

OUTWARD FDI AND INWARD MIGRANT

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**Outward FDI from West EU to CEE and Inward migration from CEE to
West EU: A Time and Country-Pair Gravity-Model Analysis Using PPML and
GMM Methods**

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Master's thesis

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The thesis is 22,255 words in length, excluding Appendices.
I have written this Master Thesis independently. Any ideas or data taken from
other authors or other sources have been fully referenced.

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Acknowledgement

The completion of this thesis signifies the end of my journey as a master's student. During my year in London, I acquired the foundational skills necessary for my thesis while also experiencing the rich diversity that the city has to offer. My year in Tartu was equally enriching, where I met many inspiring mentors and friends who contributed to the depth of this thesis.

My deepest gratitude goes to my thesis supervisor, Jaan Masso, who has been an invaluable source of guidance and support throughout this process. He consistently took the time to answer my questions, no matter how trivial they seemed, and provided constructive feedback and precise direction for my research. His meticulous approach to scholarship and his generous, patient manner have profoundly influenced me.

I also want to express my heartfelt thanks to my parents, whose unwavering support and encouragement have been indispensable throughout my academic journey. Whether it was comforting me during challenging times or sharing in my achievements, their silent support has been a constant source of strength.

Lastly, I am grateful to my friends for their care and assistance during this period. Your companionship has made my academic journey less solitary and more fulfilling.

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Abstract

This paper explores the relationship between Foreign Direct Investment (FDI) from Western European (West EU) countries to Central and Eastern European (CEE) countries, and migration from CEE to West EU over the period 2005 to 2020. Using Poisson Pseudo-Maximum Likelihood (PPML) and Generalized Method of Moments (GMM) methodologies, our analysis focuses on several dimensions of this relationship and involves time and country pair. We aim to solve the questions: Five questions can be concluded from above: (1) What is the relationship between Western Europe's FDI and migration from Central and Eastern Europe? (1) What is the relationship between Western Europe's FDI and migration from Central and Eastern Europe? (2) Does FDI have a lag effect on migration? (3) Does the relationship between FDI and migration vary by time and country-pairs group? We find a consistent positive correlation between FDI and migration, indicating that increases in FDI are associated with increases in migration. Notably, our findings suggest that FDI does not have significant lagged effects on migrations. This is in addition to the fact that this relationship between FDI and migration is robust across different periods but the relationship would have been weakened by significant shocks associated with, for instance, the 2008 financial crisis, the 2015 refugee crisis, and the 2020 COVID-19 pandemic. Our results further suggested that the relationship between FDI and migration of country pairs including Russia, Poland, and Romania is not stronger than other country pairs even when economic size is factored in. These findings contribute to the understanding of how economic investments and national policymaking in EU countries interact with migratory patterns, noting complex causality flowing from economic incentive towards human mobility.

Keywords: *Outward FDI, Inward Migration, West EU to CEE, Country-Pair Data, PPML & GMM*

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1 Introduction

FDI and migration are two crucial economic and social factors of the global economy, and their influences are interrelated. Economically, FDI significantly drives economic growth, for it creates jobs, augments productivity, and brings new business practices; investment also channels capital into the recipient countries' economies, technologies, and managerial know-how. At the same time, migration enriches these economies by filling the gaps in labor, introducing a wide range of skills, and fostering innovation. Socially, it greatly influences the cultural dynamics of the new homeland, affecting language, religion, food, and art (Levitt, 1998).

However, along with benefits, both FDI and migration bring certain challenges with them. Though global interconnectedness has been enhanced in recent decades, the connection between FDI and migration has gained share in national economies. Economists are generally of this view that these components lead to net gains in national wealth and capacity (Basu & Guariglia, 2007; Dollar & Kraay, 2003). The distribution of these gains, however, is uneven among people and regions within countries. The political controversy and resistance can be quite high in this regard. A reaction has been attributed to globalization through FDI and migrations—a wave of economic and cultural backlash in host countries because the local people feel threatened by foreign influence. It has been argued that while at a point in time migration tends to drain developing nations of skilled labor, on the other hand, it may also flow leading to FDI and hence reciprocal benefits. Increased FDI, stimulated by migration, can help mitigate the negative impacts of the brain drain over the long term (Qureshi & Wan, 2008; Winters et al., 2004). Therefore, managing the dynamic interplay between FDI and migration is crucial to balancing the substantial benefits with potential socio-economic and cultural disruptions.

Empirical research to the effect of migration trends from CEE countries to Western Europe after the EU enlargements in 2004 and 2007 is extensive. This scholarship includes detailed examinations of migration dynamics and organizational structures in Europe with particular foci on the flows from CEE countries. The more important studies consider the migration processes particularly from countries like Poland (Okólski, 2000) Hungary and the Czech Republic, and evaluate the impact on both sending and receiving nations. Another particular focus has been on the role and dynamics of migrant networks that are very important in showing the movement that is taking place from CEE nations to Western European countries. Moreover, the

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impact of EU expansion on the economic dimension of source and destination countries has also been an area that has attracted a lot of sensitivity as far as research is concerned (Dustmann et al., 2003). Scholars like Brücker & Baas (2009) further provided elaborate analysis of the aspect of labor migration after the year 2004, examining how the transitional arrangements with regards to free movement of workers have impinged on both regions. Still, yet, other scholars have centered on sub-topics like causes of migration (Boswell, 2002). This has also been pivotal in the understanding of the broader implications of these migratory movements. According to findings by Brücker & Trübswetter (2007), possible migration patterns from new member states to EU-15 countries. Thus, narrowing the focus to investigate how FDI from West EU into CEE countries and inward migration from CEE countries into Western Europe should potentially yield an elaborate understanding of how EU enlargement has changed the relationship between FDI and migration on the European continent.

FDI links with migration in a very intricate, multi-dimensional relationship. FDI inflows from migration-receiving to migration-sending countries raise higher wages and better job quality in the migration-sending countries throughout subsidiaries in the form of FDI from migration-receiving countries, compared to wages offered by local companies. and, over time, decrease the number of potential migrants in sending countries (Federal Reserve Bank of San Francisco et al., 2016; Ratha et al., 2011). Conversely, FDI can drive down migration costs as it provides good knowledge about receiving countries, which can be widely diffused by existing migrant networks. It can help reduce information costs and might raise migration as well (Cuadros et al., 2016). Policy changes at the national level play a very crucial role in determining migration and FDI, as one set of policy changes can determine the influence of FDI on migration over time. Therefore, the complex interplay between FDI and migration necessitates an understanding and managing these linkages to see that the benefits from these institutions are optimized for global development.

Using simple OLS, PPML, and GMM methods, based on 98 country pairs across 2005 to 2020 year, we seek to elucidate the specific relationship between FDI from Western Europe and migration from Central and Eastern Europe. Three questions can be answered from the above: (1) What is the relationship between Western Europe's FDI and migration from Central and Eastern Europe? (2) Does FDI

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have a lag effect on migration? (3) Does the relationship between FDI and migration vary by time and country-pairs group?

Our findings indicate a positive relationship between migration from CEE to West EU and FDI from West EU to CEE. This suggests that an increase in FDI from West EU to CEE is associated with an increase in migration from CEE to West EU. In the PPML and GMM model, the results were consistent and did not provide sufficient evidence of a lag effect of FDI on migration. In the GMM method, we mainly use two methods: IV-GMM and DGMM. And the institutional quality variable was used as an instrumental variable in IV-GMM. Both GMM regressions consistently showed a significant positive relationship between migration from CEE to West EU and FDI from West EU to CEE. The IV-GMM regressions were run separately for different time periods, each including a set of year dummies. Likewise, the DGMM regressions included year dummies.

From perspective of time control, the relationship of FDI and migration approximated high robustness using PPML and IV-GMM across three different periods—thus it implies that this temporal factor does not significantly affect the relationship of FDI and migration. PPML and IV-GMM contain many years which are statistically significant between 2005 to 2020 such as from 2009, 2015 to 2020, while DGMM regressions have also put emphasis on the years like 2014, 2016, 2020. It suggests there are events that have been timelined, such as the 2008 financial crisis, the 2015 refugee crisis, and the ongoing 2020 COVID-19 pandemic, which can influence migration.

From perspective of country-pair control, We split into two groups, one involving pairs of countries with larger economies in Russia, Poland and Romania, and the other involving pairs of countries in other Central and Eastern Europe. Using PPML and GMM, respectively, we further demonstrate that the coefficients of FDI and migration are larger in the other CEE country pairs relative to the pairs involving more migrants in Russia, Poland and Romania, even though we control for the size of their economies.

In the second section, we will delve into the theoretical aspects of the relationship between FDI and migration, followed by empirical research to investigate the specific factors influencing this relationship. The third section will be dedicated to detailing our research model, data, and the estimation techniques used. The fourth section will present an analysis of the descriptive statistics and discuss the outcomes

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of the regression analyses. The fifth section will discuss main estimation results. The concluding section will summarize the findings and policy implications and then address the limitations of our research.

2 Literature Review

We will first discuss the relationship between FDI (Foreign Direct Investment) and migration from a theoretical perspective. We then proceed to observe this relationship through empirical examples, followed by an examination of factors influencing this relationship from an empirical viewpoint.

2.1 Theoretical Framework

From a theoretical perspective, the relationship between Foreign Direct Investment (FDI) and migration is complex and multifaceted. Classical theories typically view FDI as a capital flow and migration as a movement of labor, two fundamental factors of production. Through the lens of international trade and factor mobility, theories such as those proposed by Markusen (1983) and Mundell (1957) suggest that FDI can reduce the total volume of migration by aligning wages between the source and recipient countries. Additionally, the New Economics of Migration posits that the relationship between FDI and migration is ambiguous. On one hand, FDI can reduce wage disparities between countries, potentially lowering migration. On the other hand, FDI might enable lower-income families to improve their quality of life through technology transfer, thereby reducing migration costs and possibly increasing migration (Chiswick, 2000).

From the company's perspective, a series of ways through which FDI and migration are interrelated. Multinational companies transfer employees from the foreign subsidiary to the headquarters, thus leading to the transfer of skills and technology (Mayer & Riphahn, 2000). Another way through which immigrant networks ease FDI is since they are established and operate in both the home and host country – thus better information and understanding (Batista et al., 2007). Along these lines, re-migration aids in the enhancement of transnational relations, in that returnees who reintegrate into the society make effective networking that assists in gaining partnerships between former employees overseas and possible countrymen subsidiaries back at home (Mayr & Peri, 2008).

Finally, considering the perspectives of developed and developing countries, Sassen (1990) theorizes that while neoclassical economic theory asserts that FDI in the source country tends to promote job creation and reduce migration from less developed countries (LDCs), it can also lead to internal economic imbalances in host LDCs, potentially driving migration to more developed countries. This dynamic is

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fueled by the reshaping of internal economic structures in LDCs to meet the demands of more developed nations.

Discussing the relationship between FDI and migration from a theoretical perspective reveals ambiguity, even though most theoretical viewpoints suggest that the relationship between FDI and migration is inverse. Next, we will primarily explore new directions in the relationship between FDI and migration from empirical studies.

2.2 Empirical Study

2.2.1 The Relationship between FDI and Migration

The relationship between FDI and migration is notably complex. D'Agosto et al (2013) find that there is a strong positive relationship, or complementarity, between migration flows and FDI. However, FDI can also act as a substitute for migration by influencing direct and indirect labor demand. This means that the relationship between FDI and migration can be either positively or negatively correlated.

Regarding the positive effects between FDI and migration, FDI can attract migrants by creating jobs and offering higher wages, whether in migrant-sending or migrant-receiving countries. Karlsson et al. (2007) in research on employment growth in China due to FDI had showed a positive effect. The explosion of employment being generated by the inflow of FDI was compelling many local provinces to cater to the demand of the labor market, and as a consequence, there was an avowed swelling in the population of migrants into these provinces or from the neighboring provinces for employment opportunities. According to study of Marelli et al. (2014), , generally, FDI inflows have a positive employment multiplier effect in the macroeconomy for all economic sectors except the construction sector, the positive effects are felt more in the Northern and Western EU regions, for instance, Scandinavian countries, Denmark, Ireland, United Kingdom, France, Germany, Belgium, Luxembourg, Netherlands, and Austria as opposed to the Central and Eastern European and Southern regions. This outcome gap in employment may be one of the reasons why migrants coming from Central and Eastern European regions into Northern and Western EU regions also have higher wage levels than those coming from Southern ones. In the same vein, Konings (2004), with data at the firm level for more than 1,000 European transnationals and their affiliates, also confirms that the phenomenon of FDI has an important effect on employment in a country, thus determining

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migratory patterns inside Europe as well, since higher areas in employment can attract migrants seeking better economic prospects. This is in a similar line with Aladelusi and Olayiwola (2021), who explored the influence of FDI on job creation in Nigeria over this 35-year period and found that much of it came from FDI, mainly in influencing migration to Nigeria for a better economic opportunity.

