation and/or natural disasters (Gao at al., 2023).

This paper aims to address internal migration in the Croatian case and to respond to the following research question: which factors can explain the movement of people across Croatian regions? Croatia exhibited substantial (e)migration flows in the last decade, particularly after joining the European Union (EU). Thus, the relatively scarce empirical literature details the effects of such (international) migration levels (Župarić-Ilijć, 2016; Draženović et al., 2018). However, the empirical literature on regional migration in Croatia is almost non-existent. Therefore, this paper aims to shed some light on the determinants of regional migration inflows and outflows while questioning the effect of different economic, societal, and environmental factors. The empirics based on NUTS3 level classification covers 20 regions plus the City of Zagreb within the 2000-2019 period. The applied econometric (macro) approach involves a panel data estimation based on the fixed effects, which the Hausman test proved to be more consistent than the random effects.

The main results show that regional migration patterns in Croatia are aligned with the stylized facts about migration. Economic factors, such as GDP per capita, employment, or wages, significantly determine the inflow and outflow of regional migration. It is also true for the tourist activity proxied with the number of tourist nights per region. Namely, regions with significant tourist activity show higher regional migration inflow and lower migration outflow. It is in line with expectations, especially if one considers the fact that such regions register significantly higher levels of seasonal employment and that a high share of domestic residents is one reason to perform a tourism-related activity during the summer. Moreover, the environmental factor proxied with the regional investment in environmental protection significantly determines regional migration, as well as the social factor captured by the share of elderly (65+) in the total population.

The organization of the paper is as follows. The next Section reviews the literature on migration with an emphasis on internal (regional) migration. Section 3 describes the data and outlines the methodology. Section 4 presents the results, while Section 5 gives concluding remarks and discusses the possible directions for further research.

2. Literature review

The economic literature on migration became prominent after WWII when large migration flows affected economic outcomes in countries across the globe[2]. Most of the migration arose due to labour reasons and wage differentials between countries, regions and/or areas. Basically, any individual maximizes utility subject to a budget constraint and accommodates to labour market conditions. Thus, to optimize his/her utility, an individual tends to migrate where the wage differential is larger[3] and living standards are higher, but the overall effect of immigration will depend, among others, upon country- and/or region-specific labour market dynamics, competition or skill and education structure.

Thus, the economic effects of immigration are examined in a multifaceted way. Some studies focus on labour market outcomes of immigration (Card, 2001 and 2007; Borjas, 2006; Peri and Sparber, 2009), while others point its effects on innovation (Stephan and Levin, 2001; Gauthier-Loiselle and Hunt, 2008), public finances (Coppel et al., 2000; Roodenburg et al., 2003) or housing market (Saiz, 2007; Gonzalez and Ortega, 2009) of the hosting country.

Narrowing on the labour market outcomes, the immigration effect highly depends on the composition of skills of immigrants. In case of complementary skills, immigration can lead to increased productivity by filling the gaps of the native workforce. Borjas' (2003) seminal paper on the effect of immigration on wages, concludes that the inflow of low-skilled immigrant workers lowers the wages of the native workers, leading to an overall decrease in labour productivity. D'Amuri et al. (2010) find that the wage and employment displacement effects from 1990s immigration to Germany were concentrated among the immigrants themselves, with little impact for natives. While considering a detailed skill composition of the immigrant population, Peri (2012) suggests that an increase in the share of immigrants in the labour force has a positive effect on labour productivity and does not crowd out employment. That is especially true for industries that require complex tasks and higher levels of education. The study of Ottaviano and Peri (2012) goes even more further by considering different schooling levels as well as experience levels and reinforces the conclusion how immigration positively impacts labour productivity.

[2] Refer to Kerr and Kerr (2011) for an extensive literature review on economic consequences of migration.

[3] It is worth mentioning that the search and/or improvement of economic conditions is not the only reason for migration. Other reasons include to join family, to escape from conflicts, persecutions, or human rights violations, as well as to move in response of the adverse effects of climate change, natural disasters, or other environmental problems (IOM, 2021). Moreover, corruption (Poprawe, 2015) and mistrust in institutions (Voicu and Tufiş, 2017) also significantly affect migration flows.

The literature that discusses internal (regional) migration is not extensive and often focussed on country-specific cases. This is so because significant internal migration patterns are evident only in countries that face large regional disparities in employment opportunities and/or living standards (Bonifazi, 2015), in countries that are affected by civil unrest and/or conflicts (Lichtenheld and Schon, 2021), and in countries that exhibit environmental degradation and/or natural disasters (Gao at al., 2023). Moreover, international migrants are unlikely to fill in the high skilled labour force gaps that regions face (Coombes, 2010). Smith et al. (2010) show that London benefits from a *brain drain* from other regions in England due to the risk of becoming trapped in low skill equilibrium. Namely, skilled locals migrate to other regions with better opportunities because at the local level there are just a few jobs that require high skills.

Basile and Causi (2005) indicate that the unemployment rate, regional GDP and wages as well population age structure are the main determinants of internal migration in Italy in the 1996-2000 period. Similarly, Bonifazi (2013) pinpoints that internal migration in Italy in the 1960s is largely driven by the economic and demographic growth of urban areas in the North and the impairment of the rural areas in the Central and Southern part. However, just a year later Bonifazi et al (2014, 2015) emphasize that the foreign population increment affects internal mobility in Italy at most, while almost a decade later Bonifazi et al (2021) add that the specific feature of delayed youth transitions from home observed in the 2020s augment even more internal migration flows in Italy.

Windzio (2004) emphasizes that workplace-related interregional migration in Germany became of major relevance since the early 1970s exhibiting a North to South shift, while Windzio (2007) adds evidence of a massive East to West shift after Germany's reunification. According to Farwick (2009), population losses in East Germany coupled with urbanisation cause a considerable shrinking of central cities (Eichstädt-Bohlig et al., 2006). Moreover, substantial migration of highly skilled labour from less to more developed regions decreases human capital levels necessary for further development of the less developed regions (Friedrich and Schultz, 2008).

