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Labour Market and Immigration Nexus in V4 countries: Using Panel Data Analysis for the Period of 2000-2020

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Abstract

Immigration and its effects have been a heating topic among V4 countries after the 2014 migration crisis. Hence the current study is interested to study the relationship between unemployment and immigration in the case of V4 countries. Accordingly, it covers 20 years for the period of 2000 to 2021. Using secondary dynamic panel data and applying fixed effect with Driscoll and Kraay standard errors. The result of this paper indicates a positive and significant effect of immigration on unemployment. Policy recommendation includes immigration integration policy and prioritise economic growth, inflation, labour movement free movement within EU and development policies while incorporating immigrant as factor to propel the growth in the labour-intensive industry.

Keywords: *Labour market; immigration; Visegrad countries*

Introduction

In 2004, the Visegrad Group (VG)[5] which includes four countries such as Slovakia, Czech, Poland, and Hungary was created; the primary goal of these countries was to enter to the European Union (EU) and North Atlantic Treaty Organization (NATO) (Bauerová 2018). Since the achievement of its primary goal, the main concern was to continue its activities or end its existence. However, entering the EU met the main goals of VG, still it was required to further take new responsibility and encounter new challenges, such as the migration crisis of 2014. Thus, the VG was considered to extend its scope to shared migration challenges and cooperate as a united and collective response to migration policy implementation within the EU and V4 countries. The objective was primarily to negotiate migration issues within the EU institutions and present the region as a united front with shared interests and concerns (Bauerová 2018; Grumstrup et al., 2021; Stefancik et al., 2021). However, individual motives of each member country have been the main concern.

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[5] The Visegrád Group is a cultural and political alliance of four Central European countries: the Czech Republic, Hungary, Poland, and Slovakia which was founded in 1991.

Basically, the policy response and operation of V4 in terms of addressing the migration crisis is oriented into two levels. The first part is the united action of V4 countries with consideration of shared interest and their reaction to EU policy. The second level of policy action is represented as an individual response by four countries separately (do Nascimento Tabosa, 2018; Sahoo & Pradhan, 2021). After years, however, partially the problems arising from migration crisis have been addressed, but still a lack of a comprehensive and united policy approach to efficient and adaptable migration management, which ensures an optimal degree of incoming migrants and integration into the host countries' society seems unachieved, hence it requires in depth and further analysis.

Immigration has been considered a dynamic phenomenon with a complex cause and effect relationship and various consequences on economy and society as a whole. One of these impacts is on the labour market, specifically on unemployment (Kilic 2019; Kabir, 2021; Vorobeva & Dana, 2021). Accordingly, this study explores, assesses, and analyses the impact and relationship of immigration and unemployment in V4 countries. In addition, this study will immensely contribute to our understanding of the exact impact of immigration on unemployment with consideration of applying scientific research methodology and presenting policy implications and recommendations.

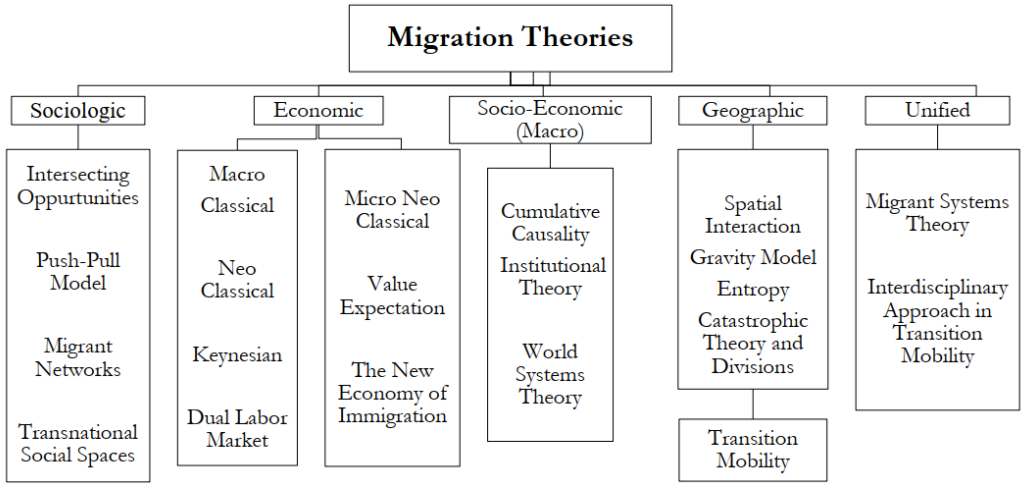
The main objective of this study is to empirically analyse the impact of immigration on unemployment for a panel of V4 countries. The hypothesis is presented as follows: "A negative relationship exists between immigration and unemployment in the V4 countries."