Regarding the negative effects between FDI and migration, particularly for migrant-sending countries, the areas receiving FDI inflows typically have more job opportunities and are often more developed. This can lead to a reshaping of internal economic structures in some less developed countries by decreasing labor supply to meet the external demands of more developed countries (Sassen, 1988).

2.2.2 The Factors Influencing the Relationship between FDI and Migration

We primarily review the relationship between FDI and migration from several perspectives including wage levels, employment levels, population and education, distance, GDP, as well as institutional quality and trade.

In terms of wage levels, According to Gheasi and Nijkamp (2017), there is a positive correlation between international migration and FDI, significantly influenced by wage disparities. Additionally, FDI tends to increase wages and the skill premium, especially in developing economies, potentially exacerbating wage disparities and influencing migration patterns (Federal Reserve Bank of San Francisco et al., 2016). But Podrecca and Rossini (2015), by analyzing 13 EU countries, concludes that wages is negative with the relationship between outward FDI and inward migration.

In terms of Employment level, Federico and Minerva (2007) examined the impact of Italy's outward FDI on local employment growth and concluded that FDI can improve employment conditions locally. This enhancement in job prospects may attract more migrants to areas with better employment opportunities, potentially affecting migration patterns.

In terms of population and education, Wang et al. (2013) discovered that outward FDI to OECD countries from non-OECD countries significantly affects individuals with high school and university education migrating from non-OECD to OECD countries, while its impact on individuals with primary education is less pronounced. Gheasi et al. (2013) observed that countries with a higher proportion of highly educated migrants tend to attract varying levels of FDI. This is so because migrants with the increased level of education often bring forth professional knowledge and skills that are valued enough to help in meeting high-skilled labor

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demands in the receiving countries. Therefore, education fosters development and innovation, ultimately attracting more FDI in high-skill sectors. Kugler and Rapoport (2007) also investigated the impacts of education-induced high-skill and low-skill labor on FDI. My own data on the migration and FDI interactions between the US and the rest of the regions in the 1990s depicted the negative correlation between FDI and low-skilled migration in the manufacturing sectors, precisely as predicted by trade models. Conversely, FDI showed a positive correlation with the initial stock of high-skilled U.S. migrants in the host country in both the services and manufacturing sectors. These findings deepen our understanding of the complex interactions between population levels, FDI, and migration.

In terms of distance, distance influences both FDI and migration through geographic, cultural, economic, administrative, and political dimensions. Geographic distances increase costs and barriers, deterring both investment and migration (Blanc-Brude et al., 2014; Kandogan, 2016), while economic and administrative proximity can attract FDI and facilitate migration (N. Bailey & Li, 2015).

In terms of GDP, regarding economic growth, FDI and industrial structure can significantly influence long-term growth and foster innovation. Economic vibrancy can attract more immigrants looking for job opportunities in more developed regions (Krugman, 1995; Venables, 1996). Conversely, in less developed migrant-sending nations, over the course of time, economic growth might depress, thereby leading towards a possible "middle-income trap," where wages do not rise anymore and growth, driven by innovation, is lacking. This economic scenario may further impact the migration of people, as they may go looking for job and living opportunities overseas. Ghosh (1992) showed that international migrations tend to follow international capital movements but in the opposite direction, extending capitalism to wider parts of the world and integrating more people into the global economy. For example, if FDI flows from country I to country J, it logically implies that migration might tend to move from country J to country I. This directional flow can be influenced by factors such as the capital-labor ratio, where countries with higher capital-labor ratios may attract more FDI, while those with lower ratios may see greater emigration as labor seeks opportunities elsewhere. Therefore, the capital-labor ratio plays a significant role in determining the direction of migration flows in response to economic disparities between countries, making the relationship between

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FDI, labor market dynamics, and migration interconnected and significant in shaping migration patterns through its impact on employment opportunities.

In terms of institutional quality, institutional quality also indirectly influences the impact of migration on FDI. Chen and Cheng (2023) note that institutional quality positively moderate the relationship between migration and FDI. In environments with poor institutional quality, individuals familiar with the local environment and having connections can help overcome the challenges posed by the institutional framework, thus potentially strengthening the relationship between migration and FDI. Conversely, in environments with strong institutional quality, the impact of migration on FDI may be less pronounced, potentially weakening the relationship as established systems may already facilitate foreign investment independently of migration dynamics. Alfaro et al. (2008) also indicated that one of the major barriers facing multinational corporations in creating subsidiaries in developing countries is partially associated with the poor quality of institutions concerning potential host nations for FDI.

In term of trade, there is a complex interplay among migration, trade, and FDI. For instance, Felbermayr and Jung (2009) research, show how migration indirectly influences FDI through the channel of trade and points to the negative and positive effects that migration has on host and home countries. These impacts are derived from the way in which migration stimulates economic growth and innovation in host countries and at the same time presents possible reduction of demand for FDI in the home countries. Moreover, Candau (2013) argues that, under the theoretical framework of new economic geography theory, trade costs are fundamental determinants for both FDI and migratory flows. Candau's theoretical analysis indicates reductions of tariffs from capital and labor forces and changes in the FDI and migration patterns, especially in the aspects of reduced urban living costs and access to markets. The research deepens the understanding of how trade drives the relation between FDI and migration, noting furthermore that trade liberalization and growth in marginal trade opens new opportunities for migration and enhances these opportunities by attracting FDI. For example, the study of Aubry and Rapoport (2019) shows both the positive correlation of the trade volume and the FDI, beside the bridging role of migration in this process, which is the factor fostering economic connections between the host and home countries. The particular example of the case study of Mexico illustrates how trade policy, FDI, and migration policy operate to

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permeate through economic growth and social development within certain economic environments. This is well brought out by the example of Mexico in liberalizing trade to make FDI more attractive and labor more mobile (Aroca, 2005). Trade acts as a bridge linking FDI at the forefront but prepares the capital market fit enough for the mobility of capital and talent through a decline in trade costs.

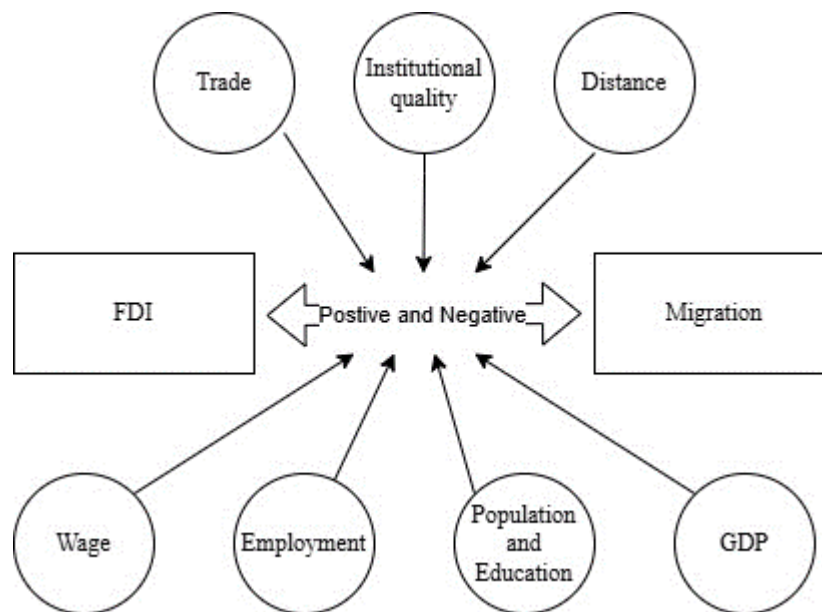


Figure 2.1 Summary of Factors affecting relationship between FDI and Migration

Source: author's summary

3 Methodology

3.1 Crozet Model Adaptation for Migration Analysis

Our research builds on Crozet's methodology to further explore the dynamics of migration, specifically by applying the concepts of spatial agglomeration and the interactions between centripetal forces. Crozet's model, which is rooted in the frameworks of Krugman's model of economic geography and Hirschman's theory of cumulative causation, identifies two types of economic linkages: forward and backward linkages (Crozet, 2004).

"Forward linkages", in our research, help influence individual decisions on where to work—in more developed areas rather than in less developed ones. These linkages emanate from those economic benefits to an individual when working in places that are more developed or economically concentrated: the chances of work increase and so do the wages.

On the other hand, "backward linkages" are those factors that determine the location of the firm in a place, largely from a developed area to a less developed area. These would typically include such considerations as availability of skilled and available labor, proximity to the potential market, and the supportive infrastructure presence in the less developed area.

Conversely, "backward linkages" refer to the factors that influence firms' decisions on where to locate their operations, particularly from more developed to less developed area. These typically include considerations such as the availability of skilled and available labor, proximity to potential markets, and the presence of supportive infrastructure in less developed area.

About the forward and backward linkage, according to De Simone & Manchin (2012), based on Venables' research on "Fragmentation and Multinational Production," outward FDI essentially represents developed countries (Home) investing capital in developing countries (Foreign) to reduce production costs or expand markets (backward). Conversely, inward migration refers to labor from developing countries (Foreign) moving to developed countries (Home) in search of higher wages and better living conditions (forward). The interaction between these two dynamics can increase the developed countries' understanding and trust towards the developing nations, potentially encouraging more FDI in these countries (Venables, 1999). However, FDI can enhance employment prospects and increase wage levels in developing countries, which may lead to a decrease in migration to developed

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countries. Consequently, FDI is a vital element that should be taken into account in migration research.

With forward linkages in focus, the thesis researches the rationale for migration decisions, with particular attention given to how economic and social benefits linked to certain locations attract people from less developed to more developed regions.

What needs to be further introduced is Crozet's derivation of the model using the existence of the market potential theory and the theory of immigrant choice, which are related to FDI in some way.

3.1.1 Market Potential and FDI

We start by introducing the Harris Market Potential function to evaluate regional attractiveness (Harris, 1954):

$$\text{Market Potential}_j = \sum_{j=1}^J (Y_j / d_{ji}). \quad (1)$$

Where J represents the number of locations within the relevant area, Y_r denotes the economic output or size of region j and d_{ir} signifies the distance between the less developed country j and the more developed country i ,

When a more developed country i invests more in a less developed country j (More FDI), economic size Y_j will increase. Along with economic size increasing in less developed country, the employment level and wage will potentially rise.

3.1.2 Migration Choices and FDI

Tabuchi and Thisse (2002) conclude that migration decisions are influenced by wage level, employment level and migration costs, which rise with distance and are modelled as

$$\pi_{ji,t}^k = V_{ji,t}^k + \varepsilon_i^k = \ln[\omega_{j,t} \rho_{i,t-1} [d_{ij}(1 + bF_{ij})^{-\lambda}] + e_i^k] \quad (2)$$

where $d_{ij}(1 + bF_{ij})^{-\lambda}$ represents the migration cost, which rises with the distance between home region j and host i regions, b and λ are strictly positive coefficients, F_{ij} is a dummy variable indicating whether the two regions share a border. Additionally, $\rho_{i,t-1}$ denotes the employment probability for an immigrant in country i at time $t - 1$, e_i^k is a stochastic variable that captures individual k 's subjective perception of the characteristics of region i .

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Along with the increase of FDI, $\omega_{i,t}$ will increase and then

$\ln[\omega_{j,t} \rho_{i,t-1} [d_{ij}(1 + bF_{ij})^{-\lambda}]]$ increases, which indicates an increase in the utility of an individual k staying in the country j . At the same time, $d_{ij}(1 + bF_{ij})^{-\lambda}$ stays the same so that the total utility of the migration decision is more favorable for staying in country j compared to moving to country i

3.1.3 Production, Consumption and Market

The model focuses on three economic products—traditional goods, non-tradable services, and manufactured goods—while simplifying factors of production to labor alone, distributed as $L_{i,t}$ across regions.

