

Marina Perić Kaselj, Maja Vizjak, Kristina Duvnjak

Quantitative Analysis of Active Labour Population Migrations – The Case of Croatia

Migrations are a worldwide phenomenon occurring for centuries and an ongoing topic among numerous researchers. As such, global migrations have an impact on the labour market and the economy, Croatia being no exception. A dynamic history of migrations resulted in Croatia being labelled as a traditional emigration country. With the global financial crisis in 2008, an increasing number of active-labour population is migrating from Croatia to, mainly, developed European countries. After Croatia's accession to the European Union in 2013, a new market and new opportunities opened up for job seekers. In a time when more and more individuals are emigrating and a continuous need for active labour population is emerging, the question of the scale of migrations is raised. The article investigates how wages and unemployment influenced migrations in Croatia between 2007 and 2016. The data was tested using a multiple regression model and additionally confirmed by the MAPE. The obtained results confirm the significance of the model and its parameters.

Keywords: labour market, unemployment, wages, multiple regression, MAPE.

Kvantitativna analiza migracij delovno aktivnega prebivalstva – primer Hrvaške

Migracije so svetovni fenomen. Prisotne so že več stoletij in zato predmet številnih raziskav. Svetovne migracije vplivajo na trg delovne sile in gospodarstvo, čemur smo priča tudi na Hrvaškem. Zaradi dinamične migracijske zgodovine se Hrvaške drži sloves tradicionalne države izseljevanja. Tako se tudi vse od svetovne finančne krize leta 2008 dalje vse več delovno aktivnega prebivalstva seli s Hrvaške zlasti v razvite evropske države. Vstop Hrvaške v Evropsko unijo leta 2013 je odprl nov trg in nove priložnosti za iskalce zaposlitve. V času, ko državo zapušča še več posameznikov in vse bolj narašča potreba po delovno aktivnem prebivalstvu, se zastavlja tudi vprašanje obsega migracij. Članek preučuje vpliv plač in brezposelnosti na migracije na Hrvaškem med letoma 2007 in 2016. Podatke smo preverili s pomočjo modela večkratne regresije in naknadno potrdili z MAPE. Pridobljeni rezultati potrjujejo pomen modela in njegovih parametrov.

Ključne besede: *trg delovne sile, brezposelnost, plače, večkratna regresija, povprečna absolutna odstotna napaka (MAPE).*

Correspondence address: Marina Perić Kaselj, Institut za migracije i narodnosti / Institute for Migration and Ethnic Studies, Trg Stjepana Radića 3, HR-10000 Zagreb, Croatia, e-mail: marina.peric@imin.hr; Maja Vizjak, Rektorat Sveučilišta u Zagrebu / Rectorate of the University of Zagreb, Trg Republike Hrvatske 14, HR-10000 Zagreb, Croatia, e-mail: vizjakm@unizg.hr; Kristina Duvnjak, Fakultet za hotel-ski i turistički menadžment / Faculty of Tourism and Hospitality Management, Primorska 46, HR-51410 Opatija, Croatia, e-mail: kri.duvnjak@gmail.com.