Worth mentioning are also the works that deepen the internal migration analysis by investigating migration flows between urban and rural areas (rather than between administrative regions or geographical areas). Bocquier and Costa (2015) show that, besides the better survival prospects in urban areas, it is mainly changes in economic production that increase net migration to urban areas, through land pressure, productivity increase, institutional changes, and other factors. These authors conclude that in Sweden and Belgium migration explain most of the urbanisation in the long term, and the same is true for the Netherlands according to Baudin and Shelter (2016) as well as for France, Italy and Germany according to Bocquier and Brée (2018).

The empirical evidence of internal migration in Croatia is relatively scarce, especially if one considers the economic implication of population movement across regions. On the one hand, Stojčić et al. (2015) use spatial methods to explore the impact of internal migration on innovation activities in Croatia in the 2005-2013 period. They find the presence of a negative intraregional and positive interregional impact of inter-county and international migration patterns on regional innovation activity. On the other hand, Pitoski et al. (2021) implement a network analysis to examine internal migration in Croatia and conclude that internal migration significantly affected urbanization as well as the systematic abandonment of large cities in the East of Croatia. These two works are rare examples of studies that tackle internal migration in Croatia. Other works mainly focus on the emigration of Croats and demographic losses, particularly in the period after Croatia joined the EU. Župarić-Ilijć (2016) pinpoints that Croatian net migration balances significantly worsened after the accession to the EU, while Vidovic and Mara (2015) show that emigration patterns after joining the EU intensified significantly, due to higher economic development and better quality of life in other EU member states. Draženović et al. (2018) reinforce the same conclusions. Moreover, they pinpoint, on the one hand, that access to the single EU market was the main economic driver of emigration flows in Croatia since 2013, while on the other hand, demographic factors and the prevalence of corruption arise as the main non-economic factors of emigration of Croats.

3. Data and methodology

The empirical part of this study relies on macro-level aggregated data collected in a longitudinal fashion across 21 Croatian regions during the 2000-2019 period. The year 2019 is selected as the ending year for two main reasons: First, to avoid the bias that would be implicitly induced by including the COVID-19 period when the movement of people was restricted if not prohibited; second, detailed national account statistics on a regional level are not available for recent years, so the utmost extension (no matter the COVID-19 exogenous shock) could go until 2020. Additionally, it is worth mentioning that, due to data availability, some alternative models are based on a shorter period to keep the panel data balanced. These short periods may be either 2004-2019 or 2008-2019. All the data are collected from the Croatian Bureau of Statistics (CBS).

The 21 regions (or 20 regions and the City of Zagreb in particular) correspond to the NUTS (The Nomenclature of Territorial Units for Statistics) level 3, which, compared to the NUTS level 2 did not suffer any changes in the observed period. Moreover, a larger number of modelled entities allows for more variability and heterogeneity and thus leads to more unbiased and consistent results.

The dataset is constructed to align with the theoretical and empirical literature, and consists of the following (set of) variables:

- Internal migration: this is the main dependent variable, and it is defined as the inflow of internal migration, the outflow of internal migration, and the net internal migration level.
- Economic variables: this set of variables captures the factors that can be classified as economic reasons to migrate. In particular, these are the economic variables:
  a) GDP per capita as a measure of living standards across regions;
  b) wages to capture eventual wage differentials with a distinction between gross and net wages;
  c) labour productivity measures, that are calculated using national account data; in particular productivity measured as GDP per person employed, and gross value added per person employed;
  d) labour market data: employment and unemployment in persons (registered administrative data);
  e) structural economic activity-related data: total sale value of products, value of completed construction works, number of tourist nights, share of gross value added in ICT, financial activity and agriculture, forestry, and fishing. All economic variables in levels are denominated in euros and refer to real terms, obtained by using the consumer price index with the base year set to 2015;
- Social variables: these sets of variables are meant for some living conditions across Croatian regions. In particular, these refer to:
  a) population data: such as the natural rate of population change, population levels, net migration levels (which differs from the net internal migration as it includes (international) immigration and emigration in Croatian regions),
  b) number of graduated students which accounts for eventual schooling migration,
  c) population aging: the share of people aged 65+ in the total population;
- Environmental factors: the environment can be considered as a push as well as a pull factor. In the case of a push factor, the environmental variables refer to the negative consequences of environmental degradation and/or climate change, while in the case of pull factors they refer to the attractiveness of the environment. I use two measures to proxy for the latter.
  a) A dummy variable that corresponds to one in case a particular region has a national or natural park on its territory. Worth mentioning that in Croatia

there are 8 national parks and 12 natural parks, which are geographically located across 12 regions.

b) The amount of total realised investments in assets, methods, practices, technologies, processes, and equipment for environmental protection. This variable captures the attitude of a particular region toward environmental protection.

Figure 1 shows the underlying heterogeneity of the dependent variable, and the net internal migration flow in particular[4]. First, it is worth mentioning that on a regional level in the observed 2000-2019 period, the net internal migration rate was on average negative (-125 persons annually). Second, it is possible to observe that the largest stream of net internal migration is exhibited for the City of Zagreb. Third, the regions that exhibit a positive internal migration in all of the observed years are only four (County of Istria, County of Primorje-Gorski Kotar, County of Zadar and County of Zagreb), compared to the seven regions that in all observed periods register a negative net internal migration, i.e. population loss (County of Bjelovar-Bilogora, County of Slavonski Brod-Posavina, County of Osijek-Baranja, County of Požega-Slavonia, County of Sisak-Moslavina, County of Virovitica-Podravina and County of Vukovar-Sirmium). The lower panel of Figure 1, which groups the dataset across years, shows that net internal migration flows follow the business cycle pattern, i.e. the flow is more positive and larger in case of expansion periods and tends to shrink and incline to the negative values in periods of recession. It is possible to observe that in the 2009-2013 period, which corresponds to the economic crisis and recession, the net internal migration varies less.