The amount of labour required for each variety in the non-tradable services (denoted as x) and manufactured goods (y) can be expressed as $\beta_x q_x + \varepsilon_x$ and $\beta_y q_y + \varepsilon_y$ respectively, where q is production quantity and $\beta_x(\beta_y)$ and $\varepsilon_x(\varepsilon_y)$ are marginal and fixed input requirements for production in industry x or y

Thus, the total amount of labor required to produce $n_{xi,t}(n_{yi,t})$ varieties of goods will be:

$$L_{i,t} = L_{i,t}^x + L_{i,t}^y = n_{xi,t}(\beta_x q_x + \varepsilon_x) + n_{yi,t}(\beta_y q_y + \varepsilon_y) \quad (3)$$

It is assumed that consumers' preferences are uniform with a constant elasticity of substitution between goods and consumers have identical Cobb-Douglas preferences over goods ($U_{i,t} = C_{yi,t}^\phi C_{xi,t}^\mu C_{zi,t}^{1-\phi-\mu}$) (4).

$C_{xi,t}^\mu$ is a composite of manufacturing product varieties:

$$C_{xi,t}^\mu = \left(\sum_{m=1}^{n_{x,t}} c(m)_{xi,t}^{\frac{\sigma_x-1}{\sigma_x}} \right)^{\frac{\sigma_x-1}{\sigma_x}} \quad (5)$$

$C_{yi,t}^\phi$ is the number of available produced y varieties in region i and can be expressed as follows:

$$C_{yi,t}^\phi = \left(\sum_{m'=1}^{n_{y,t}} c(m')_{yi,t}^{\frac{\sigma_y-1}{\sigma_y}} \right)^{\frac{\sigma_y-1}{\sigma_y}} \quad (6)$$

Where σ_x indicates the elasticity of substitution between various types, $c(m)_{xi,t}^{\frac{\sigma_x-1}{\sigma_x}}$ represents the quantity of a specific type m in region i at date t , $n_{x,t}$ refers to the total number of available types in the economy.

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In this framework, according to the economic principle that all producers have the same profit-maximizing price,

$$P_{xi,t} = \frac{\sigma_x}{\sigma_x - 1} \beta_x w_{i,t} (7) \text{ and } P_{yi,t} = \frac{\sigma_y}{\sigma_y - 1} \beta_y w_{y,t} (8),$$

where σ_x and σ_y are the elasticity of substitution between different goods.

$$\text{The real wages in region } i \text{ can then be expressed as } \omega_{i,t} = \frac{w_{i,t}}{P_{yi,t}^\phi P_{xi,t}^u} (9)$$

Furthermore, in the complete-competition market, free entry leads to zero-profit at equilibrium, and we can draw the number $n_{xi,t}(n_{yi,t})$ of firms as follows:

$$n_{xi,t} = \frac{L_{i,t}^x}{\varepsilon_x \sigma_x} (10) \text{ and } n_{yi,t} = \frac{L_{i,t}^y}{\varepsilon_y \sigma_y} (11)$$

Next, Next, integrating the previously mentioned equations with the market potential theory proposed by Harris (1954), we can draw $P_{xi,t}$ and $P_{yi,t}$. These variables represent the CES price indices for the aggregate of industrial and service goods, respectively. Both indices reflect the total market sizes of all regions, appropriately weighted by the distances between them.

$$P_{xi,t} = \left[\sum_{r=1}^R \left(\sum_{m=1}^{n_{xy,t}} \tau_{ir} p_{xr,t}^{1-\sigma_x} \right)^{\frac{1}{1-\sigma_x}} \right] =$$

$$\left[\sum_{r=1}^R n_{xy,t} \left(B d_{ir}^\delta p_{xr,t}^{1-\sigma_x} \right)^{\frac{1}{1-\sigma_x}} \right] (12)$$

$$P_{yi,t} = \left(\sum_{m'=1}^{n_{it}} p_{yi,t}^{1-\sigma_y} \right)^{1/(1-\sigma_y)} = n_{yi,t}^{1/(1-\sigma_y)} p_{yi,t} (13)$$

3.1.4 Migration Probabilities, Gravity Model Adaptation and FDI

According to the Market Potential (Harris, 1954), Migration theory (Tabuchi & Thisse, 2002) and above equations, Crozet summarize the gravity model for migration:

$$\left(\frac{M_{jit}}{\sum_{i' \neq j} M_{ji't}} \right) =$$

$$\tilde{a}_{j(t-1)} \left[(L_{i(t-1)})^{\frac{\varphi}{\sigma_y - 1}} \right] \left[\left(\sum_{k=1}^R L_{k(t-1)}^x (w_{k(t-1)} d_{ij}^\delta)^{1-\sigma_x} \right)^{\frac{u}{\sigma_x - 1}} \right] +$$

$$\left[w_{i(t-1)}^{1-\varphi} \rho_{i(t-1)} \right] \left[d_{ij} (1 + \beta(1 - F_{ij})) \right]^{-\gamma} (14)$$

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In this formula, M_{jit} captures migration from country j to country i , driven by economic and geographic factors.; $L_{k(t-1)}^x$ represents the employment level in country k at time $(t - 1)$, $w_{k(t-1)}$ indicates the wage conditions in country k at the time $(t - 1)$ and d_{ij} signifies the distance between countries. And F_{ij} is an indicator equal to one if the two countries share a common border. $\tilde{\alpha}_{j(t-1)}$ is a function that considers the sum of differences between the value of remaining in the home country and migrating to each potential destination. The remaining terms in equation (14) are parameters arising from the Cobb-Douglas function Crozet uses to describe consumer utility, as specified in equation (4).

Considering the impact of FDI, we hypothesize that an influx of FDI into a less developed country j enhances the country's wage level $w_{k(t-1)}$ and increases the employment level. However, based on this formula, there are still differences between the two areas that different employment and wage level will be affected by how much FDI is that we need to explore. FDI serves as an economic input that can bring capital and technology, thereby enhancing the productivity and wage levels of the recipient country. Additionally, due to improved production efficiency and the creation of new job positions, employment opportunities in underdeveloped countries may increase. That is, although jobs in underdeveloped areas increase, wage levels and job opportunities between underdeveloped and developed areas are still different. FDI in underdeveloped areas, however, is expected to bridge the wage levels and employment opportunities between the two.

Thus, the formula above mainly discusses that employment opportunities, levels of industrial development (measured by GDP), wage disparities and distance as the primary reasons driving migration from developing to developed countries.

3.2 Construction of Equation and Variable

In the Crozet (2004) model summary gravity model, FDI can be indirectly associated with $w_{k(t-1)}$ (wage level) and $(L_{i(t-1)})$ (employment level) because FDI usually increases. The larger the population of the country of origin, the greater the potential for emigration. Similarly, a larger population in the destination country provides a bigger labor market (employment level) for immigrants (Lewer & Van den Berg, 2008)). In addition, Crozet's model explicitly states that d_{ij} represents the distance between two countries and $\tilde{\alpha}_{j(t-1)}$ reveals other factors that can affect migration. GDP can be indirectly associated with other factors that may affect

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migration, such as political stability, education and health services, etc., thus making the migration model more explanatory and predictive. Therefore, GDP can comprehensively consider other factors that affect migration. So we use GDP to represent a $\tilde{a}_{j(t-1)}$ (Bove & Elia, 2017). Further, we can assume that, from the Crozet (2004) model, migration levels to each destination country will be decreasing in the wage gap and increasing in the employment level between the receiving and sending labor market by FDI; and decreasing in moving costs by distance.

According to models developed by Crozet (2004), De Simone & Manchin(2012), Lewer & Van den Berg (2008), and Chen & Cheng (2023), migration from less developed to more developed regions is influenced by several factors, including FDI difference, GDP ratio, population level rate, wage disparities, geographical distance, and unemployment rate between migration-receiving countries and migration-sending countries . These factors can be formalized in the following equation:

$$\log Migration_{F \rightarrow H} = \alpha_1 \cdot \log FDI_{H \rightarrow F} + \alpha_2 \cdot \left(\frac{GDP_F}{GDP_H} \right) + \alpha_3 \cdot \left(\frac{POP_F}{POP_H} \right) + \alpha_4 \cdot \text{wageGap}_{H-F} + \alpha_5 \cdot \text{Distance}_{H-F} + \alpha_6 \cdot \text{Unemployment}_{H-F} + \epsilon \quad (15)$$

The notations of the variables in the equations are as follows

$\log Migration_{F \rightarrow H}$: Migration flow from the developing country (Foreign) to the developed country (Home).

$\log FDI_{H \rightarrow F}$ FDI flow from the developed country (Home) to the developing country (Foreign).

GDP_F, GDP_H Gross Domestic Product of the developing country (Foreign) and the developed country (Home), respectively.

POP_F, POP_H population levels of the developing country and the developed country, respectively.

$Distance_{H-F}$ describes the distance between the more developed country and the less developed country

$IncomeGap_{H-F}$ The wage differential between the developed and developing countries.

$Unemployment_{H-F}$, Relative ratio of unemployment rate between the developed and developing countries.

ϵ is an error term.

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Table 3.1

Variables and their preview description

	Variable	Variable Type	Full Name
1	$Migration_{F \rightarrow H}$	Dependent Variable	Net Migration from CEE to West Europea
2	$FDI_{H \rightarrow F}$	Independent Variable	Foreign Direct Investment (FDI) from West Europe to CEE
3	GDP_F, GDP_H	Control Variable	GDP (constant 2015 US\$)
4	POP_F, POP_H	Control Variable	Population level
5	$Distance_{H-F}$	Control Variable	The geographic distance between countries
6	$WageGap_{H-F}$	Control Variable	Wage differences (US\$)
7	$Uemployment_{H-F}$	Control Variable	The unemployment rates ratio between developed and developing countries

Source: author's calculations

3.3 Estimation Method

The gravity model is extensively utilized for analyzing bilateral international flows, encompassing trade, investments, migration, and tourism. Its popularity is underpinned by its strong theoretical base and effective estimation techniques that accurately identify the key drivers behind these flows, as detailed by Anderson (2011) and Bergstrand & Egger (2013). Modern enhancements in gravity models have led to the incorporation of structural forces or extensive fixed effects within the gravity equation, an approach that is designed to account for multilateral resistance terms, which refer to terms like geographical distance are usually collinear with Pair FE, as elaborated by Anderson and Yotov (2012). This sophisticated model specifically integrates fixed effects for both home and host countries on an annual basis (HH*Year

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FE), which helps to control for national-level variations that change over time, such as fluctuations in GDP or population sizes. It also includes fixed effects for each country pair (Pair FE), which aim to capture bilateral-specific unobserved factors.

Typical factors used in gravity models, like geographical distance or a common language, are often collinear with Pair FE and, therefore, are usually excluded from this model's regression analysis. This advanced model framework utilizes the fullest extent of fixed effects that panel data can accommodate, thereby focusing exclusively on variables that change over time at the bilateral level, such as shifts in migration patterns.

Fally (2015) explored whether multilateral resistance terms, such as cultural differences, are effectively captured by home-year and host-year fixed effects. He confirmed their adequacy by leveraging the pseudo-Poisson maximum likelihood estimator (PPML), which was initially proposed by Silva and Tenreyro (2006). PPML addresses common biases found in ordinary least squares (OLS) estimations, including heteroscedastic residuals and zeros in the dependent variable. Correia et al. (2020) further enhanced the PPML algorithm, making it especially proficient at adjusting for multilateral resistance, pair-specific heterogeneity, and correlated errors across different countries and over time. This advanced PPML method improves regression accuracy by clustering standard errors on dyads. Therefore, combining structural gravity models with the PPML method is now considered the most advanced and preferred approach for estimating gravity equations.

In the first part of our regression analysis, we use the Poisson Pseudo-Maximum Likelihood (PPML) method to tackle the presence of zeros in migration and FDI data.

This potential endogeneity could arise from the formation of "social networks" facilitated by the influx of highly skilled immigrants from specific countries. There are two primary reasons for this phenomenon: First, highly skilled immigrants living and working in the host country can serve as valuable intermediaries, enabling firms in the destination country to more effectively navigate the economic, social, and political landscapes of their countries of origin. Second, when these migrants return to their home countries, they can play a similar role in reverse. They can use their understanding of the host country's customs and business practices to help firms in their home regions establish subsidiaries and attract international financial capital.

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In the second part of our analysis, we primarily address endogeneity through the Generalized Method of Moments (GMM) approach. For IV-GMM, we introduce institutional quality as the main instrumental variable. Institutional quality, encompassing six dimensions—Control of Corruption, Government Effectiveness, Political Stability and Absence of Violence/Terrorism, Regulatory Quality, Rule of Law, and Voice and Accountability—significantly impacts FDI flows. Typically, investments are directed towards regions with lower corruption, higher governmental efficiency, and better reputations. Thus, institutional quality is used as an instrumental variable in IV-GMM. The measure for six indicators of institutional quality is rigorously assessed using the Worldwide Governance Indicators, with each indicator ranging from approximately -2.5 to 2.5. The data about institutional quality is available at www.govindicators.org. Equal weights are assigned to each of these six indicators, and the weighted values are aggregated to form a composite score that represents overall institutional quality. Dynamic GMM (DGMM) is also employed for dynamic analyses, focusing on whether FDI creates migration pathways.