1. Introduction

The destabilization of Croatian demographics started in the 1960s with economic migration mainly caused by uncontrolled deagrarization leading to a reduction of employment in agriculture, deruralization as a result of emigration from rural areas, and, finally, accelerated urbanization causing overpopulation of larger cities (Akrap 1998), e.g. Zagreb. According to Podgorelec et al. (2019), Croatia has traditionally been a country of considerable emigration, which is proven by its demographic picture that reflects migration trends. Such dynamic history contributed to a long-term negative migration balance which consequently labelled Croatia as a traditional emigration country. Moreover, as Živić et al. (2005) emphasize, migrations are a highly important determinant of Croatia's population development. This is certainly not an issue faced by Croatia alone, but rather a global, transnational issue. In the era of globalization, migration trends are intensifying as, on the one hand, the demand for labour on the integrated world economy market is growing, while on the other hand demographic projections show that migration is and will remain a crucial factor of development of a globalized world (Skupnjak-Kapić 2008). Milardović (2008) emphasized that the demographic and economic dimensions of globalization are complementary, and although the focus in social sciences is not on demographics, they are interesting in the context of observing global trends of world population movement and migration. The free movement of people in the global labour market is one of the goals of universal liberalization and of the international organizations present on the global market today. This was confirmed by a survey conducted by GCIM (2005) showing that approximately a half of all international migrants are economically active workers. Open borders are an essential determinant of growth and development due to the mobility of goods and services as well as population and capital, as seen in the case of developed countries. With Croatia's accession to the European Union in 2013, access to the European market increased the mobility of both capital and workforce. The article investigates the scope, spatial distribution and demographic structure of the Croatian migration contingent and presents the long-term negative effect on socio-economic and, especially, demographic development. Negative demographic projections triggered by an aging population, declining birth rates as well as economic, social, health and political factors, which continue to this day, have long been a point of interest and concern for experts and the scientific public as foundations of a society and its economy. There are numerous reasons why one would migrate in search for a better life, among which wages and low living standards (Mlikota & Prelas Kovačević 2013), organization and governance of the state, the futility and demise of the state, society and nation, corruption, crime and nepotism in the country (Jurić 2017), religious intolerance and nationalism, absence of positive changes in the country (Jerić 2019), unfavourable economic

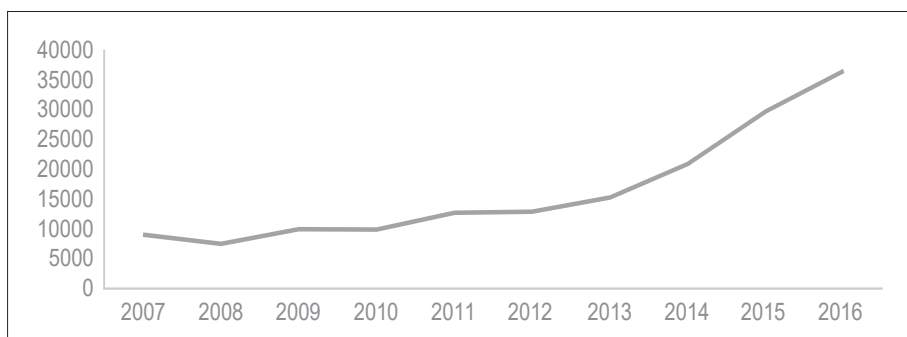
conditions, a decline in the overall employment rate and living standards, poor entrepreneurial climate, long waiting employment opportunities, and the inability to find permanent employment in one's profession (Župarić-Iljić 2016). The above resulted in the emigration of a concerning number of young people without whom the development processes and the prospects of a prosperous country are impossible. This negative demographic trend leaves many destabilizing consequences for Croatia's basic systems: healthcare, pension, work, financial and educational (Bališa 2019). Therefore, the article studies the migrations of the active labour population since the beginning of the global economic crisis to determine the scope and the drivers of migration from Croatia. This period is selected for analysis as the consequences of migrations are mostly visible during this time.

2. Explorative Analysis of the Croatian Labour Market

Voluntary or involuntary migration, promotion of labour mobility, formal education and lifelong learning programmes, as well as knowledge-based work and intellectual capital are a crucial prerequisite of competitiveness and readiness for change within the economic system (Vasilj & Ereš 2018). These factors are part of a contemporary labour market review, which requires abandoning the traditional form of organization and transitioning to a learning organization (Azemović & Azemović 2018). The actual migration reality is convincing evidence that this phenomenon cannot be accepted as a simple mechanical one, but as a complex dynamic process of narrow interaction between socio-political, economic and demographic factors, which only confirms that they reflect on the level of development of the said factors (Lajić 2002; Bogunović 2006; Nejašmić & Mišetić 2004). Researchers and the general public have never been more interested in labour market issues as they are today, given the political and economic developments before and especially after the 2008/2009 global economic crisis, when unemployment in some countries almost reached the percentage of the first major global crisis in the 1920s (Radman Peša 2015). The economic crisis, which only recently ended in Croatia, has prolonged and dramatically affected the unemployment trend in Croatia (Puljiz 2001) and strengthened the desire to leave Croatia. The increasing unemployment rate in Croatia, which is also the main driver of active labour population migrations, is a consequence of the mismatch between the supply and demand of employment with regard to occupation, education and skills of employees and the requirements of employers (Obadić 2008). Furthermore, there is the question regarding the actual number of unemployed population or emigrants as stated by Obadić (2008). Namely, the survey unemployment rate is considerably lower than registered, suggesting that a number of officially unemployed people are working in the unofficial sector of the economy. Regardless of the speculations, the data used in this paper