Theoretical Framework

Migration, defined as movement of people from point A to Point B for any reason, bears and triggers continuous changes in the social, economic, and political system of sending and receiving countries. The motive to migrate has been evolving from time to time and has immensely contributed to the ongoing updating of the theoretical framework. For example, after the Second World War, the main motive was the labour market, while more recently wars and internal conflicts are considered as main push factors which contributed to the concept of (in)security centered theoretical approaches (Cohen and Sirkeci, 2011; Sirkeci, 2009; Heywood, 2013; Stefancik et al., 2022; Onyusheva, 2022; Lloyd and Sirkeci, 2022). Particular to this study, since our focus is on the economic aspect of migration, the theoretical framework is focused on the economic perspectives. However, several theories of international migration have been developed which is summarised in the below table by *(Bijak, 2006)*.

Among the economically based migration theories explaining the decision of people to migrate is the Push-Pull model, put forward by Everett Lee. According to this theory, the decision to migrate is directly related to the development in the recipient country as a pull factor and driving push factor in the source country. He further explains that even the decision to migrate cannot be rational and it can be obligatory, depending on the intensity of push factors and the attractiveness of the pull factors (Lee, 1966).

Figure 1. Immigration Theories Scheme (Bijak, 2006)



The neoclassical Micro and Macro which is also known as equilibrium theory, considering labour force and capital imbalance as main factor of labour movements. According to the theory developed by Lewis (1954), high wages and a shortage of labour force in wealthier countries motivate labour force from poor countries with lower wages and limited job opportunities to migrate to rich countries, which brings the balance in the international labour market (Lewis, 1954). Thus, it is perceived that if there is no wage difference, individuals will be less keen to migrate.

A theory called "Divided Labour Market" was developed by Piore (1986) to study the relationship between the labour market and migration. He argues that wages are not a necessary condition for labour migration, indeed the structure of the labour market plays a key role. He divided the labour market into labour intensive with lower skills and labour market with high skills which is considered more stable. As long as there is demand for unskilled labour in the labour-intensive market, more will be migration motive to these markets (Piore, 1986).

To understand the dependency relationship between migration and labour market, the "Cumulative Causation Theory" is important. It is a common current approach where the migration stream changes the social framework and labour market structure. The concentration of migrants in certain sectors or industries of the host countries labels that sector as immigrant work, and as a result, this kind of jobs are no longer preferred by and not preferred by domestic workers. Therefore, to keep that industry alive, constant and permanent inflow of immigrants is required and the relationship of migration and labour market becomes permanent (Massey et al., 2014; Ushakov, 2022).

While analysing the migration and labour market nexus, the theoretical framework we can summarise indicates that the relationship between migration and labour market is interaction oriented. However, the degree of the relationship between migration labour markets is not concise and clear. Moreover, there is still lack of a well-established convergence among migration researcher on a single migration model to form hypothetically relevant determinants

into one concrete theoretical framework which will serve as guiding principle for future studies (Bodvarsson & Van den Berg, 2013; Mkiyes, 2021).

Empirical Literature

Literature examining the relationship of migration and labour market is dominated by studying migration's impact on employment and unemployment, wages, and productivity at micro and macro level. Meanwhile, various approaches and methodologies are considered; some researchers conducted at national level, while some other have been at international or regional level. In this part, the aim is to present a review of literature with specific focus on the understating of migration and unemployment empirical relationship, methods applied, and outcome.

Marios Stephanides believes that migration depends on other factor such as skill, education level, immigrants 'characteristics, differences in waves, total number of immigrants in a country, and the legal status of immigrants. Therefore, the result might vary over time and affect several factors such as changes in relative wages and human capital investment by domestic worker (Christofides, 2009; Galstyan et al., 2021; Sirkeci et al., 2022).

At Micro-level, K. Kulkolkarn and T. Potipiti (2007) researched the relationship between migration, wages, and unemployment in Thailand. They applied Ordinary Least Square (OLS) method for the period of 2001-2005. The result indicated a statistically significant negative relationship of migration on unemployment. Additionally, a study conducted by Vincent Fromentin (2013) to study the relationship between immigration and unemployment in France. With the application of system of equations for immigration, wage, GDP, and unemployment, the estimation of cointegration did not indicate any changes in unemployment due to immigration, while the result from vector error correction model suggests a negative impact.