3.4 Details of Data

Our research focuses on the relationship between Foreign Direct Investment (FDI) and immigration, specifically analyzing the migration patterns from less developed regions to more developed ones, and the flow of FDI from developed to less developed areas. We divide our study into two main country groups and match them from separate groups, based on their location and levels of development.

According to the EuroVoc (that is a multilingual thesaurus and is used by the European Parliament), our study targets Western European countries as the higher-income western part of Europe as host countries such as Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, United Kingdom and Switzerland. In the case of the less developed regions, our focus shifts to Central and Eastern European countries as developing countries or foreign countries such as Albania, Czech Republic, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Ukraine, Estonia, Latvia and Lithuania. (More Countries details shown in Appendix A)

The timeframe of our study is limited to the years 2005 to 2020, allowing us to examine contemporary trends and shifts in both migration and FDI within these specified regions.

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Data on the volume of net migration to West EU will be sourced from the Organization for Economic Co-operation and Development (OECD). This choice is driven by the need for consistency and comparability in international research.

FDI from West Europe to CEE: FDI data will be sourced from the OECD, an international organization that employs standardized methods and established standards, ensuring methodological consistency and enhancing the credibility of our research. This data source is more reliable for analyzing FDI trends compared to the sporadic time series data from the Deutsche Bundesbank and other central banks, which do not maintain a uniform standard for statistics. Data from 2005 to 2020 reveals gaps, particularly in North Macedonia, Bulgaria, Albania, Moldova, Montenegro, and Bosnia and Herzegovina, where missing data accounts for nearly half of the total absences (427 out of 862). As these countries will be excluded from our study scope, the remaining data gaps total 342. Furthermore, our research primarily focuses on FDI from Western European countries to Central Eastern Europe and the Baltic states. Notably, negative FDI values, indicating capital withdrawal or outflows, will be excluded from the analysis as our interest lies in positive investment flows. For a more detailed analysis, positive FDI values will be logarithmically transformed.

The wage disparity between Western Europe and the Central and Eastern European and Baltic states can be examined by assessing the wage ratio, which compares average earnings in Western Europe to those in the Central and Eastern European and Baltic regions. This analysis utilizes data from the Wages and Working Time Statistics (COND), which captures the earnings of employees. Earnings include gross remuneration, both in cash and in kind, paid at regular intervals for time worked or tasks completed. Additionally, this encompasses compensation for time not worked, such as annual vacations, other forms of paid leave, or holidays. Given the characteristics of the income ratio, there should still be nonnegligible variation, at least due to the economic growth. Consequently, the primary method for handling missing data involves initial linear interpolation followed by forward filling.

The geographic distance between countries, a crucial variable in studies based on the gravity model, will be sourced from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). Distances in the CEPII GeoDist database are computed as distance calculations that are weighted according to some economic

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scale, such as weighted average distance, and may incorporate weights like purchasing power parity (PPP) or GDP per capita.

The population level difference between Western Europe and Central and Eastern European is determined by calculating the ratio of population numbers in Western Europe to those in Central and Eastern Europe. This ratio is derived from data sourced from the United Nations Population Division available through the World Development Indicators Database.

About unemployment, due to the lack of standard employment data, we have adopted an alternative approach, assessing employment levels from the perspective of unemployment rates. The unemployment rate is defined as the proportion of the labor force that is jobless but available for and seeking employment. The data is sourced from the International Labour Organization and can be accessed via their website at <https://ilostat.ilo.org/data/>.

4 Empirical Part

4.1 Descriptive Statistics

Table 4.1

Descriptive Statistics Summary

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
log_Mig	1,388	7.114	1.942	1.946	12.44
log_FDI	1,008	5.260	1.815	-2.071	10.75
GDP_Ratio	1,630	20.52	27.79	0.0409	159.0
Pop_Ratio	1,630	6.379	11.08	0.00324	62.74
Wage_Ratio	1,630	6.196	5.510	0.878	74.55
Distan	1,630	1,321	612.8	174.6	3,050
Unemployment	1,630	0.834	0.429	0.187	4.163
InstituQuali_diff	1,630	1.083	0.608	-0.244	2.668
Number of Country_pair	98	98	98	98	98

Source: author's calculations

This table provides detailed descriptive statistics on variables related to migration from Central and Eastern Europe to Western Europe (log_Mig) and Foreign Direct Investment from Western Europe to Central and Eastern Europe (log_FDI). It

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includes the number of samples, mean, standard deviation, minimum, and maximum values for each variable. The logarithm of migration numbers (\log_Mig) has 1,388 data points, with a mean of 7.114 and a standard deviation of 1.942, indicating a relatively wide distribution of data. The minimum value is 1.946 and the maximum is 12.44, reflecting extreme differences in migration numbers. The highest migration volumes are primarily from Romania to Germany and from Poland to Germany, while the lowest are mainly from Estonia to France and Croatia to Luxembourg (Country details as seen from Table 1-2 in Appendix). The sample size for the logarithm of \log_FDI is smaller at 1,008, with a mean of 5.260 and a standard deviation of 1.815. The minimum value of -2.071 may indicate capital outflow, and the maximum value of 10.75 shows that in some cases, FDI amounts are very high. The country combinations for the highest and lowest FDI present diversity, but it can be concluded that Hungary is the country receiving the most FDI, while Belgium has the least outbound FDI (Country details as seen from Table 3-4 in Appendix).

Overall, these are descriptive statistics that lay down the base for an additional understanding of migration flows from Central and Eastern Europe to Western Europe and the complicated link with Foreign Direct Investment. The data manifest broad variations on different economic indicators, which would be critical as policy formulation and model analysis unfold subsequently.

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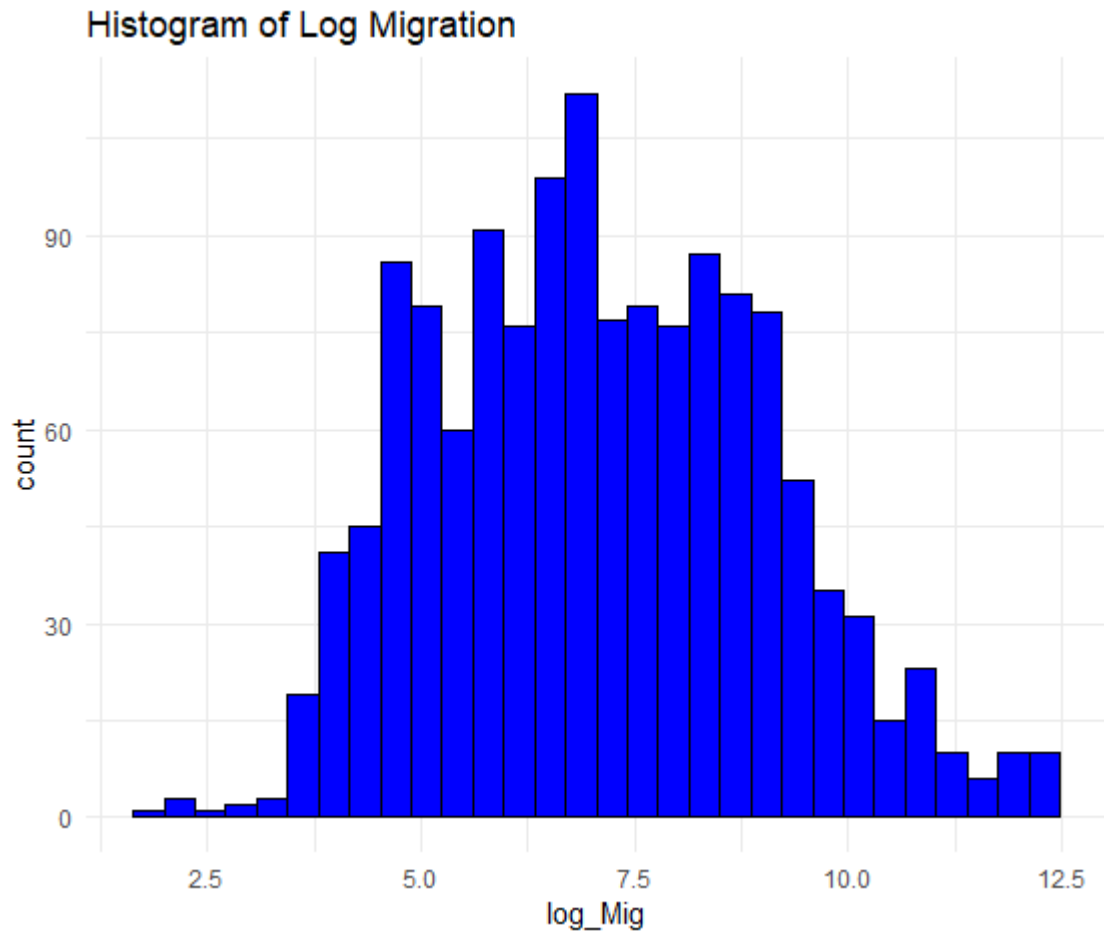


Figure 4.1 the distribution of log Migration

Source: author's calculations

A histogram of log-transformed migration numbers shows that its distribution is right-skewed, with large peaks occurring in the log-interval between 6 and 8, which implies that the most observations should be concentrated within this range. Because it's a log-transformed data set, logical deduction in this likely case would mean that the majority of migration numbers fall between several thousand and tens of thousands. The right tail of the distribution is long; in such a way, the lower intersection of country-pair and year exhibits very high migration numbers. This could be an indicator that a few cases are much higher than most of the others. Peaks in flow from Poland to Germany and Romania to Germany coincide with effects of certain occurrences; this is like in the cases of peaking just before financial crises or political transitions.

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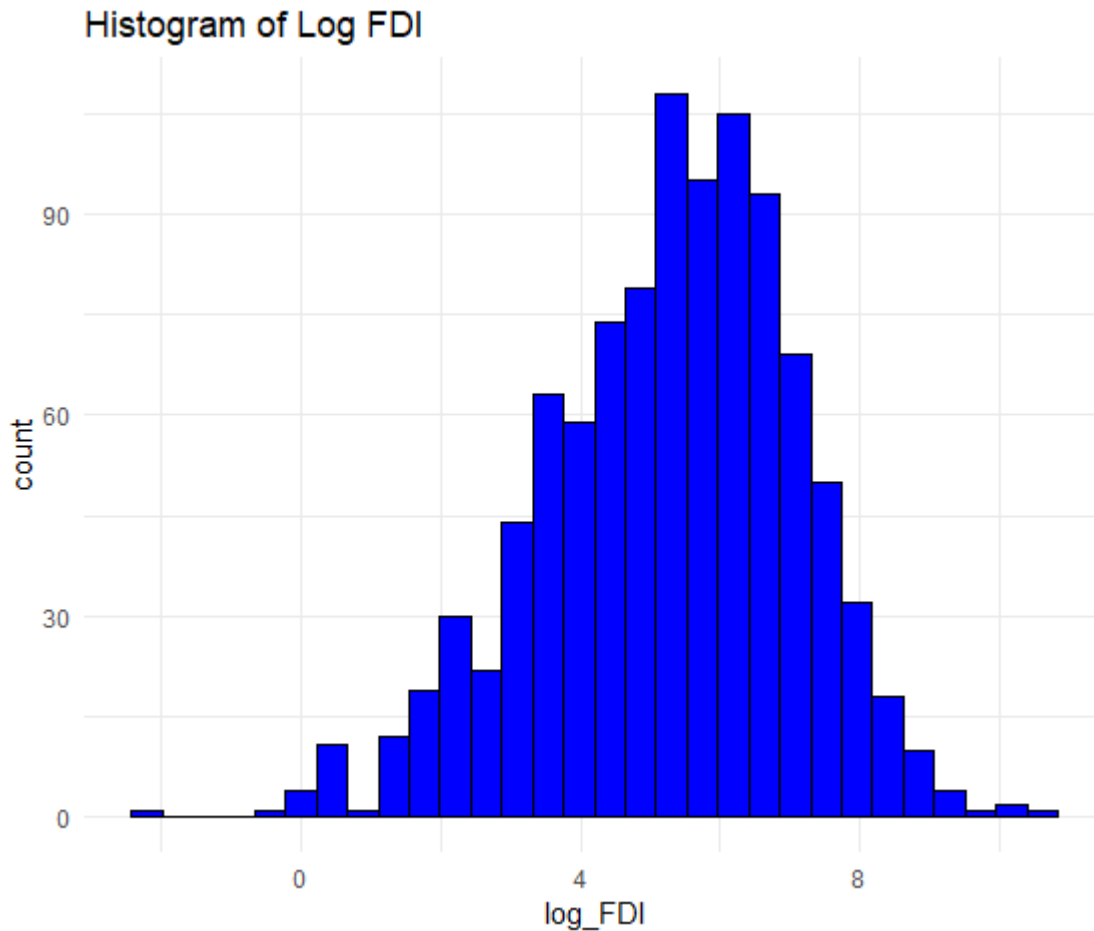