are taken from the official statistics bureau, the Croatian Bureau of Statistics. Methodological problems are conditioned primarily by the lack of a systematic static base – the Population Register. Data on emigration of the population from Croatia can be obtained on the basis of the census and the annual report of the Central Bureau of Statistics on Migration. However, censuses only indicate data related to the last relocation and not on previous migrations (Klempić Bogadi & Lajić 2014). The annual reports of the Central Bureau of Statistics on Migration are based on statistics kept by the Department for Administrative Affairs, but are methodologically questionable especially when it comes to external migration because the emigrating population generally does not deregister their residence in Croatia. According to the Croatian Bureau of Statistics (2017a), First Release of the Migration of Population of the Republic of Croatia, the number of emigrants from Croatia abroad is increasing, and in the last few years this process presents a sharp upward trend as seen in Chart 1 below.

Chart 1: Migration of Croatian population, 2007–2016



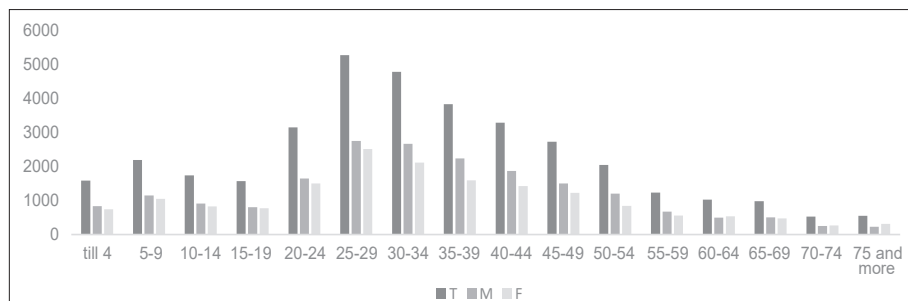
Source: Croatian Bureau of Statistics (2017a).

Numbers of emigrants from Croatia have peaked in 2016, as seen in Chart 1, from 29,651 in 2015 to 36,436 in 2016 although intensive emigration of the population began already in 2013. The main reason for migrating is the inability to find a job in Croatia which is suitable for one's education, skill or experience level. The majority of the population migrating are young people or families with children in a search for a better life, as shown further in Chart 2. However, as mentioned earlier, other reasons are increasingly highlighted.

Data show that 57.6 % (Croatian Bureau of Statistics 2016) of people aged 25–49 were unemployed in 2016, which is a very high rate of young unemployed people and the numbers are increasing (60.3 % in 2017, according to the Statistical Yearbook of Croatia (Croatian Bureau of Statistics 2017c)). Young people seem to be the most affected by the global crisis. Back then, they were in a transitional period, lacking professional experience and sometimes adequate knowledge and education, which made them a vulnerable employment group

(Obadić 2011). To minimise costs in such times, employers reduce the number of jobs and increase the number of low-income workers thus making employment unstable, which discourages young people from finding employment (Obadić 2017). This corresponds to Chart 2 where the peak of the migrating population is between 25 and 39 years, approximately, with the age group 25–29 having the total highest number of migrations (T = 5.263) equally distributed between male (M = 2.751) and female (F = 2.512). The labour active group that is most represented in emigration is the one trying to be active in the labour market but, unfortunately, with less success, as employers in Croatia are mostly looking for experienced workers, thus leaving the young people who have just graduated without many opportunities. To present the magnitude of the research issue, the following table shows population projections related to migrations.