[4] Refer to Appendix 1 for the same Figures related to the internal migration inflow data and the internal migration outflow data.

Figure 1: Heterogeneity of the net internal migration flow in Croatia across regions (upper panel) and across time (lower panel)

Source: Author's calculation

The empirical methodology is based on a panel data regression involving a balanced panel over the 2000-2019 period in the baseline specification and over a shorter span in alternative specifications. As aforementioned, a panel estimation over 20 regions and the City of Zagreb allows for more variability by making the estimates more efficient and for more control over unobserved components. A similar econometric approach, applied by Alvarez et al. (2020), assessed the internal migration trends across OECD countries. Worth mentioning is that some of the works that inspect internal (regional) migration employ an embed gravity model approach within the panel estimation to allow for the accountability of distance between entities (Etzo, 2011). However, in all of such models, internal migration refers to cities and municipalities rather than regions, for which one can precisely measure the distance between entities (i.e., municipalities, cities). Given that this work relies on regional data, such an approach wouldn't be efficient.

The panel data on internal migration, as obvious, include two dimensions, the temporal measure and the geographical measure, which can better explain the individual heterogeneity and better deal with the omitted variables (Wooldridge, 2002). It is known that migrants are heterogenous, and many variables may affect the choice of migration. Among the panel estimation techniques, the fixed and random effect models are those mostly applied. The fixed effect estimator allows for the unobserved effects to be correlated with the regressors, which is not the case of the random effect estimator, as the same correlations brings inconsistency. Thus, all the performed models are estimated using both, the fixed and the random effects, and then tested using the Hausman test (Hausman, 1978). The latter inspects the consistency of the random effect model, i.e. the extension of the correlation between the unobserved effects and the covariates. For all performed models, the Hausman test has rejected the random effect estimator in favour of the fixed effects estimator, and thus the results presented in Section 4, correspond to the estimates obtained under the fixed effect or *within* panel variant.

The applied panel model is of a simple form as follows:

$$IM_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it} \tag{1}$$

where IM_{it} is the internal migration variable (net, inflow, outflow) of region i in time t and X_{it} a set of independent variables for region i in time t, which include economic, social and environmental determinants of migration decisions, as previously explained. Moreover, given that the economic factors for migration also include some macroeconomic time series (like GDP, productivity, wages, and similar) there is a possible threat of serial correlation that leads to the underestimation of the standard errors (and biased inference consequently). The Breusch-Godfrey test for serial correlation in panel models indicates the expected serial correlation among the macroeconomic variables, so the presented estimation

results do not rely heteroskedasticity robust standard errors, but on clustered standard errors. Additionally, in some cases the log-log equation setup is used (between migration flows and economic factors) for an easier interpretability of the estimates.

4. Results

The starting models include among the dependent variables the minimum main factors and controls that according to the theory and/or previous empirical works stem as important and significant. This means that equation explaining the regional migration (*RM*) inflows and outflows includes GDP per capita in real terms (*GDPpc*), population levels (*Pop*) and employment levels (*Empl*). Moreover, the model adds the net (international) emigration and immigration flows (*InternMigr_net*) to control for population attitude toward migration. For an easier interpretation, both the dependent and independent variables (except the net (international) migration variable which is in many of the observed datapoints negative) are transformed in logarithms and thus the coefficients indicate elasticities. Table 1 shows the results of these estimations.

Table 1: Panel (fixed effects) estimation results of the baseline models

	Dependent variable	
	$\log(RM_{it}^{inflow})$	$\log(RM_{it}^{outflow})$
$\log(GDPpc_{it})$	0.216* (0.1051)	0.252** (0.0923)
$\log(POP_{it})$	0.618*** (0.1738)	0.313* (0.1498)
$\log(Empl_{it})$	-0.428** (0.1546)	-0.650*** (0.1332)
$InternMigr\_net_{it}$	0.0005*** (0.000008)	0.0003*** (0.000007)
Adj. R^2	0.1532	0.1237
Num. obs.	399	399

Notes: Clustered standard errors in parenthesis; * – significant at the 10% level, ** – significant at the 5% level, *** – significant at the 1% level.

Source: Author's calculation

It is possible to observe that the main theoretical factors are confirmed also in the Croatian case and that the estimates have the expected sign. A 1% increase in the regional GDP per capita increases the migration inflow from other regions by 0.2% and the migration outflow to other regions by 0.3%. Similarly, if employment in a region increases by 1%, then the migration inflow from other regions decreases by 0.4%, while the migration outflow by 0.7%. Worth mentioning is that the GDP per capita, as well as employment (or unemployment), are considered both pull and push factors of migration. The size of both (GDP per capita and employment) effects is larger (and more significant) in the case of outflows than inflows, leading to an overall conclusion about a negative net effect of internal migration. However, to deal with a precise and proper magnitude of the effect, one would need a detailed dataset on regional migration that diversifies the inflows according to regions of origin and outflows according to regions of destination. In that case, the magnitude of the effect of productivity or employment increases would be proper. Thus, in this work, the focus is on the sign and significance of the factors.