Figure 4.2 the distribution of log FDI

Source: author's calculations

The second histogram displays the distribution of log-transformed foreign direct investment (\log_FDI). This histogram shows a more distinct unimodal distribution, peaking around a log value of approximately 5, which likely corresponds to medium-scale FDI. The data is relatively concentrated around the center, indicating that most FDI values fall within a narrow range. The distribution's tails are flatter, suggesting that a few country pairs or years received very high or very low FDI. Similar to the migration histogram, the distribution of FDI also indicates that in some instances, the amounts of FDI can vary significantly due to specific economic conditions or policy changes. Overall, in the context of considering FDI from Western Europe to Central and Eastern Europe and the Baltic States, and migration from these regions to Western Europe, the distribution characteristics of these two histograms may reflect the complexity of economic interactions and population movements between these areas. Particularly, the log-transformed histograms provide a clearer

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understanding of outliers and variability, which is crucial for further exploring the correlations between these variables and conducting regression analysis

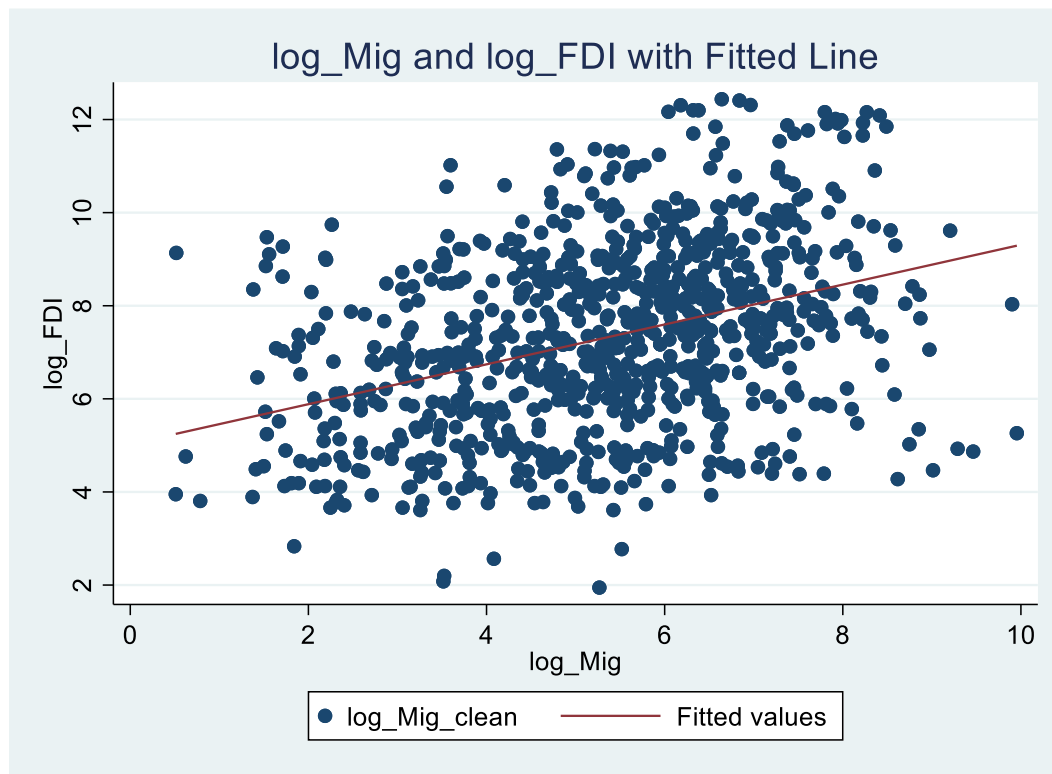


Figure 4.3 Scatter Plot of Log FDI and Migration without outlier

Source: author's calculations

The scatter plot illustrates the relationship between log-transformed foreign direct investment (\log_FDI) and log-transformed migration numbers (\log_Mig). The distribution of points shows a positive correlation between the two variables, visualized by a red linear regression fit line and its surrounding grey confidence interval. The positive slope of the fit line and the relatively wide confidence interval suggest that, while there is a moderate positive correlation, there is also significant variability among the data points.

The calculated Pearson correlation coefficient is 0.3665, indicating a moderate level of positive correlation. This means that as FDI increases, migration numbers also tend to increase, but the relationship is not very strong.

Indeed, this graph evidences the significant trend that there will be FDI outflows from Western European nations into Central and Eastern European areas, in suggesting that there shall be significant migration outflows from these nations to

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Western Europe. The likely case of the relationship is that it shall be based on some type of economic development, labor attraction or even policy activities between the involved regions. The correlation analysis is the backbone and the basis for further research to determine the causal capacity of these relationships; however, there are more needs for statistical tests and analyses to prove this.

4.2 Regression Analysis

4.2.1 OLS, FE and RE regressions

This chart uses three statistical models—Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE)—to thoroughly analyze the relationships between Foreign Direct Investment (FDI) and various economic indicators such as GDP ratio, population ratio, wage ratio, distance, and unemployment rate.

Specifically, every 1% increase in the logarithm of FDI will cause migration to increase by 0.474% in the OLS model, indicating that FDI growth has a positive influence on increasing migration. In addition, the increase in GDP ratio also shows a positive influence. For every 1% increase in the OLS model, migration increases by 0.069%, while the increases in the FE and RE models are 0.059% and 0.013% respectively, showing an increase in the size of the economy. Growth has a positive influence on promoting economic exchange activities. However, the impact of the population ratio varies in different models. For every 1% increase in the OLS model, migration decreases by 0.137%, while in the FE model it increases by 0.430%. This indicates that the influence of the population ratio on economic activity may be affected by effects of regional characteristics and model differences.

In this study, we conducted a statistical analysis of the relationship between FDI and migration flows, revealing the presence of heteroscedasticity and validating the superiority of the fixed effects model over the random effects model through the Hausman test. In the heteroscedasticity test P-value is 0.0032, below the threshold of 0.05, we reject the null hypothesis, indicating the presence of heteroscedasticity. This indicated that the error variances were not constant, suggesting a need to adjust the model to correct this issue. The results of the Hausman test ($\chi^2(5) = 77.23$, $\text{Prob} > \chi^2 = 0.0000$) strongly rejected the null hypothesis of no systematic difference in coefficients between the two models, indicating that the fixed effects model is more effective in addressing potential endogeneity issues, particularly when dealing with variables such as GDP ratio and population ratio, where significant coefficient differences are observed (See from Table 5 in Appendix). These differences reflect the

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fixed effects model's enhanced ability to control for unchanging national characteristics. However, since migration data are fundamentally count data and exhibit characteristics of overdispersion, direct linear models may not provide the best fit. Considering these factors, along with the skewness of the data, this study will employ the PPML approach for further analysis. The PPML method is well-suited for handling count data, particularly applicable to trade flow and migration data in panel datasets. It effectively addresses the issues of over-dispersion in the dependent variable and allows for direct modeling of heteroscedasticity, thus improving the accuracy and interpretative power of the estimates (Motta, 2019).

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Table 4.2.1

OLS, FE, RE Regression Results

	(1)	(2)	(3)
VARIABLES	OLS	FE	RE
log_FDI	0.474*** (14.09)	0.001 (0.09)	0.018 (1.18)
GDP_Ratio	0.069*** (12.22)	0.059*** (4.95)	0.013* (1.71)
Pop_Ratio	-0.137*** (-9.18)	0.430*** (7.37)	-0.006 (-0.30)
Wage_Ratio	-0.065*** (-4.83)	-0.054*** (-9.21)	-0.053*** (-8.79)
Distan	-0.000 (-1.05)		0.000 (0.06)
Unemployment	-0.170 (-1.25)	-0.012 (-0.22)	-0.045 (-0.78)
Constant	4.980*** (19.74)	4.481*** (10.26)	7.121*** (18.06)
Observations	881	881	881
R-squared	0.294	0.155	
Number of Country_pair		99	99

Note: t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculations

4.2.2 PPML regression

Based on the presence of heteroscedasticity and the reasons outlined in the estimation method, we will conduct four separate PPML regressions here. The first regression is a standard regression without fixing time or country pairs. The second regression controls time, the third regression controls country pairs, and the fourth regression controls both time and country pairs simultaneously.

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Overall, this model shows significant statistical performance. About Wald Test, It is very significant across all models, indicating the model's overall effectiveness. About Pseudo R^2 , The change in values suggests that adding fixed effects improves the model's explanatory capability.

The results of these PPML regression models, where the dependent variable is 'log_Mig' (log of migration), indicate that FDI has a significant positive impact on migration from Central and Eastern Europe (CEE) to Western Europe in some models. Specifically, a 1% increase in FDI leads to an approximate 0.067% increase in migration in the basic PPML model and a 0.070% increase in the model with fixed time effects. However, the impact of FDI on migration becomes insignificant in models with fixed country pair effects and both fixed country pair and time effects. These results suggest that while FDI promotes migration from CEE countries to Western Europe, this relationship is sensitive to bilateral relationships and time trends.

Regarding other variables, a 1-unit increase in the GDP ratio leads to a 0.5% to 0.9% increase in migration, indicating that a larger economic scale enhances the attractiveness for migration. The population ratio shows mixed effects, with a 1-unit increase resulting in a 1.7% decrease in migration in the basic models, but a 5.5% to 1.8% increase in migration in models with fixed country pair effects, suggesting that the impact of population growth on migration varies depending on the model specifications. A 1-unit increase in the wage ratio leads to a 0.4% to 1.0% decrease in migration, implying that higher wages reduce the economic incentive to migrate. The impact of geographic distance on migration is minimal or insignificant across models. The factors identified were that a 1-unit increase in the unemployment rate tends to lower migration by 1.7-3.3%—in other words, higher unemployment would decrease migration. These are useful results for policy-makers in understanding the dynamic relation between FDI and migration and in arriving at appropriate policies on migration and investment.

In term of changes in the impact of Log FDI, from Model 1 and Model 2 (without and with time fixed effects). Log FDI has a significant positive association with migration, suggesting that an increase in FDI might drive an increase in migration. FDI from Western European countries to the CEE region can usually improve local employment and wage levels, further enhancing the migration capacity of the workforce while maintaining the original desire to migrate due to the economic disparities that still exist between Western Europe and the CEE region, thereby

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promoting migration (Popescu, 2014; Radulescu & Serbanescu, 2012). From Model 3 and Model 4 (with country-pair fixed effects and both country-pair and time fixed effects): The impact of Log FDI is not significant, indicating that once country-pair fixed effects are controlled, the direct positive impact of FDI on migration disappears. This may suggest that the effect of FDI is obscured by country-specific factors or that the relationship between migration and FDI varies greatly among different country pairs.

For GDP_Ratio, across all four models, The associated coefficients for GDP ratio are positive and significant, suggesting that a higher GDP ratio would be attractive to migrants. This, suggests that migrants are attracted to countries with larger economies, which tend to have higher investment public services, and a greater availability of goods and correlates with a more diverse industries, in all probability because of more job opportunities and better living standards. This is an added reason that the actual size and performance of the economy would appear to be the attractions for migrants (Kahanec & Pytliková, 2017).

For Pop_Ratio, in models without country-pair fixed effects (Models 1 and 2), the coefficient for population ratio is negative and significant. Conversely, in models with country-pair fixed effects (Models 3 and 4), the coefficient becomes positive and significant. In terms of economics, larger populations can be reflected in more dispersed resources, which further weaken the relationship between FDI and migration. (Strielkowski & Sanderson, 2013). On the other hand, this positive shift could reflect in specific country-pair contexts. This is because of economies of scale whereby a large population in the CEE countries avail larger markets and further avails more labor resources, which attract FDI from the Western European countries. Besides, when the population is large, many opportunities and demand are created, which in turn motivates the Western European countries to invest more and attract more migrants (Resmini, 2000).