Neutrally, a study conducted by F. Mete (2004) to explore the relationship between migration, GDP per capita, and unemployment in Finland for the period of 1981-2001. Applying the Granger causality test, he found no statistically significant causality relationship between migration, unemployment, and GDP per capita.

At macro level, a study by Esposito et al. (2020) used Panel Error Correction Model with consideration of core-periphery effects with the sample of 15 EU countries and for the period 1997-2016 studied the impact of immigration on unemployment. The finding of the study reveals that in the long run immigration reduces unemployment in the peripheral countries, while in the short run it reduces for the whole sample.

Additionally, a panel data study conducted by Latif Ehsan (2015) to reveal the relationship between immigration and unemployment in Canada. In this study the author applied panel econometric techniques such as FMOLS, DOLS, and panel VECM. The result clearly indicates that in the short run immigration has a significant positive impact on unemployment, while in the long run it has a negative but insignificant impact. Furthermore, the author argues that in the short run immigrant's adoptability barriers such as their skill and education contribute to the positive relationship, while in the long run they get more experience and education which helps them to adopt and compete in the market.

Meanwhile, P. Epiphany and G. Gancia (2005) conducted a study to understand regional effects of migration on unemployment and trade. The study applied spatial econometrics analysis and found that migration decreases regional unemployment in the short run, whereas it increases unemployment in the long run.

To sum up, various research concluded with numerous impacts of immigration on unemployment. Understanding of these studies highlights the gap in immigration and labour market nexus in case of V4 countries. Therefore, this paper contributes to fill the gap by applying a different methodological approach.

Methodology and Data

To conduct the analysis, the study will apply panel data analysis and multiple regression model, using Fixed Effects Estimation with Driscoll and Kraay standard errors test and several diagnostic tests, such as multicollinearity (VIF), autocorrelation, and heteroscedasticity. Further, to have a more reliable result, the study will further apply test for robustness as well, to solve for possible heteroskedasticity and endogeneity between the variables.

The Model

The paper applies a multiple regression econometric model to study and assess the relationship of a single dependent variable, which is unemployment with multiple independent variables where the immigration is the focused variable of the study. It is worth mentioning that we utilised a similar model which was used by Kilic et al. (2019) and J Ortiz et al. (2015) for studying the impact of migration on unemployment. Besides, control variables such as wage, inflation, per capita growth, and also EU enlargement dummy and 2014 immigration crisis dummy for discovering the best inferences are included.

Multiple Regression Model (Panel Data Analysis):

Function: $Yj = f(X1j + X2j + Xnj)$ (1)

Econometric Specification: $\log(\text{Unemployment})it = \mu i + \delta t + ß1\log(\text{Immigration})_{it} + ß2\log(\text{Inflation})_{it} + ß3\log(\text{Wages})_{it} + ß4\log(\text{GDPPG})_{it} + ß5(\text{EU-Enlargement})_{it} + ß6(\text{Crisis2014})it + \varepsilon_{it}$ (2)

Where μi and δt capture the unobserved country-specific effects and time specific effects, respectively, and $\varepsilon i,t$ is the error term and is assumed to be i.i.d. null mean and variance equal to σ^2_{ε}.

Data and Variables

The study observes secondary data sources extracted from the World Bank's World Development Indicators (WDI), Eurostat, and OECD databases for 20 years (2000-2020). Regarding the expected sign and justification of the variables, as per the literature on relationship of immigration and unemployment, the expected sign can be either positive in the short run and negative in the long run. It is believed that higher wages encourage an increase in the labour supply and less demand for labour; however in the long run the market will adjust or return to equilibrium. Inflation in the short run can contribute to employment and decrease unemployment, but in the long run, the effect can be the opposite, and the

expected sign is negative. Additionally, it is perceived that GDP per capita also represents productivity of a nation or labour force, therefore as the productivity increases the demand for labour force also increases, as result the unemployment decrease. We also assume that EU enlargement has provided the opportunity for labour force movement across other EU countries and triggered or challenged competitiveness of domestic industries which might increase unemployment in the V4 countries. Finally, to know the exact impact of migration crisis started in 2014, we also added a year dummy for 2014-2017.