Chart 2: International migration of population, by age and sex, 2016



Source: Croatian Bureau of Statistics (2017a).

Table 1: Population estimate of Croatia by main age groups, 2011/2017

Population	2011	2017	2011/2017
Total	4,284,889	4,125,700	–3.72 %
Under 15 years	652,428	594,300	–8.91 %
15–64 years	2,629,652	2,468,000	–6.15 %
65 years and above	661,333	825,400	24.81 %

Source: Elaboration modified by authors based on the Croatian Bureau of Statistics (2018).

The demographic trend shown in Table 1 demonstrates a strong negative trend in the age group under 15 (–8.91 %) followed by the 15–64 group (–6.15 %). The positive trend in the group 65 and above shows that Croatia is an ageing nation. This shows that, without young population, there will be a decline in employment rates associated with an increase of unemployment and growing economic inactivity, an increase in early retirement and the number of social benefits for the disabled and veterans, a growing share of informal economy and an increasing effect of discouraged workers (Obadić 2017), which puts in ques-

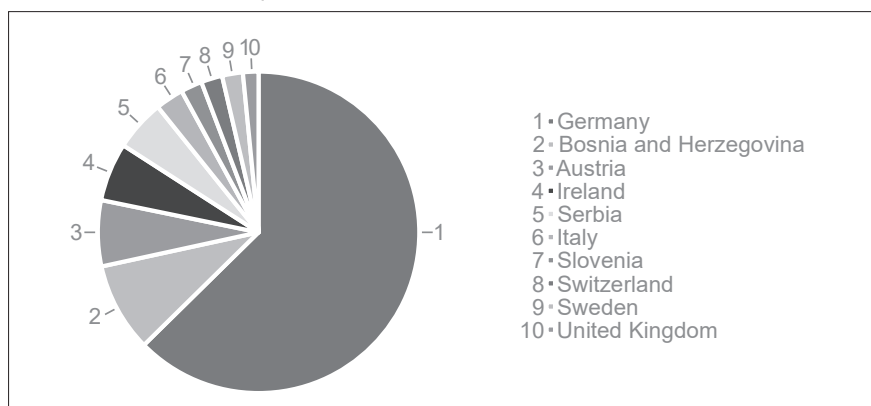
tion the prosperity of the country. Negative or positive effects of emigration from Croatia are best reflected in the national economy and are visible immediately and without a time lag. Emigrations are reflected in reduced spending and a decrease in total employment, as well as a decrease in budget revenues and expenditures due to the decline in the number of taxpayers and budget users (Jurić 2017). As the majority of emigrants is in the labour active group, the revenue side of the budget will suffer the most (Akrap et al. 2017). Akrap et al. (2017) emphasize an additional issue of the state budget structure itself, as most budget revenues come from the taxation of spending and a considerable part of budget expenditures is allocated for pensions. This will put even more pressure on the pension system in Croatia, with the already extremely unfavourable ratio of active insureds and pensioners 1.17:1 (Croatian Bureau of Statistics 2017b). In his study Šterc (2016) highlights that if the current state continues, Croatia will have a ratio of three inactive per one active insured, which is not sustainable in the long run.

Croatia is economically and population-wise a less developed country and, thus, more exposed to migration processes. By joining the EU which advocates labour mobility, its position further weakened (Mesić 2014). Even before the global crisis, Croatia faced numerous historical, political and economic circumstances that made it one of the countries with the most significant and long-lasting emigration. As Čizmić et al. (2005) state, in some periods more than a third of the Croatian population was outside their homeland. Emigration began in the 1960s, mostly to Germany. In 1972, nearly half a million migrants in Germany were workers from the former SFRY, and although official German statistics are not accurate as countries of the former SFRY were labelled as Yugoslavia until their independence, it seems that most of them were Croats motivated by political and economic factors (Čizmić et al. 2005). The positive and continuing migration trend is also confirmed by the data provided by the Croatian Bureau of Statistics and presented in the chart below.