For Wage_Ratio, across all models, the coefficient for the wage ratio is consistently negative and significant, indicating that a higher wage ratio may inhibit migration flows from lower-wage to higher-wage countries. This finding could be contrary to the expectation that higher wages should attract more migrants. However, this might suggest that high-wage countries also have correspondingly higher living costs or stricter requirements for skills and qualifications. Butikofer and Peri (2017) finds that while high wages are appealing, they are often accompanied by higher

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living expenses, which can deter migration unless the wage differential is sufficient to offset these costs. Additionally, stringent skill and qualification requirements can restrict the accessibility of these high-wage jobs to migrants. Besides, migrants with high skills can integrate more effectively and capitalize on high-wage opportunities, but this also depends on the recognition of their qualifications and the demand for their specific skills in the host country (Chaloff & Lemaître, 2009; Piyapromdee, 2021).

For Distance, in all four models, the coefficient for distance is nearly zero and statistically insignificant. This suggests that, after considering other economic and social factors, the impact of distance itself on migration flows is not apparent. In the context of globalization and European integration, even though the distance might affect migration costs, its impact could be offset by advancements in communication technologies, improvements in transportation facilities, and especially in Europe, policies of open borders and free labor movement (Castles, 2002; Schwartz, 1973). Similarly, Organiściak-Krzykowska and Sieciński (2021) concludes that the erosion of nation-state sovereignty by enabling more extensive global interactions from transnational networks and autonomy under globalization weakens systems of border control and migrant assimilation, thereby diminishing the direct impact of distance on migration decisions

For Unemployment, in models with only country-pair fixed effects (Models 3), the impact of unemployment on migration is positive, though not significantly. Conversely, Moreover, in Models 2 and 4, the effect of unemployment turns out to be a significantly negative value (in Model 1, unemployment is insignificant negative). Generally, a higher unemployment rate might indicate poorer economic conditions, thereby reducing the attractiveness of the area and decreasing inward migration (E. Goss & Paul, 1990). However, in specific situations, such as in countries with well-developed social welfare policies, a high unemployment rate may not significantly deter inward migration (Warin & Svaton, 2008). Also, De Jong et al. (2020) concludes that unemployment benefits probably are one of factors attracting migrants

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Table 4.2.2

PPML Regression Results With log_Mig as Dependent Variable

VARIABLES	Dependent Variable: log_Mig			
	PPML	PPML with Fixed Time	PPML with Fixed Country_Pair	PPML with Fixed Country_Pair and Time
log_FDI	0.067*** (12.82)	0.070*** (13.25)	0.000 (0.23)	0.002 (1.38)
GDP_Ratio	0.009*** (15.36)	0.008*** (14.89)	0.008*** (4.60)	0.005*** (3.53)
Pop_Ratio	-0.017*** (-11.09)	-0.017*** (-10.73)	0.055*** (7.03)	0.018*** (2.94)
Wage_Ratio	-0.010*** (-6.77)	-0.008*** (-5.69)	-0.009*** (-3.99)	-0.004*** (-3.28)
Distan	-0.000 (-0.87)	-0.000 (-1.43)		
Unemployment	-0.025 (-1.46)	-0.033* (-1.79)	0.001 (0.10)	-0.017** (-2.42)
Constant	1.654*** (46.32)	1.647*** (46.16)	1.652*** (25.14)	1.870*** (37.30)
Wald	448.17	440.99	80.83	36.71
P-value	0.00	0.0000	0.0000	0.0000
Pseudo R2	0.0365	0.0403	0.1201	0.1223

Note: Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.5

Source: author's calculations

4.2.2.1 Using log_Mig lagged one period as the dependent variable

Considering the model with a lagged dependent variable of log_Mig, the relationship between log_Mig and log_FDI remains significant without control effects and with control for time effects, similar to the scenario without the lag. The relationships with other economic variables are largely consistent with those observed in the non-lagged model. (Also considering on log_Mig with a two-period lag as the dependent variable, the relationship between FDI and migration remains virtually unchanged and the results are placed in Appendix Table 6)

However, here are some differences between regressions with lagged migrations and with migrations.

Firstly, in the models incorporating lagged variables, the impact of FDI displays more complex dynamic characteristics. Specifically, in models without lagged variables, FDI generally shows a positive impact, indicating a direct promotion of economic growth and employment. However, with the introduction of lagged variables, the influence of FDI turns negative (seen model 3 PPML with Fixed Country_Pair shown in Table 4.3), possibly reflecting that while FDI initially brings positive influences, it may lead to adverse effects in the long term due to market saturation and intensified competition. This suggests that the influences of FDI may exhibit starkly different characteristics across different time scales, with short-term economic stimuli potentially offset by long-term structural adjustments and market responses. In short term, Misra (2012) points out that FDI can act as an economic stimulus in host countries by providing capital inflows, creating jobs, and enhancing local industry capabilities. The offered argument is totally on the other side and states that these gains are going to come entirely at the cost of domestic firms, and any unfair attempt to thwart this competition is likely to result in displacing the domestic system causing a negative impact on the local industries. Besides, Dinh et al. (2019) concluded in the long run that it could enable technology transfer, increased productivity, and consequently closer integration with the global economy, which could lead to a significant increase in economic growth in the host country.

Secondly, the significance of the unemployment rate changes in the models containing lagged variables, especially when country-pair fixed effects are considered, where its statistical significance declines. This may be due to the model controlling for specific economic structural features that are invariant between countries through

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fixed effects, thereby weakening the potential for independent variations in the unemployment rate across different country pairs. This result underscores the importance of considering fixed effects in international comparisons and policy assessments, as well as the necessity of properly handling time dependency and country-specific factors in economic models.

When specifically considering models that simultaneously control for time and country-pair fixed effects, it is observed that the significance of the unemployment rate is notable in models without lagged variables, but becomes non-significant in models with lagged variables. This indicates that the influence of unemployment on migration may be partly absorbed due to the introduction of lagged variables, demonstrating the dynamic dependency present in time series data (Dunlevy & Gemery, 1977). Similarly, A. J. Bailey (1994) suggests that the influence of unemployment on migration may be partially absorbed or delayed by other factors captured through these lagged variables, demonstrating the dynamic dependency present in the data. Also, Fields (1976) points out that the immediate impact of unemployment on migration may be overshadowed by the delayed effects of previous economic conditions and migration flows.

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Table 4.2.3

PPML Regression Results With One-Year-Lagged log_Mig as Dependent Variable

Dependent Variable: log_Mig with lagged one year				
VARIABLES	(1) PPML	(2) PPML with Fixed Time	(3) PPML with Fixed Country_Pair	(4) PPML with Fixed Country_Pair and Time
log_FDI	0.066*** (11.95)	0.070*** (12.36)	-0.001 (-0.32)	0.003 (1.55)
GDP_Ratio	0.009*** (14.85)	0.008*** (14.29)	0.009*** (5.47)	0.005*** (3.54)
Pop_Ratio	-0.017*** (-10.78)	-0.016*** (-10.34)	0.070*** (7.78)	0.021*** (3.10)
Wage_Ratio	-0.010*** (-6.29)	-0.009*** (-5.69)	-0.008*** (-3.58)	-0.004*** (-3.55)
Distan	-0.000 (-0.82)	-0.000 (-1.23)		
Unemployment	-0.022 (-1.20)	-0.036* (-1.90)	0.021** (2.43)	-0.009 (-1.18)
Constant	1.655*** (43.38)	1.652*** (43.44)	1.532*** (21.66)	1.849*** (35.24)
Wald	402.87	399.61	86.00	32.30
P-value	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.0356	0.0400	0.1209	0.1233

Note: 1. Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculations

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Overall, according to the analysis results, under the PPML regression approach, we have demonstrated a positive correlation between FDI and migration from scenarios without fixed effects and fixed time. However, when we estimate under country-pair conditions, the relationship between FDI and migration becomes less significant. Therefore, when considering the relationship between FDI and migration flows, it is necessary to consider that FDI might not directly affect migration flows. The influence of FDI is subject to the impact of specific economic factors of the country pairs on migration policies. This also proves that under the PPML estimation method, the policies of the migrant-receiving countries may be more important than time. This means that a more detailed analysis of the economic and social connections between specific country pairs is required, as well as understanding how FDI indirectly affects economic policies or indicators to further influence migration, in order to achieve the desired economic and social effects. Therefore, moving forward, we will explore how different national migration policies impact migration by treating Country-Pair as a set of dummies for deeper investigation in 4.2.2.3.

4.2.2.2 PPML Regression Results of Different time periods

The analysis for FDI coefficients over different periods and different models provides important insights into the study of the relations between FDI from Western Europe to Central and Eastern Europe and migration from Central and Eastern Europe to Western Europe.

For instance, the coefficients for FDI are positive and significant at 0.085 in 2005-2010, 0.053 in 2010-2015, and 0.060 for 2015-2020. For concreteness, it is specified that FDI has a strongly positive impact on migration for the specific periods. For instance, during the time period 2005-2010, a 1% increase in FDI caused a 0.085% increase in migration. In 2010-2015, the same increase in FDI actually results in a 0.053% increase in migration. In 2010-2015, when FDI prior to the increase was 1%, it resulted in an increase of 0.053% in migration, which represents a fall in the effect compared to the previous period. In the period 2015-2020, when FDI prior to the increase was 1%, it resulted in a 0.060% increase in migration, representing a mild recovery in the influence that FDI had on migration, thus further indicating that, perhaps, CEE may be experiencing a better economic situation or patterns of FDI across the world have shifted.

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In the pooled model, which pools the impact over the entire period of 2005 to 2020, the coefficient is 0.067, and hence an average of 1% increase in FDI increases migration from CEE to Western Europe by 0.067%. A model that includes controls for year dummies shows the coefficient to be somewhat higher, at 0.070, suggesting that accounting for years enhances the observed relationship between FDI and migration, in the sense that, on average, a 1% increase in FDI—subsequent to controlling for year-specific factors—will augment migration by 0.070%.

Other important determinants also produce significant consequences in terms of the migration movement. The GDP ratio influence has a consistently positive and statistically significant mark for the periods; hence, higher GDP ratios in CEE countries generate higher migration rates to Western Europe. Concretely, a 1-unit increase in the GDP ratio results in an augmentation of migration by 0.7% to 0.9%. The population ratio influence has a consistently negative and statistically significant mark for the whole period; hence, a higher population ratio in CEE countries results in a lower migration rate to Western Europe. Migration goes down by 1.6% to 1.9% for a 1-unit increase in the population ratio.

The wage ratio is mostly negative and statistically significant; that is to mean, an increase in wage ratio in CEE countries brings about migration to Western Europe. More specifically, a 1-unit increase in wage ratio results in a decrease in the migration rate between 0.5% and 1.4%. Distance remains negatively related to migration but mostly insignificant, showing that physical distance has no significant effect in deterring migration between CEE and Western Europe.

The minutes of unemployment show mixed effects on migration. Higher unemployment in CEE is strongly connected with increases in intra-2005-2010 migratory flows to Western Europe, reflecting the observation that it is really hardship that pushes people to migrate. On the other hand, in the 2015-2020 period, higher unemployment is related to decreases in migration. This might be an indicator of improved economic conditions—but also might have other factors that relate to these migration decisions—from whatever impulse is given to these people. Therefore, the differences in FDI coefficients across the three time periods and the general model are indicative of the dynamic nature of the relation between FDI and migration; in this, the role played by economic conditions, policy changes, and global trends is quite significant. This shows that the general model with year dummies is slightly higher.

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Table 4.2.4

PPML Regression Results Of Different Periods

VARIABLES	(1) PPML from 2005-2010	(2) PPML from 2010-2015	(3) PPML from 2015-2020	(4) PPML General	(5) PPML With Dum-Year
log_FDI	0.085*** (10.33)	0.053*** (5.81)	0.060*** (7.38)	0.067*** (12.82)	0.070*** (13.25)
GDP_Ratio	0.009*** (7.95)	0.008*** (9.29)	0.007*** (9.77)	0.009*** (15.36)	0.008*** (14.89)
Pop_Ratio	-0.019*** (-5.15)	-0.016*** (-6.37)	-0.016*** (-9.08)	-0.017*** (-11.09)	-0.017*** (-10.73)
Wage_Ratio	-0.005** (-2.36)	-0.005* (-1.80)	-0.014*** (-5.62)	-0.010*** (-6.77)	-0.008*** (-5.69)
Distan	-0.000** (-2.29)	-0.000 (-1.34)	-0.000 (-0.29)	-0.000 (-0.87)	-0.000 (-1.43)
Unemployment	0.131*** (3.12)	0.055 (1.18)	-0.123*** (-5.41)	-0.025 (-1.46)	-0.033* (-1.79)
Constant	1.388*** (24.54)	1.689*** (27.90)	1.863*** (33.94)	1.654*** (46.32)	1.566*** (32.43)
Observations	308	327	370	881	881

NOTE: 1. Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

2. In PPML regression With Dum-Year, coefficients of time dummies will not present in this table

Source: author's calculations

4.2.2.3 Adding A set of Dummies with Country-Pair based on PPML Model

Although the evidence of some interesting patterns comes from these fixed-effects-country pairs regression analyses of migration flows between countries in Europe, the bilateral migration patterns reveal highly significant statistical differences between the kind of migrant-receiving countries and Austria, Belgium, Germany, France, the UK, Luxembourg, and the Netherlands. The causes of such differences reflect composite influences of the conditions on economic, policy, geography, and culture.