Table 1. Description of Variables

Variables	Description	Expected Sign	Data Source
Unemployment	Unemployment Rate (%)	Neutral	Eurostat, (2022)
Immigration	number of immigrants (in 10000)	-/+	Eurostat, (2022)
Wages	Wage (%) salaried workers	+	World Bank
Inflation	Consumer price index (%)	-	World Bank Data Bank
GDPPG	Gross domestic product per capita in constant 2010 US dollars growth (%)	-	World Bank national accounts data
EU-Enlargement	Dummy variable indicating the EU enlargement in 2004 for all V4 countries (0,1)	+	European Union (2022)
Crisis 2014	Dummy variable on 2014-2017 immigration crisis	-	European Commission

Source: Compiled by author

Table 2. Summary Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Unemployment	80	9.207143	4.752876	2	20
Immigration (10000)	80	5.604834	6.723045	.2023	22.6649
Inflation (CPI)	80	3.143236	2.581581	-.8741259	12.03578
Wages	80	83.467	6.195418	68.84	93.1
GDP-precipitate growth	80	2.969221	3.117439	6.45067	10.79969
EU-Enlargement	80	.047619	.2142379	0	1
Crisis2014-2017	80	.047619	.2142379	0	1

Source: Stata calculation

Result

Model Specification Tests

To test if the model and selection of independent variables is appropriate, we applied Ramsey specification, Ramsey test for possibility of omitted variables and link test for single equation model. The result for both tests indicates the correctness of the model specification as shown in Table 3 (Mehmood, 2014).

Table 3. Ramsey and Linktest tests

Model Specification	Ramsey Test Ho: Model has no omitted variables	F(3, 67) = 0.51	p-val> F = 0.6797
	Linktest (Single equation estimation)	_hat	p-val = 0.931 > 0.000
		_hatsq	p-val = 0.301 > 0.000

Source: Stata calculation

Test for Multi-Collinearity

It is considered important before running a regression analysis for possible multi-collinearity among the independent variables. For this purpose, we have the variance inflation factors (VIFs) test. As a role of thumb if the VIF exceeds 10, which usually happens when R2 exceeds 0.90, indicating multicollinearity. To test for that, we applied the VIF and the result is indicating mean value of VIF 1.26 which is less than the threshold and thus no multicollinearity, as depicted in Table 4 below (Akinwande, 2015).

Table 4. VIF Test Result

VIF Test		
Variables	**VIF**	**1/VIF**
Immigration	1.26	0.795084
Inflation (CPI)	1.64	0.609213
Wages	1.16	0.862456
GDP-precipitate growth	1.03	0.967815
EU-Enlargement	1.04	0.962571
Crisis2014	1.46	0.876486
Mean VIF		**1.26**

Source: Stata calculation

Correlation Test

To have more accurate result of our analysis, it is important to test for possible correlation among the variables of our interest. Generally, if the correlation value of two variables is more than 0.5 it should be considered problematic for further regression analysis. As for our variable, it seems acceptable, except for our variable of the focus which is 0.6 and leads us to further investigation.

Table 5. Correlation Test

	Unemployment	**Immigration**	**Inflation**	**Wage**	**GDP per capita**	**EU-enlargement**	**Crisis -2014**
Unemployment	1.0000						
Immigration	-0.6900*	1.0000					
Inflation	0.2096*	-0.4537*	1.0000				
Wage	-0.03599	-0.1588	-0.0891	1.0000			
GDPpercapita	-0.0619	-0.0732	-0.0990	-0.0755	1.0000		
EU-enlargement	0.1235	-0.0235	0.0017	-0.0263	0.1124	1.0000	
Crisis-2014	-0.2223*	0.2614*	-0.4492*	0.0401	0.0380	0.4464	1.0000

S*ource*: Stata calculation

Tests for Serial Correlation and Heteroskedasticity

To test for the possibility of serial correlation, existence of which might misinterpret the result and finding of our research. Hence, we conducted the Wooldridge and Bruch-Pagan test. In case of micro panel data where the number of years is less than 20 years, it is expected to have possible serial correlation. This means that standard errors of coefficients are smaller than their actual values. The result from Wooldridge accepts the null hypothesis (p-value > 0.05 & p-value > 0.01).

Additionally, the existence of Heteroscedasticity can result in wrong estimates of standard error for coefficient and hence of their t-value. To test for that, we applied Breusch-Pagan / Cook-Weisberg test for heteroskedasticity and the result in Table 8 rejects the null hypothesis

of constant variance. This means the possibility of being heteroskedastic and the likelihood of bias, inconsistency, and inefficiency in coefficient of the regression result is somehow not controlled.

Table 6. Tests for Serial Correlation and Heteroskedasticity

Wooldridge Test for autocorrelation		**Breusch-Pagan / Cook-Weisberg test for heteroskedasticity**	
H**o:** No First Order autocorrelation		Ho: Constant variance	
F(1, 3)	100.452	**χ2 (1)**	8.13
p-val > F	0.0021	p-val> χ2	0.0870
STATA 14.2 xtserial command		STATA 14.2 hettest	

Source: Stata calculation

Hausman Test

To choose whether fixed effect or random effect test is the appropriate panel model, we applied Hausman test. The result from Hausman test is based on the following hypothesis testing.