Table 2 shows different alternative models' estimation results, that encompass the inclusion and/or replacement of different factors discussed in the previous Section. First, the estimates remain robust if the GDP per capita is replaced by labour productivity (model (1)), which remains consistent also in other specifications (model (4)). Moreover, if the demographic factor is proxied with the ratio of people aged 65+ in the total population, results remain consistent, and the estimate shows that a larger share of the elderly decreases the migration inflows (model (6)). Second and in line with the theoretical foundations, wages are a significant determinant of regional migration inflows. An increase in wages attracts migrants. Third, if the structure of regional economic activity is considered then it is possible to observe the following: On the one hand, tourism significantly affects (and attracts) the inflow of people from other regions, while the value of sales and construction are not statistically significant (model (3)). On the other hand, if the gross value added in agriculture, forestry, and fishery (*GVA_aff*) as well as ICT and financial sectors (*GVA_ict* and *GVA_fin*, respectively) are considered, then all three results being statistically significant with a difference that the ICT and financial sectors lead to an increase in migration inflows, while the primary sector decreases the same inflows and results as an unattractive determinant (model (4)). Fourth, the environmental factor proxied with the investment in environmental protection (*Eco_inv*) is significant and positively affects the migration inflows (model (5)).

Table 2: Panel (fixed effects) estimation results of the alternative models, for the regional migration inflows

Dependent variable: $\log(RM_{it}^{inflow})$						
	(1)	(2)	(3)	(4)	(5)	(6)
$\log(GDPpc_{it})$		0.219* (0.1053)	0.189* (0.1120)		0.283* (0.1513)	0.233* (0.1347)
$\log(POP_{it})$	0.505** (0.1544)		0.764** (0.2556)	0.662* (0.4071)	0.470* (0.2640)	
$\log(Empl_{it})$	-0.574*** (0.1184)		-0.541* (0.2369)	-0.662* (0.3816)	-0.337* (0.1774)	-0.521* (0.2927)
$InternMigr\_net_{it}$	0.00006*** (0.0000)	0.00006*** (0.0000)	0.00006*** (0.0000)	0.00003** (0.0000)	0.00003** (0.0000)	0.00003** (0.0000)
$\log(LProductivity)_{it}$	0.502*** (0.1028)			0.606*** (0.1338)		
$\log(Wages\_gross)_{it}$		0.603** (0.2260)				
$Pop\_natchange_{it}$		0.0001** (0.00003)				
$\log(Sales)_{it}$			-0.023 (0.0410)			
$\log(Constr)_{it}$			-0.421 (0.0329)			
$\log(Tourist\_night)_{it}$			0.149*** (0.0333)			
GVA_aff_{it}				-0.002** (0.0097)		
GVA_ict_{it}				0.009*** (0.0266)		
GVA_fin_{it}				0.010*** (0.0255)		
$\log(Eco\_inv)_{it}$					0.031*** (0.0108)	
Old_ratio_{it}						-0.010* (0.0055)
Adj. R^2	0.1952	0.1542	0.2513	0.2508	0.1718	0.2213
Num. obs.	399	378	210	210	210	210

Notes: Clustered standard errors in parenthesis; * – significant at the 10% level, ** – significant at the 5% level, *** – significant at the 1% level.

Source: Author's calculation

Similarly, the analysis is conducted for the regional migration outflows, and the results are presented in Table 3. If the results are to be compared to those in the previous Table, then the main differences are as follows. First, the population variable is not significant when modelling migration outflows, meaning that moving from region *i* does not depend on the population of region *i*. Again, in this case, as previously mentioned, a more detailed dataset capturing precisely which are the destination countries would give a proper estimate of the population effect. However, the same conclusion is valid also when the share of elderly (65+) is considered (model (6)). Second, the larger the sales value, the construction value of the tourist activity, and the lower the outflows to other regions. It is in line with the expectations as a higher volume of economic activity disincentives migration and should offer better income/welfare opportunities (model (3)). Third, when the shares in gross value added in selected sectors are considered all three estimates are of significant value and with merely unexpected signs (model (4)). An increase in the agriculture, forestry, and fishing value-added share decreases migration outflows and this is in line with the expectation. However, it seems that an increase in the share of gross value added in the financial and ICT sectors in region *i* increase outflows from the same region *i*. These surprising results should be additionally inspected with a micro (per individual) approach as macro data cannot provide the underlying reasons. Eventually, the education structure of the migrant population could provide insights in this respect.

Table 3: Panel (fixed effects) estimation results of the alternative models, for the regional migration outflows

Dependent variable: $\log(RM_{it}^{outflow})$						
	(1)	(2)	(3)	(4)	(5)	(6)
$\log(GDPpc_{it})$		0.1699* (0.0923)	0.307* (0.1613)		0.236* (0.1249)	0.507** (0.1500)
$\log(POP_{it})$	0.184 (0.1291)		0.349 (0.2967)	0.584* (0.2823)	0.573 (0.4640)	
$\log(Empl_{it})$	-0.851*** (0.0989)		-0.650** (0.2810)	-0.656* (0.3816)	-0.625* (0.3274)	-0.493* (0.2554)
$InternMigr\_net_{it}$	0.00002* (0.0000)	0.00003*** (0.0000)	0.00003*** (0.0000)	0.00003** (0.0000)	0.00002** (0.0000)	0.00003** (0.0000)
$\log(LProductivity)_{it}$	0.623*** (0.0860)			0.604*** (0.0990)		
$\log(Wages\_gross)_{it}$		0.8846** (0.1931)				
$Pop\_natchange_{it}$		-0.0001** (0.00003)				
$\log(Sales)_{it}$			-0.004*** (0.0007)			
$\log(Constr)_{it}$			-0.075*** (0.0196)			
$\log(Tourist\_night)_{it}$			-0.115*** (0.0188)			
GVA_aff_{it}				-0.004** (0.0072)		
GVA_ict_{it}				0.008*** (0.0197)		
GVA_fin_{it}				0.011*** (0.0188)		
$\log(Eco\_inv)_{it}$					0.027*** (0.0091)	
Old_ratio_{it}						0.003 (0.0168)
Adj. R^2	0.1983	0.1407	0.3846	0.3718	0.2821	0.2614
Num. obs.	399	378	210	210	210	210

Notes: Clustered standard errors in parenthesis; * – significant at the 10% level, ** – significant at the 5% level, *** – significant at the 1% level.