The large difference with Austria represents that it could be a source of high migration inflows coming from Romania and Russia, which entails strong economic ties in respect of the migration policies of that country, or just the favorability of Austria. Migration flows from the Czech Republic, Estonia, Croatia, Lithuania, Slovakia, and Slovenia relative to Austria are far less due to differences in economic attractiveness or opportunities for employment and quality of life.

The percentage of the working-age population migrating out from the Czech Republic, Estonia, Croatia, Hungary, Lithuania, Serbia, Slovakia, and Slovenia governs the gap that would have been created between the demand in the Belgium labor market and the supply available for it. Outward migration from Belgium to Bulgaria, Poland, Romania, and Russia is quite notable, which may reveal some correlation between the labor market requirements of these countries and economic opportunities made available through Belgium.

Since Germany is one of the biggest economies within Europe, this country is more actively involved in the migration flows with Poland, Romania, Russia, and Ukraine. The rates of economic benefits and social achievements are quite high in this country for the inhabitants of these states. The migratory flows from people who migrate to Germany from Estonia, Croatia, Lithuania, and Slovenia are much smaller; probably, activities within the economy are not strongly linked to the German economy. Szarucki et al. (2016) almost made the same assertion while relating that Poland and Romania are countries that culturally have the most link with Germany because the historical flow of migration and geometry proximity had insisted on the two countries' feeling a higher inflow

France receives much more in migration flows from Romania and Russia, this may be explained by the strong cultural and historical ties with France; however,

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migration flows from Croatia, Hungary, Lithuania, and Slovenia are much less, probably due to language barriers and insufficient economic opportunities.

The United Kingdom particularly receives higher migration flows from Poland and Romania, whose labor forces are very active in specific industries in the UK. However, migration flows from Estonia, Croatia, and Slovenia to the UK are lower, possibly due to these countries' relatively smaller economic sizes and geographical distance from the UK. Barrell et al. (2006) mentions one possible reason is that the UK labor market had specific demands that migrants from Poland and Romania were able to meet, particularly in the construction and service industries. This contrasts with the smaller scale of migration from Estonia, Croatia, and Slovenia, where fewer individuals may have been motivated or needed in specific UK industries

Luxembourg, being a small country, sees significantly lower migration flows from Bulgaria, the Czech Republic, Estonia, Croatia, and Hungary, indicating that residents of these countries may prefer to migrate to larger European countries in search of more opportunities. Paas and Scannell (2003) migrants often prefer destinations with more robust economic opportunities, which are typically larger EU countries compared to smaller ones like Luxembourg

The Netherlands experiences higher migration flows from Poland and Romania. At the same time, these negative migration flows taking place from the Czech Republic, Estonia, Croatia, Lithuania, Serbia, Slovakia, and Slovenia to the Netherlands could possibly be generated by economic attractiveness and geographical conditions. Engbersen et al. (2013) also add that less intensive migration from countries like Czech Republic, Estonia, Croatia, Lithuania, Serbia, Slovakia, and Slovenia may have something to do with better economic stability and less inconsistency in matters of income disparities when compared to Netherlands.

From the point of view of the countries of emigration, the main presence of Romania, Russia and Poland is large and significant in various countries of Central and Eastern Europe. In the case of Romania to Austria, for example, the decision of Romanians to emigrate is mainly driven by the economic conditions of the destination country, with GDP per capita being a strong pull factor. In addition, the social networks existing in the destination country play a crucial role in influencing the migration decision, which is usually facilitated by previous migratory flows (Davidescu et al., 2020). At the same time, Romania's accession to the European Union has facilitated more migration flows to Austria as many legal and bureaucratic

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barriers to movement within the EU have been removed. Austrian companies actively invested in Romania, strengthening the economic ties between the two countries, making them more familiar and economically interdependent (Hunya & Iara, 2006). These two mutual approaches not only provide economic incentives for migrants, but also help Romanians integrate into the Austrian economy.

Through this detailed country-pair analysis, it is evident that migration flows are influenced not only by economic factors but also deeply by policies, historical connections. These findings provide valuable insights into the complex dynamics of international migration and can assist policymakers in better designing and implementing evidence-based migration policies.

4.2.2.4 Further group-based comparison between Country pairs involving Most emigration Country and Other Country pairs by PPML

Based on previous PPML analysis with country pairs as dummy variables, from the perspective of emigration countries, Russia, Poland, and Romania have a higher number of emigrants compared to other emigration countries (also from their own huge population). Therefore, we divide our discussion into groups. From the perspective of emigration countries, the first group consists of country pairs involving Russia, Poland, and Romania, while the second group includes all other country pairs excluding Russia, Poland, and Romania.

In the PPML model, for country pairs involving Russia, Poland, and Romania, the impact of FDI on migration is relatively minor. Specifically, a 1% increase in FDI is expected to result in a 0.015% increase in migration output, though this effect is statistically significant only at the 10% level. In contrast, for other country pairs, a 1% increase in FDI is expected to result in a 0.043% increase in migration output, which is highly significant at the 1% level. This contrast suggests that in country pairs not involving Russia, Poland, and Romania, FDI might be associated with more job opportunities and higher rates of economic growth, thereby more strongly stimulating migration flows.

Additionally, population ratios and wage ratios also display different patterns of impact across different country pairs in the PPML model. For the group involving Russia, Poland, and Romania, a 1-unit increase in the population ratio leads to a 6.8% increase in migration output, though this effect is only significant at the 10% level. Conversely, in other country pairs, each 1-unit increase in population ratio actually decreases migration output by 1.8%, with significant evidence at the 1% level. This

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indicates that the relationship between population size and migration output within different country pairs may be influenced by a combination of economic conditions, labor market dynamics, and social policies.

Regarding wage ratios, the PPML model shows that 1-unit changes in wage ratios significantly decrease 2.8% migration output in the country pairs involving Russia, Poland, and Romania. However, in other country pairs, increase in wage ratios leads to a decrease in migration output, and this result is also not significant.

Table 4.2.5

PPML Regression Results of Group-based Comparison

VARIABLES	RUS, ROU, POL group	Other group
log_FDI	0.015* (1.85)	0.043*** (7.49)
GDP_Ratio	0.007 (0.87)	0.011*** (15.23)
Pop_Ratio	0.068* (1.90)	-0.018*** (-10.43)
Wage_Ratio	-0.028*** (-6.72)	-0.000 (-0.08)
Distan	-0.000*** (-3.20)	-0.000*** (-6.21)
Unemployment	-0.041 (-1.48)	-0.023 (-1.41)
Constant	2.219*** (35.23)	1.748*** (43.85)
Observations	260	621
R-squared	0.0528	0.0462

Note: Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculations

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In the previous content, we have analyzed the comparative foreign direct investment (FDI) and migration relations of the countries involved in Russia, Poland and Romania with the other CEE pairs. Further, We introduce the variables \log_mig/\log_pop and \log_fdi/\log_gdp in order to better control for the impact of economic scale on this relationship.

In Table 4.6 are the results of the regressions reporting the model performance with the implementation of the new variables: The performance results show that both for the above-mentioned groups of country pairs, respectively including Russia, Poland, and Romania, and respectively others, the positive coefficient of \log_FDI implies a positive correlation between an increase in FDI and migration number. The point estimations are slightly higher for the other group—that is, 1% of FDI increases induce an increase of approximately 0.321% in migration—while for the group of country pairs, including Russia, Poland, and Romania, the increase is of approximately 0.186%.

The positive sign of the coefficient of \log_mig/\log_pop_ratio suggests that an increase in migrants takes place per unit of population, and hence, it is related to an overall increase in migration numbers. This is because network externalities affect individual migration decisions (Epstein, 2008) Thus, the increase from the results does not appear in general but also with respect to each person. The negative sign of the coefficient of \log_fdi/\log_gdp_ratio leads to showing that an increase in the proportion of FDI in relation to GDP will be negatively correlated to migration. Maybe this reflects a reverse relationship: countries with a large FDI-to-GDP ratio have other factors that are suppressing migration flows, or the affinity of the capital has an attractor, probably because these investments are more likely to be of the directed type, coming to capital-intensive industries (Iqbal et al., 2013; Pegkas, 2015).

The introduction of two new variables, \log_mig/\log_pop_ratio and \log_fdi/\log_gdp_ratio , allowed the model to control for the impact of economic scale on the relation of FDI and migration so that the model can differentiate the differences between economies of various sizes and reflect the impact of FDI on migration more accurately (Garas et al., 2016).

These two new variables affect the relationship between FDI and migration, though a big positive association remains between FDI and migration even with the new variables considered, while the flows of migrants are depressed in countries with

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a high FDI-to-GDP ratio. This may be because countries with high FDI-to-GDP ratios attract capital-intensive investments, thus reducing the need for low-skilled labor (Bang & MacDermott, 2019; Mehic et al., 2013). Moreover, the process of economic restructuring and technological upgrading reduces the amount of labor-intensive work, which in turn increases the pressure in the local labor market. Therefore, the workers that were initially involved in labor-intensive industries may decide to migrate to Western Europe in seek of better economic terms(Jones, 1994; Ulrich & Martin, 2009). Again, the importance of the negative coefficient of \log_fdi/\log_gdp says that the increase in the proportion of FDI in GDP should be accompanied by an increase in migration numbers, while the increase in FDI should go together with it. The mechanism that is in force within these countries is that either the countries can attract more capital-intensive investments or are in the process of conducting their economic transition. These are policy considerations that underscore the potential importance of taking economic scale and structure into account in examining the relationship between FDI and migration.

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Table 4.6

PPML Regression Results of Group-based Comparison with two more adding variables

VARIABLES	RUS, ROU, POL group	Other group
log_FDI	0.186*** (13.20)	0.321*** (14.83)
GDP_Ratio	0.009*** (4.38)	-0.000 (-1.37)
Pop_Ratio	-0.063*** (-5.94)	-0.001 (-1.12)
Wage_Ratio	-0.001 (-1.47)	0.004*** (4.37)
Distan	0.000** (2.42)	0.000*** (5.18)
Unemployment	0.026*** (4.07)	0.003 (0.61)
log_mig_log_pop_ratio	2.219*** (49.96)	2.359*** (70.12)
log_fdi_log_gdp_ratio	-5.023*** (-12.82)	-7.954*** (-14.47)
Constant	1.036*** (41.88)	0.786*** (41.56)
Observations	260	621
R-squared	0.0887	0.1161

Note: Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculation

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4.2.3 GMM for Robustness

4.2.3.1 IV-GMM without and with lagged migration

In these three IV-GMM regression models, we meticulously analyzed the impact of Foreign Direct Investment (\log_FDI) and other economic indicators on migration, specifically focusing on the relationship between FDI and migration. The first model does not incorporate lagged migration data, the second model considers migration data with a one-year lag, and the third model includes migration data with a two-year lag, aiming to explore the impact of these lags on model outcomes.

In all models, the logarithm of Foreign Direct Investment (\log_FDI) demonstrates a significant positive impact on migration. In the model without migration lag, the \log_FDI coefficient is 0.841, and it slightly increases to 0.852 in the model that includes a one-year lagged migration. In the model with a two-year lagged migration, the coefficient is 0.851. Specifically, a 1% increase in FDI leads to an approximate 0.841% increase in migration without considering the lag, a 0.852% increase with a one-year lag, and a 0.851% increase with a two-year lag. This indicates that FDI enhances the positive impact on migration, with the lag effects of migration slightly increasing the positive relationship between FDI and migration. This might reflect that the influx of migrants not only directly affects the economy through the labor market but also indirectly influences it by attracting or facilitating more foreign direct investments.

The GDP ratio (GDP Ratio) shows a positive correlation with migration in all models, with coefficients of 0.071, 0.073, and 0.070 for the models without lag, with a one-year lag, and with a two-year lag, respectively. This translates to a 1-unit increase in GDP ratio leading to a 7.1% increase in migration without lag, a 7.3% increase with a one-year lag, and a 7% increase with a two-year lag, emphasizing the attractiveness of a larger economic scale in drawing foreign direct investment and consequently increasing migration.