Out of the total number of emigrants (36,436) from Croatia in 2016, the majority (56.08 %) migrated to Germany. The reason mainly lies in the already established Croatian migrant networks in Germany, which resulted in numerous mediations between family, relatives and others, which indeed plays a major role in emigration (Jurić 2017). Upon EU accession in 2013, the last major wave of emigrations (Jerić 2019) to EU countries, primarily to Germany, began and peaked in 2015, as presented in Chart 1. Following Germany is Bosnia and Herzegovina with 8.02 %. This can be explained with the high percentage of emigration from BiH in the post-war period and their subsequent return to their homeland (Pejanović 2006). Other top ten countries are Austria (5.94 %), Ireland (5.26 %), Serbia (4.60 %), Italy (2.53 %), Slovenia (1.93 %), Switzerland (1.91 %), Sweden (1.87 %) and the United Kingdom (1.40 %). A further research should investigate whether these countries are chosen for their geographic position or

for migration networks that have been created in the past. Countries and their main destinations shown further on in brackets (not presented in Chart 3, such as Asia (China), Africa, North and Central America (Canada and USA), South America, Oceania (Australia) and New Zealand, as well as unknown destinations) represent 8.12 % of the total migration. Migrations had a positive trend even after 2015, up until 2018 when total migration started to decrease. The labour mobility provided by the EU greatly contributed to Croatia's negative demographic trend, destabilizing healthcare, pension, work, financial and educational systems.

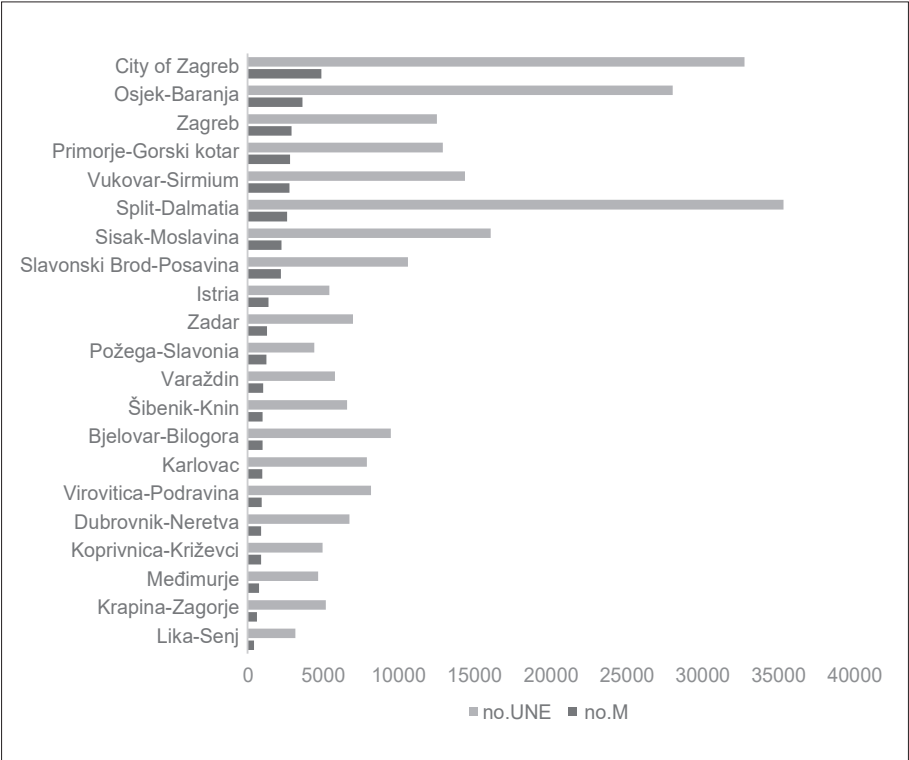
Chart 3: International migration from Croatia, by country of destination, 2016



Source: Croatian Bureau of Statistics (2017a).