Source: Author's calculation

Besides the presented alternative models, other specifications performed are to check for the robustness of the results. These include the replacement of GDP per capita with regional gross value added or GDP per employee. No matter which we consider, the results remain robust, and both living standards and productivity determine internal migration in Croatia. Similarly, using the net wages compared to the gross wages leads to the same conclusions. The personal income surtax that may lead to differences among net wages across regions does not have any significant role in leading to different migration patterns. Including the number of graduates, i.e., controlling for eventual schooling migrations, does not affect the results, and estimates are statistically insignificant. Additionally, the baseline specifications were estimated using the pooled OLS estimator to check whether conclusions would significantly differ, no matter the fact that the LM test results supported the fixed effects of the pooled estimation. Furthermore, the panel estimation performed on 20 regions only omits the case of the City of Zagreb, given that the City of Zagreb has a sort of *double* treatment in the administrative organization of the country. The City of Zagreb is both a city and a region, as well as it represents a high concentration of economic activity and people with significantly above average values of any indicator (outliers). Also, in this case, the aforementioned conclusions remain robust.

5. Conclusions

This paper studies the impact of economic, social, and environmental factors on internal migration flows in the Croatian case during the 2000-2019 period. Internal migration flows are based on the NUTS3 level and comprise 20 regions plus the City of Zagreb.

The main results show that regional migration patterns in Croatia are aligned with the stylized facts about migration. That is, GDP per capita and employment significantly determine the inflow and outflow of regional migration. Moreover, in both cases, the environmental factor proxied with the regional investment in environmental protection significantly determines regional migration. It is also true for the tourist activity proxied with the number of tourist nights per region. Namely, regions with significant tourist activity show higher regional migration inflow and lower migration outflow. It is in line with expectations, especially if one considers the fact that such regions register significantly higher levels of seasonal employment and that a high share of domestic residents is one reason to perform a tourism-related activity during the summer.

This study applies a macro approach to investigating the internal migration determinants. A micro-approach could give better insights into the reasons for movements. However, a macro approach that diversifies the migration inflows according to regions of origin and migration outflows according to regions of

destination would allow for a proper estimation of the magnitude of the effect of each determinant. Therefore, this is a limitation of this work and the reason why it limits to inspecting the sign and significance of the factors. Moreover, an improved dataset could also assess on a better level an eventual endogeneity bias between GDP with regional migration. This study assumes that an increase in GDP increases the inflow of migrants (which is in line with the migration literature), rather than vice versa, and thus to correct for eventual reverse causality the models use the population proxy and productivity levels.

Another valuable extension would be to inspect the internal migration determinants among municipalities and cities (rather than regions). This would allow us to apply distances between entities and perform a gravity model approach within the panel technique. Such a three-dimensional method is more suited to inspect differentials of wages, living standards, or productivity and give a proper evaluation of the size of the effect.

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References

Alvarez, M., Bernard, A., Lieske, S. N. (2020) "Understanding Internal Migration Trends in OECD Countries", *Population, Space and Place*, Vol. 27, No. 7, pp. 1–22, https://doi.org/10.1002/psp.2451.

Basile, R. Causi, M. (2005*)* "Le determinant dei flussi migratori nelle province italiane: 1991-2001 [The determinants of migratory flows in the Italian provinces: 1991-2001]", Economia & lavoro, Rivista di politica sindacale, sociologia e relazioni industriali, Vol. 2/2007, pp. 139–0, https://doi.org/10.7384/72341.

Baudin, T., Stelter, R. (2016) *Rural exodus and fertility at the time of industrialization. Louvain-la-Neuve: Université catholique de Louvain*, Discussion paper 2016-20, Institut de Recherches Économiques et Sociales [Internet]. Available at: <https://sites.uclouvain.be/econ/DP/IRES/2016020.pdf> [Accessed: May 6, 2023]

Blanchard, O. J. et al. (1992) "Regional Evolutions.", *Brookings Papers on Economic Activity*, Vol. 1992, No. 1992, pp. 1–75, https://doi.org/ 10.2307/2534556.

Bocquier, P. Brée, S. (2018) "A Regional Perspective on the Economic Determinants of Urban Transition in the 19th Century France", *Demographic research*, Vol. 38, No. 50, pp. 1535–1576, https://doi.org/10.4054/DemRes.2018.38.50.

Bocquier, P., Costa, R. (2015) "Which Transition Comes First? Urban and Demographic Transitions in Belgium and Sweden" *Demographic Research*, Vol. 33, No. 48, pp. 1297–1332, https://doi.org/10.4054/DemRes.2015.33.48.

Bonifazi, C. (2013) "Mobile per forza. Spostamenti di popolazione nell'Italia della crisi [Mobile by necessity. Population movements in crisis Italy]", *Il Mulino*, Vol 5, pp. 798–805, https://doi.org/10.1402/74616.

Bonifazi, C., Heins, F., Tucci, E. (2014) "Le migrazioni interne in Italia nel 2011-12 [Internal migration in Italy in 2011-12]". In Colucci, M., Gallo, E. S., ed., *L'arte di spostarsi. Rapporto 2014 sulle migrazioni interne in Italia*, Roma: Donzelli.

Bonifazi, C., Heins, F., Tucci, E. (2015) "Le migrazioni interne: Tendenze e dimensioni [Internal migration: Trends and dimensions]". In Colucci, M., Gallo, E. S., ed., *Tempo di cambiare, Rapporto 2015 sulle migrazioni interne in Italia*, Donzelli: Roma.

Bonifazi, C. et al. (2021) "The Regional Dynamics of Internal Migration Intensities in Italy", *Population, Space and Place*, Vol. 27, No. 7, https://doi.org/10.1002/psp.2331.