H0: Individual effects are random,

H1: Individual effects are constant,

As a result, the null hypothesis was not rejected at the 99% confidence level because the relevant p-value is 0.0001 which is less than 0.05. Therefore, the Fixed effects model was used to continue the analysis.

Table 7. Hausman Test Result

Variables	**Coefficients**		
	(b)	**(B)**	**(b-B)**
	FE	**RE**	**Difference**
Immigration	-.2902496	-.3059502	.0157006
Inflation (CPI)	-.0976668	-.3059502	-.023557
Wages	.9790418	-2.052517	3.031559
GDP-precipitate growth	-.1498901	-.1163909	-.0334992
EU-Enlargement	.3105632	.218585	.0919782
Crisis2014	-.3384896	-.3514762	.0129866
Ho: difference in coefficients not systematic		b = consistent under Ho and Ha; obtained from xtreg	
Prob>chi2 = **0.0001** chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B) = **29.13**		B = inconsistent under Ha, efficient under Ho; obtained from xtreg	

Source: Stata calculation

Regression Result

The result from the Wooldridge test for autocorrelation and Breusch-Pagan / Cook-Weisberg test for heteroskedasticity indicates to apply the fixed effects regression with Driscoll and Kraay Standard Errors. Similar treatment was done by Mehmood; Mustafa, Hassan (2014). The result in the bellow table indicates not much disturbing difference between the fixed effects estimates.

Table 8. Regression Result

-From model 1-6 are the Fixed Effects estimator applied
-Model 7 is the Fixed Effects Estimation with Driscoll and Kraay standard errors

Models	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Immigration	-0.286***	-0.312***	-0.285***	-0.294***	-0.291***	-0.290***	-0.290**
	(0.0376)	(0.0426)	(0.0466)	(0.0475)	(0.0456)	(0.0447)	(0.0968)
Inflation (CPI)		-0.0443	-0.0346	-0.0324	-0.0917	-0.0977*	-0.0977**
		(0.0415)	(0.0416)	(0.0415)	(0.0460)	(0.0452)	(0.0276)
Wages			-0.00256	0.408	0.729	0.979	0.979
			(1.265)	(1.345)	(1.298)	(1.279)	(1.415)
GDP-per capitate growth				-0.138*	-0.132*	-0.150*	-0.150*
				(0.0611)	(0.0588)	(0.0584)	(0.0677)
Crisis2014-2017					-0.348*	-0.338*	-0.338*
					(0.134)	(0.132)	(0.151)
EU-enlargement						0.311	0.311 **
						(0.161)	(0.0895)
Constant	4.979***	5.282***	5.030	3.470	2.121	1.015	1.015
	(0.375)	(0.441)	(5.427)	(5.743)	(5.544)	(5.467)	(5.575)
R-squared	0.386	0.399	0.371	0.430	0.482	0.509	0.509
adj. R-sq	0.360	0.363	0.323	0.372	0.421	0.443	
N	77	77	77	77	77	77	77

Note: Standard Errors are presented in the parentheses. *** denotes significant at 1%, ** at 5%, and * at 10%.
Source: Stata calculation

According to the regression model, our main variable of interest, immigration, indicates positive and significant relationship with unemployment, it means a 1% increase in the inflow of immigrant will decrease unemployment by 0. 29 %. This result is consistent with work of Kilic, Cuneyt, Mesut Yucesan, and Halil Ozekicioglu (2019), K. Kulkolkarn and T. Potipiti (2007), B. Heid and M. Larch (2011), V. Fromentin (2013) and E. Latif (2015). Other variables such as inflation, GDP per capita growth, the migration crisis of 2014-2017 and EU enlargement are also significant.

Conclusion

Given the result of our regression, it can be safely concluded that the relationship between immigration and unemployment is statistically significant and negatively correlated.

Our regression analysis undeniably shows that immigration is not a significant source of unemployment in the V4 countries. It is also concluded that unemployment is strongly related to economic growth, inflation, and EU enlargement in the V4 countries.

As a result, in the context of V4 countries the, priority should be given to incentivise such as economic growth, inflation, and free labour movement within the EU while incorporating immigrants as a factor to propel the growth in the labour-intensive industry.

Currently, many areas are not explored when it comes to studying the impact of immigration on unemployment. In particular, there is a need to study more closely the impact of immigrant on the domestic labour market with consideration of various characteristics of the labour market and immigrants in that market.

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