Another issue is the internal migrations from specific parts of Croatia, which present an asymmetric and specific development. This increases the challenges facing Croatia as every new empty space encourages new migrations (Bališa 2019), both internal and external, continues the negative demographic trend, and decreases overall development. An example thereof is Continental Croatia, more precisely Slavonia. As this part is not as developed as Adriatic Croatia or Zagreb, the majority of the population migrates to more developed parts of Croatia or abroad, mainly to Ireland. Data presented by Rajković and Horvatin (2017) show that in 2016 the largest negative migration balance was related to the Osijek-Baranja county (-3,634 persons), followed by the Vukovar-Srijem (-2,763 persons) and Brod-Posavina (-2,208 persons) counties that recorded the highest numbers of emigrants, as presented in Chart 4. Demographic recourse can mainly be explained with continuous unfavourable processes that started before the Homeland War and resulted with pronounced spatial homogeneity of depopulation (Živić 2016). The following chart shows the number of unemployed population (no. UNE) and the number of emigrants (no. M) in all Croatian counties.

Chart 4: Unemployed population and emigrants by county in 2016



Source: Croatian Bureau of Statistics (2017a).

Although the Split-Dalmatia county has the highest number of the unemployed, as seen in Chart 4, the leaders in terms of the number of migrants are the city of Zagreb and the Osijek-Baranja county. The largest share of total unemployment is seen in the counties with the highest concentrations of population and the largest cities – Split-Dalmatia county, Zagreb, and Osijek-Baranja county (Botrić 2009, 85–86). Namely, after Croatia’s EU accession, the emigration of mostly the young labour active population intensified. The following table shows migrations by educational level.

Table 2: Total number of emigrants by education, 2013–2017

Education level	2013	2014	2015	2016	2017
Basic/secondary school education	36,600	41,800	47,300	54,600	60,600
Higher education	74,900	70,800	66,500	79,600	77,900
Total emigration	266,000	276,000	296,800	329,500	348,300

Source: Eurostat 2018.

Table 2 shows the total number of emigrants by education and confirms what has been stated above – that higher educated people are migrating. In such regard, it is necessary to draw attention to the transition from the education system to the labour market and to the ways to reduce the mismatch between the needs of the two, and investigate whether a high level of education is the answer to unemployment in Croatia (Obadić 2017). Some studies show that certain target groups in the labour market, such as non-economic migrants, young people, women and less educated workers, in most cases, have difficulties in finding employment, as opposed to the basic age group of men aged 25 to 54 (Obadić & Smolić 2007). Emigration from Croatia is twice as significant as reported by the Central Bureau of Statistics, as some researchers have highlighted (Živić 2016). Oračić (2008) argues that although there is no reliable and accurate data on the educational structure of emigrants, it seems that a relatively large number of highly educated young people left Croatia, half of them between the ages of 15 and 34, in search of higher salaries, better working conditions, and training opportunities. According to OECD (2018) data, 76,000 Croats immigrated to the developed countries of the world in 2016, although the statistics from the CBS and the Ministry of the Interior of the Republic of Croatia (2016) show that 36,400 people checked out of Croatia that same year. The majority migrated to Germany, which in 2016 registered 62,100 immigrants with Croatian citizenship. The OECD (2018) claims that 29,000 people emigrated annually between 2006 and 2015, while in 2015 and 2016 the number of immigrants moving to developed countries rose to 77,000 per year. Croatia is among the four EU countries with the largest drop in unemployment rate in 2018 according to Eurostat, but statistically this drop is the result of a decrease in overall active labour population rather than a direct consequence of positive economic trends.