Borjas, G. J. (2003) "The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market Get access Arrow", *The Quarterly Journal of Economics*, Vol. 118, No. 4, pp. 1335–1374, https://doi.org/10.1162/003355303322552810.

Borjas, G. J. (2006) "Native Internal Migration and the Labour Market Impact of Immigration", *Journal of Human Resources*, Vol. 41, pp. 221–258, https://doi.org/10.3368/jhr.XLI.2.221.

Card, D. (2001) "Immigrant Inflows, Native Outflows and the Local Labour Market Impacts of Higher Immigration", *Journal of Labour Economics*, Vol. 19, No.1, pp. 22–64, https://doi.org/10.1086/209979.

Coombes, M. (2010) *Migration and regional development: a research review*, Paper presented to the OECD WPTI Workshop in Paris, 7th June. Available at: <https://www.oecd.org/cfe/regionaldevelopment/45522500.pdf> [Accessed: June 6, 2023]

Coppel, J., Dumont, J., Visco, I. (2001) *Trends in Immigration and Economic Consequences*, OECD Economics Department Working Papers No. 284, Paris: OECD Publishing, https://doi.org/10.1787/553515678780.

D'Amuri, F., Ottaviano, G. Peri, G. (2010) "The Labour Market Impact of Immigration in Western Germany in the 1990s", *European Economic Review*, Vol. 54, No. 4, pp. 550–570, https://doi.org/10.1016/j.euroecorev.2009.10.002.

Draženović, I., Kunovac, M. Pripužić, D. (2018) "Dynamics and Determinants of Emigration: The Case of Croatia and the Experience of new EU Member States", *Public Sector Economics*, Vol. 42, No. 4, pp. 415–447, https://doi.org/10.3326/pse.42.4.3.

Eichstädt-Bohlig, F., Hannemann, C., Bohne, R. (2006) "Die Gestaltung der schrumpfenden Stadt [The design of the shrinking city]". In *Das neue Gesicht der Stadt*, Heinrich-Böll-Stiftung.

Etzo, I. (2011) "The Determinants of the Recent Interregional Migration Flows in Italy: A panel Data Analysis", *Journal of Regional Science*, Vol. 51, pp. 948–966, https://doi.org/10.1111/j.1467-9787.2011.00730.x.

Farwick, A. (2009) *Internal Migration – Challenges and Perspectives for the Research Infrastructure*, Working Paper No. 97, The RatSWD Working Paper Series [Internet]. Available at <http://dx.doi.org/10.2139/ssrn.1452667> [Accessed: July 14, 2023]

Friedrich, K., Schultz, A. (2008) "Brain Drain Oder Brain Circulation?". In *Konsequenzen und Perspektiven der Ost West Migration*, Leipzig: Leibnitz-Institut für Länderkunde.

Gao, P. et al. (2023) "Moving to a Healthier city? An Analysis from China's Internal Population Migration", *Front Public Health*, Vol. 11, https://doi.org/10.3389/fpubh.2023.1132908.

Gauthier-Loiselle, M., Hunt, J. (2008) *How Much Does Immigration Boost Innovation?*, Working Paper no. 14312, Cambridge: National Bureau of Economic Research – NBER.

Gonzalez, L. Ortega, F. (2009) *Immigration and housing booms: Evidence from Spain*, Discussion Paper 4333, Bonn: The Institute for the Study of Labor (IZA).

Hausman, J. (1978) "Specification Tests in Econometrics", *Econometrica*, Vol. 46, No. 6, pp. 1251–1271, https://doi.org/10.2307/1913827.

Kerr, S. P., Kerr, W. R. (2011) "Economic Impacts of Immigration: A Survey", *Finnish Economic Papers, Finnish Economic Association*, Vol. 24, No. 1, pp. 1–32.

Lichtenheld, A. G., Schon, J. (2021) "The Consequences of Internal Displacement on Civil War Violence: Evidence from Syria", *Political Geography*, Vol. 86, https://doi.org/10.1016/j.polgeo.2021.102346.

Ottaviano, G. I. P., Peri, G. (2012), "Rethinking the Effect of Immigration on Wages", *Journal of the European Economic Association* [Internet], Vol. 10, No. 1, pp. 152–197. Available at: <https://www.jstor.org/stable/41426727> [Accessed: September 12, 2023]

Peri, G. (2012) "The Effect of Immigration on Productivity: Evidence from US states", *Review of Economics and Statistics* [Internet], Vol. 94, No. 1, pp. 348–358, https://www.jstor.org/stable/41349180.

Peri, G., Sparber, C. (2009) "Task Specialization, Immigration and Wages", *American Economic Journal: Applied Economics*, Vol. 1, No. 3, pp. 135–169, https://doi.org/10.1257/app.1.3.135.

Poprawe, M. (2015) "On the Relationship Between Corruption and Migration: Empirical Evidence from a Gravity Model of Migration", *Public Choice*, Vol. 163, pp. 337–354, https://doi.org/10.1007/s11127-015-0255-x.

Roodenburg, H., Euwals, R. ter Rele, H. (2003) *Immigration and the Dutch economy*, The Hague, the Netherlands: CPB Netherlands Bureau of Economic Policy Analysis.

Saiz, A. (2007) "Immigration and Housing Rent sin American cities", *Journal of Urban Economics*, Vol. 61, No. 2, pp. 345–371, https://doi.org/10.1016/j.jue.2006.07.004.

Smith, P. W. F., Raymer, J., Giulietti, C. (2010) "Combining Available Migration Data in England to Study Economic Activity Flows Over Time", *Journal of the Royal Statistical Society*, Vol. 174, No. 4, pp. 733–753, https://doi.org/10.1111/j.1467-985X.2009.00630.x.

Stephan, P., Levin, S. (2001) "Exceptional Contributions to US Science by the Foreign-born and Foreign-educated", *Population Research and Policy Review*, Vol. 20, pp. 59–79, https://doi.org/10.1023/A:1010682017950.