3. Data and Methodology

Oračić (2008) states, as is also the case in this paper, that the relative position in the labour market is usually indicated by the unemployment rate and wages. Regarding this assertion and the assumption that the main reason for migration are low wages and high unemployment, while on the other hand there is a high demand for labour active population, the paper investigates the extent to which average monthly net wages and the number of the unemployed affect the emigration of the population using multiple regression analysis. The main hypotheses are as follows:

H_0 = *The number of emigrants from Croatia does not depend on average monthly net earnings and the number of unemployed persons in Croatia.*

H_1 = *The number of emigrants from Croatia depends on the average monthly net wages and the number of unemployed in Croatia.*

The research is based on annual data for Croatia in 2007–2016 collected from the Migration of the Population of the Republic of Croatia report (Croatian Bureau of Statistics 2017a) and the Statistical Yearbook of Croatia obtained from the Croatian Bureau of Statistics (2018). Data from Chart 1 are tested with a multiple regression model:

$$Y_i = \beta_0 + \beta_1 X_i + u_i \tag{1}$$

Where:

- $Y =$ dependent variable
- $X =$ independent variable
- $U =$ random variable
- $I =$ i number of observations
- β_0 and $\beta_1 =$ parameters of the model (β_0 intercept constant and β_1 slope coefficient)

According to the equation (1), the dependent variable is the number of migrations (M) and the independent variables are the number of the unemployed (UNE) and average net wages (W) for the period 2007–2017. Output results are presented as follows:

Table 3: Output results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	−263177.1	24878.52	−10.57848	0.0000
UNE	−0.101350	0.020847	−4.861616	0.0028
W	56.72374	4.662942	12.16480	0.0000
R-squared	0.962262	Mean dependent var		17230.11
Adjusted R-squared	0.949683	S.D. dependent var		9887.070
S.E. of regression	2217.812	Akaike info criterion		18.50763
Sum squared resid	29512129	Schwarz criterion		18.57337
Log likelihood	−80.28434	Hannan-Quinn criter.		18.36576
F-statistic	76.49612	Durbin-Watson stat		2.561423
Prob(F-statistic)	0.000054			

$R^2 \text{ adj.} = 0.9497$ $RSS = 29512129$ $X^2 \text{ Auto (1)} = 0.262$
 $X^2 \text{ Norm} = 0.599$ $X^2 \text{ White (5)} = 0.705$ $VIF = 1.05$

$M = -263177.1 + 56.72374 W - 0.10135 UNE \tag{2}$

Where:

- M = Number of migrated populations
 W = Average net wages in Croatia
 UNE = Total number of unemployed in Croatia
 RSS = Sum Squared Residuals
 $X^2 \text{ Auto}$ = Breusch-Godfrey test for autocorrelation
 $X^2 \text{ Norm}$ = Jarque-Bera test for normality of residuals
 $X^2 \text{ White}$ = White test for heteroscedasticity

Output results presented in Table 3 are obtained with EViews 9 software using data from Chart 1. Output results and equation (2) confirm the significance of the model as well as parameters. Furthermore, diagnostic statistics shows that the coefficients of variables are significant at 5 % level. For serial correlation presence, we used the Breusch-Godfrey test and obtained the critical value of 0.262, whereby the null hypothesis of second order correlation is accepted. The hypothesis of normally distributed residuals for the selected model can be accepted as Jarque-Berra statistic is 0.5999 and thus smaller than the critical value of $X^2 (2) = 5.99$. Finally, the White test is used to test the presence of heteroscedasticity and confirms the null hypothesis of no heteroscedasticity with 0.499.

To further confirm the tested model, mean absolute percentage errors (MAPE) are also tested according to equation (3).

$$MAPE = \frac{1}{T} \sum_{i=1}^t \frac{|Y_i - \hat{Y}_i|}{Y_t} \quad (3)$$

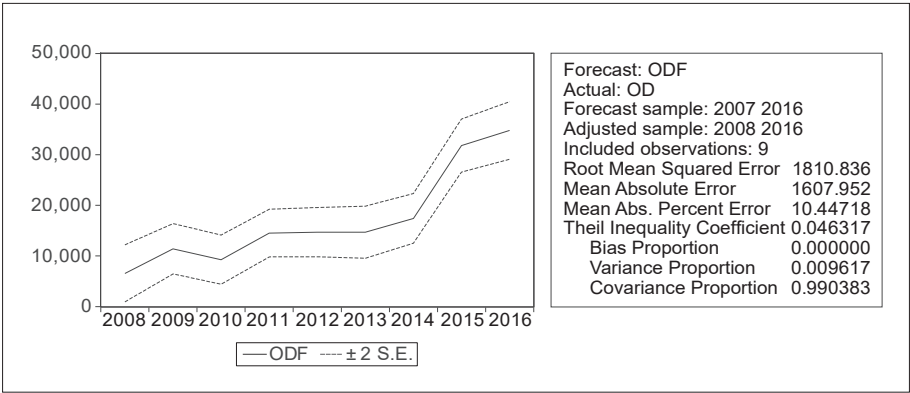
Where:

- Y = actual value of observations
 \hat{Y} = forecasting value of observations
 T = total number of observations
 t = time period

According to Baggio and Klobas (2011), when analysing models, MAPEs in the high-reliability rank or <10 % would be ideal, while models in the 11–20 % and 21–50 % range are classified as good or satisfactory. Models whose average values are greater than 50 % should not be further analysed, i.e. should not be accepted as significant. MAPEs for the model in equation (2) are shown below.

The model in Table 3 was additionally confirmed with the obtained MAPE at 10.44 %, which shows they are borderline in high-reliability rank, as mentioned above. This further confirms the significance of the model.

Chart 5: Obtained MAPE for tested model



4. Results

Equation (2) shows that even if the wages increase, the labour-active population will still migrate from Croatia. The hypothesis set in this paper about migration of the labour-active population depending on the average monthly net wages and the number of unemployed is confirmed by the multiple regression model. Furthermore, empirical results show that the tested model presents relatively good predictability performance in terms of MAPE. This proves that even if the average net wages increase and total unemployment decreases, the labour active population will continue to migrate. Although the model shows significance, it raises the question of what are the true motives of labour active population migration, considering that wage – as shown by the obtained results – obviously is not.

5. Discussion

Equation (2) shows that although the average net wages will increase by 56.72 in the coming period and unemployment will decrease by 0.10, the past period (2006) shows a decrease in wages. This past period, dominated by low wages and high unemployment, can be considered as a driver of intense active-labour population migrations and the global crisis that followed in the same period. For further research, it is necessary to analyse the level of education and jobs in order to obtain a more complete result for active labour population migrations. The limitation of this research is the low number of observations ($n=10$), which can be explained with the specific time period that was taken for analysis. In addition, the hypothesis is confirmed by the assumptions of the classical linear regression model. In addition, the significance of the model itself was confirmed by MAPE, which resulted in high reliability.

6. Conclusion

This research, explorative in nature, aims to identify the reason for emigration from Croatia in the period of the global crisis between 2007 and 2017, which mainly influenced this process in recent history. Being an aging country and in decline of active labour population – as presented by the above data – is facing an overall demographic challenge mainly in the labour market. The contribution of this research is to determine the effects of migration of the active labour population over a specific period – the global crisis and EU accession – and find out by means of a multiple regression model what drives individuals to emigrate. The dynamic migration history of Croatia plays an important role in defining active labour population as explained by numerous socio-economic factors. The main issue that emerged in this research is that the emigration of young and highly-educated population increased after EU accession, which additionally influenced changes in the decreased activity rate of the labour market. In a dynamic environment such as the labour market, this is not surprising. This leads us to the conclusion that additional measures should be introduced to encourage labour active population to remain in Croatia and even return. If wages are not a key factor for leaving or staying, then the measures should be oriented towards the social aspect of an individual who is eager for growth and development and for an opportunity for additional education and the acquisition of good practice, as offered abroad. In addition, Croatia lacks existential security and stability. With the decrease in active labour population, increasing difficulties regarding the state budget and the financing of a growing number of pensions can be expected.

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