Stojčić, N., Bečić, M., Vojinić, P. (2015) "The Impact of Migration Movements on Innovation Activities in Croatian Counties", *Društvena istraživanja*, Vol. 25, No. 3, pp. 291–307, https://doi.org/10.5559/di.25.3.01.

Vidovic, H., Mara, I. (2015) *Free Movement of Workers, Transitional Arrangements and Potential Mobility from Croatia*, The Vienna Institute for International Economic Studies Research Report [Internet], No. 402. Available at: <https://wiiw.ac.at/free-movement-of-workers-transitional-arrangements-and-potential-mobility-from-croatia-dlp-3630.pdf> [Accessed: June 16, 2023]

Voicu, B., Tufiş, C. D. (2017) "Migrating Trust: Contextual Determinants of International Migrants' Confidence in Political Institutions", *European Political Science Review*, Vol. 9, No. 3, pp. 351–373, https://doi.org/10.1017/S1755773915000417.

Windzio, M. (2004) "Zwischen Nord- und Süddeutschland: Die Überwindung räumlicher Distanzen bei der Arbeitsmarktmobilität [Between northern and southern Germany: Overcoming spatial distances in labor market mobility]", Zeitschrift für Arbeitsmarkt Forschung – Journal for Labour Market Research, Vol. 37, No. 1, pp. 29–44.

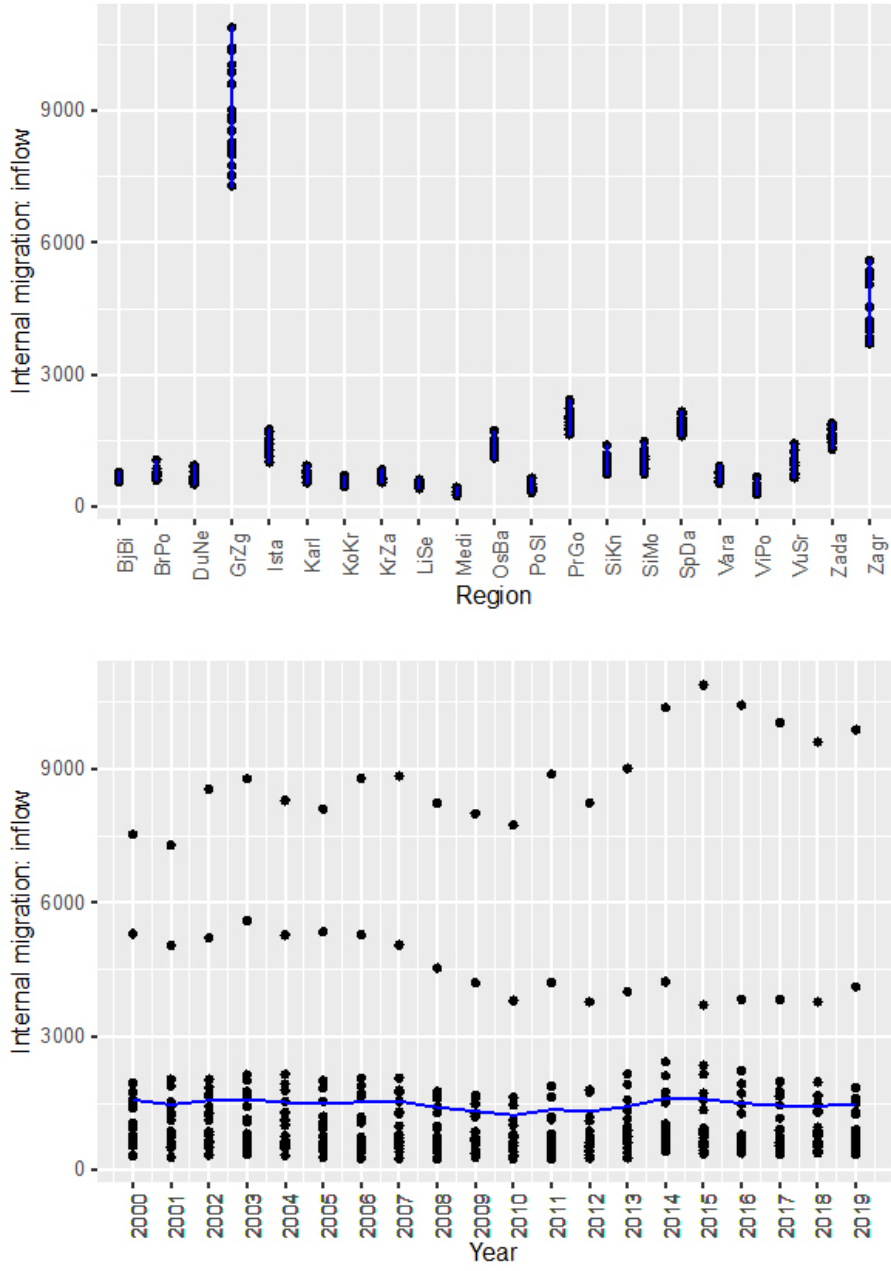
Windzio, M. (2007) "Regionale Arbeitslosigkeit und Distanz zur Grenze: Individual- und Kontexteffekte auf die Abwanderung von Arbeitskräften von Ost- nach Westdeutschland [Regional unemployment and distance to the border: Individual and contextual effects on the migration of workers from East to West Germany]", *Schmollers Jahrbuch: Journal of Applied Social Science Studies / Zeitschrift für Wirtschafts- und Sozialwissenschaften*, Vol. 127, No. 4, pp. 553–583.

Wooldridge, J. (2002) *Econometric analysis of cross section and panel data*, Cambridge and London: MIT Press.

Župarić-Ilijć, D. (2016) *Emigration from the Republic of Croatia after the Accession to the European Union*, Zagreb: Friedrich Ebert Stiftung [Internet]. Available at: <http://www.fes-croatia.org/fileadmin/user_upload/FES_Iseljavanje_web.pdf> [Accessed: August 6, 2023]

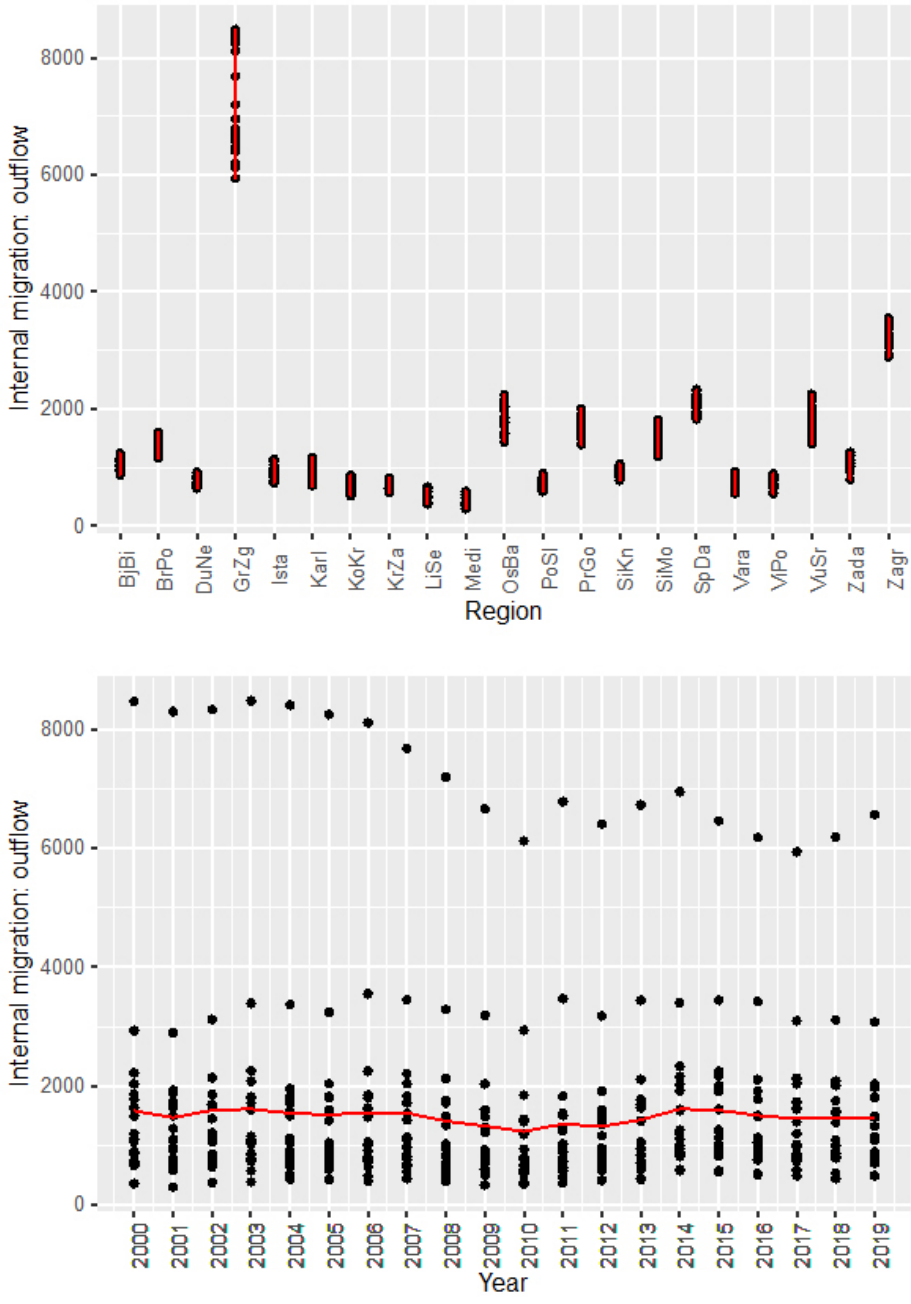
Appendix A

Figure A1: Heterogeneity of the internal migration inflow in Croatia across regions (upper panel) and across time (lower panel)



Source: Author's calculation

Figure A2: Heterogeneity of the internal migration outflow in Croatia across regions (upper panel) and across time (lower panel)



Source: Author's calculation

Odrednice unutarnjih migracija u Hrvatskoj

Ana Grdović Gnip[1]

Sažetak

Migracije su obilježile značaj utjecaj u Hrvatskoj, posebice nakon njezinog ulaska u Europsku Uniju. Stoga se nekoliko studija usredotočilo na istraživanje (međunarodnih/vanjskih) migracija, dok su unutarnje migracije na primjeru Hrvatske gotovo nezastupljene u znanstvenoj literature. Ovaj rad istražuje determinante unutarnjih migracija na razini NUTS3 u Hrvatskoj u razdoblju od 2000. do 2019. godine koristeći panel s fiksnim učincima. Rezultati ukazuju kako su regionalne migracije u Hravtskoj u skladu s teoretskim postavkama. Životni standard i mjere produktivnosti rada su, uz zaposlenost i place, glavni ekonomski čimbenici odnosno pokretači migracijskih priljeva i odljeva. Dodatno, županije koje ostvaruju značajne turističke rezultate privlače priljev i destimuliraju odljev ljudi. Povećanje udjela dodane vrijednosti u sektoru poljoprivrede, šumarstva i rabarstva također smanjuje migracijske priljeve među županijama. Štoviše, zaštita okoliša također je značajna odrednica regionalnih migracija u Hrvatskoj

Ključne riječi: *unutarnje migracije, migracije među županijama, produktivnost rada, Hrvatska*

JEL klasifikacija: *R23, J24, C23*

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