The negative coefficients for the population ratio (Pop_Ratio) and wage ratio ($Wage_Ratio$) are evident in all models, indicating that these factors may pose challenges to migration. The population ratio coefficients are -0.127, -0.128, and -0.122, meaning that a 1-unit increase in population ratio corresponds to a 12.7% decrease in migration without lag, a 12.8% decrease with a one-year lag, and a 12.2% decrease with a two-year lag. This suggests that population growth might somewhat

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limit the expansion potential of migration. Meanwhile, the wage ratio coefficients are -0.051, -0.053, and -0.063, indicating that a 1-unit increase in wage ratio corresponds to a 5.1% decrease in migration without lag, a 5.3% decrease with a one-year lag, and a 6.3% decrease with a two-year lag. This might indicate that although higher wages improve living standards, they could also suppress the growth of foreign direct investments and consequently migration.

In addition, the coefficients of distance and unemployment augment further understanding of the migration dynamics. The distance variable is so far from significance across models that we can say physical distance does not act as a significant deterrent to migration between CEE and Western Europe. Moreover, the variable of unemployment has mixed effects on migration: the coefficients are -0.467, -0.431, and -0.448, suggesting high unemployment rates in CEE countries are associated with low migration, possibly due to economic distress and/or reduced mobility.

A comparison of the results of all models can determine that the lagged migration should be taken into account in favor of understanding the dynamic relationships between FDI and migration. It results not only in an idea about the interaction among these economic variables but also in detailed information that policymakers might have while changing their migration and investment policies. In particular, this ever-so-slight rise in the coefficient of \log_FDI is testimony that the positive effect of FDI on migration is relatively constant, highlighting that lagged migration has minimal additional influence on the positive influence of FDI on migration.

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Table 4.2.7

IV-GMM Regression Results with lagged migration

	(1)	(2)	(3)
VARIABLES	IV-GMM General	IV-GMM with one-year-lagged migration	IV-GMM with two-year-lagged migration
log_FDI	0.841*** (9.39)	0.852*** (9.08)	0.851*** (8.39)
GDP_Ratio	0.071*** (13.66)	0.073*** (13.23)	0.070*** (12.50)
Pop_Ratio	-0.127*** (-9.09)	-0.128*** (-8.80)	-0.122*** (-8.44)
Wage_Ratio	-0.051*** (-4.45)	-0.053*** (-4.16)	-0.063*** (-4.97)
Distan	-0.000 (-0.45)	-0.000 (-0.46)	-0.000 (-0.68)
Unemployment	-0.467*** (-3.19)	-0.431*** (-2.87)	-0.448*** (-2.82)
Constant	3.024*** (5.73)	2.925*** (5.25)	3.038*** (5.18)
Observations	881	814	746
R-squared	0.197	0.182	0.187
Under-ID test (p-value)	0.000	0.000	0.000
Hansen J test (p-value)	0.000	0.000	0.000

Note: 1. Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculations

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4.2.3.2 IV-GMM of Different Time Period

To begin, we address the potential endogeneity in FDI flows in the gravity model by utilizing instrumental variables with a GMM estimation technique. As previously mentioned, the instrument used for FDI is institutional quality. We analyze the panel data for three periods: 2005-2010, 2010-2015, and 2015-2020. Additionally, incorporating time dummies in IV-GMM estimation procedures can significantly improve estimation accuracy and efficiency. This is particularly true in dynamic panel data models that deal with time heterogeneity and Manage the computational burden(Jin et al., 2021) and improve asymptotic efficiency can yield asymptotically unbiased estimates of dynamic parameters(Cao et al., 2021).

In this section, institutional quality is posited as an exogenous instrumental variable, influencing FDI by affecting the decision to invest or not in the recipient country based on the quality of governance. Statistical measures provide insight:

For Model's R-squared, a higher R-squared indicates that the model explains variations in the migration variable well. The inclusion of year dummies likely enhances this explanatory capacity. For Under-ID Test and Hansen J Test, the p-values for these statistical tests are zero, indicating that the instrumental variables used are appropriate and the model setup is proper, effectively addressing potential endogeneity issues.

The results of these IV-GMM regression models indicate that FDI has a significant positive impact on migration from Central and Eastern Europe (CEE) to Western Europe. Specifically, a 1% increase in FDI leads to an approximate 0.750% increase in migration during 2005-2010, a 0.804% increase during 2010-2015, and a 0.926% increase during 2015-2020. In the general model, a 1% increase in FDI results in about a 0.841% increase in migration, and this impact slightly increases to 0.863% when accounting for year-specific effects. These results demonstrate that FDI significantly promotes migration from CEE countries to Western Europe, with this effect being more pronounced in recent periods. Regarding other variables, a 1-unit increase in the GDP ratio leads to a 6.6% to 7.4% increase in migration, indicating that larger economic scale enhances the attractiveness for migration. A 1-unit increase in the population ratio results in a 12.2% to 13.5% decrease in migration, suggesting that population growth may limit migration. A 1-unit increase in the wage ratio leads to a 1.1% to 11.7% decrease in migration, implying that although higher wages

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improve living standards, they may also suppress migration. The impact of geographic distance on migration is minimal or insignificant. Lastly, a 1-unit increase in the unemployment rate results in a 46.7% to 53.7% decrease in migration, indicating that higher unemployment rates may reduce migration.

For Log FDI, across all models, the coefficient for log FDI is positive and significant, indicating a positive correlation between increased FDI from Western European countries to Central and Eastern Europe (CEE) and decreased migration from CEE to Western Europe. The inflow of FDI likely improves economic conditions in CEE countries by creating higher-paying jobs and enhancing living standards, which in turn increase the incentive for migration by lowering migration costs compared to previous poor economic conditions. Alternatively, FDI often includes strategic investments that not only seek to take advantage of lower production costs in CEE but also to tap into the local labor markets. Such strategies can lead to a mobility culture where individuals seek better opportunities within the investing firms' network, often located in Western Europe (Mutinelli & Piscitello, 1997). Also, Radulescu and Serbanescu (2012) concludes that as economies grow and integrate with Western Europe, migration tends to increase due to greater awareness of opportunities, better networks, and sometimes due to the aspirations for higher living standards in Western European countries. Besides, Kalotay (2004) concludes that FDI is a part of this integration, enhancing economic ties and thus potentially increasing migration as labor markets adjust to new economic realities after EU enlargements

For GDP ratio, the coefficient for GDP ratio is positive and significant across all models, indicating that countries with larger economies or faster growth rates are more likely to attract migrants. A higher GDP ratio typically represents better economic conditions and more economic opportunities, which are highly attractive to migrants seeking improved living and working conditions. Also, Kahanec and Pytliková (2017) migration flows from new EU member states to older member states have a positive effect on the GDP of the receiving countries.

For population ratio, the coefficient for population ratio is negative and significant in most models, suggesting that higher population level may deter migration due to intense competition for resources or higher living costs. Higher population level likely implies more intense job market competition and higher living costs, which could reduce the area's attractiveness to immigrants. Similarly, (Tamura & Masuda, 2017) by exploring migration data from Japan, suggests that while higher

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density might attract people due to perceived opportunities, it could also deter further migration if the density becomes too high, leading to overcrowded conditions and higher living costs

For wage ratio, the coefficient for wage ratio is negative and significant across all models, implying that a higher wage ratio may not attract more migration but might inhibit it due to higher living costs or stricter labor market requirements. Although high-wage countries theoretically should attract foreign labor, if these countries have relatively higher living costs or stricter requirements for migrants' skills, this could diminish migration desire (Butikofer & Peri, 2017; Florida Gulf Coast University, USA et al., 2017). Equally, Butikofer and Peri (2017) concludes that although high-skilled individuals are more likely to migrate due to better economic returns on their skills in high-wage countries, the higher living costs and stringent skill requirements in these destinations may offset the attractiveness of higher wages, making high-wage countries less appealing to potential migrants who may not meet these requirements or afford the cost of living. Also Cebula (1973) finds that higher living costs in high-wage destinations may negate the financial benefits of higher wages, thus reducing their overall attractiveness to migrants

For distance, the co-efficient of distance is highly significant and negative in all models, showing that with an increase in distance, migration propensities decrease. Higher costs of migration and more cultural and social hurdles due to great distances potentially compel people not to migrate (Schwartz, 1973). Similarly, Lim (2019) explores the risk premium that migrants are willing to pay for failure to opt out of risks associated with distance migration and demonstrates that migration decisions tend to be paced with subjective perceptions such as confidence and pessimism, aggravated by a distance.

For unemployment, the impact of unemployment varies across different models but is generally negatively correlated in most models, indicating that higher unemployment rates might deter migration. Higher unemployment rates may signify poor economic conditions and fewer job opportunities in the destination, thereby reducing its attractiveness and preventing immigrant inflow (Heitmueller, 2005; Pissarides & Wadsworth, 1989). Similarly, E. P. Goss and Schoening (1984) finds that In regions with long-term high unemployment, the population is less likely to move, suggesting that sustained high unemployment reduces mobility by diminishing the perceived probability of finding employment elsewhere

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From 2005-2010 and 2010-2015, it is observed that the coefficients for wage ratio and unemployment rate are not significant relative to 2015-2020. The potential reason could be the 2015 European refugee crisis, which led to price increases for immigrant destinations (assuming constant supply, increased refugee numbers led to higher demand and subsequently increased living costs)(Andersson et al., 2019). Even though wages in Western Europe were higher than in Central and Eastern Europe and the Baltic states, the presence of FDI could further elevate wage levels in these regions, gradually reducing their attractiveness to people from Western Europe and Central and Eastern Europe. As Georgiana Noja and Son (2015) mentions that The increased number of refugees led to higher demand for goods and services in host countries, which could have driven up prices and influenced wage levels indirectly. Despite higher nominal wages in Western Europe, the parallel growth of the cost of living would have easily offset the net benefits that are normally associated with increased wages, thereby altering the economic attractiveness of these regions. Moreover, the very fact that FDI exists in Central and Eastern Europe and increases the local economies probably more than counterbalances the attractiveness in terms of wages between these regions and Western Europe.

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Table 4.2.8
IV-GMM Regression Results of Different time periods and General

VARIABLES	(1) IV-GMM from 2005-2010	(2) IV-GMM from 2010-2015	(3) IV-GMM from 2015-2020	(4) IV-GMM General	(5) IV-GMM With Dum-Year
log_FDI	0.750*** (4.33)	0.804*** (4.74)	0.926*** (7.14)	0.841*** (9.39)	0.863*** (9.42)
GDP_Ratio	0.066*** (7.00)	0.074*** (8.09)	0.068*** (9.08)	0.071*** (13.66)	0.069*** (13.35)
Pop_Ratio	-0.127*** (-4.02)	-0.123*** (-4.96)	-0.135*** (-7.91)	-0.127*** (-9.09)	-0.122*** (-8.61)
Wage_Ratio	-0.011 (-0.58)	-0.019 (-0.82)	-0.117*** (-5.46)	-0.051*** (-4.45)	-0.038*** (-3.16)
Distan	-0.000* (-1.66)	-0.000 (-0.74)	0.000 (0.00)	-0.000 (-0.45)	-0.000 (-1.02)
Unemployment	0.692 (1.63)	-0.059 (-0.14)	-1.186*** (-5.95)	-0.467*** (-3.19)	-0.537*** (-3.54)
Constant	2.281** (2.34)	2.963*** (3.02)	3.987*** (5.30)	3.024*** (5.73)	2.408*** (4.18)
Observations	308	327	370	881	881
R-squared	0.402	0.108	0.118	0.197	0.224
Under-ID test (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000
Hansen J test (p-value)	0.000	0.000	0.000	0.000	0.000

NOTE: 1. Robust z-statistics in parentheses*** p<0.01, ** p<0.05, * p<0.1 2. In IV-GMM regression With Dum-Year, the coefficients of time dummies will not be presented in the table 3. Instrumented: log_FDI, Included instruments: GDP_Ratio Pop_Ratio Wage_Ratio Distan Unemployment, Excluded instruments: InstituQuali_diff
 Source: author's calculation

4.2.3.3 Further group-based comparison between Country pairs involving Most emigration Country and Other Country pairs by IV-GMM

Based on previous PPML analysis with country pairs as dummy variables, from the perspective of emigration countries, Russia, Poland, and Romania have a higher number of emigrants compared to other emigration countries. Therefore, we divide our discussion into groups. From the perspective of emigration countries, the first group consists of country pairs involving Russia, Poland, and Romania, while the second group includes all other country pairs excluding Russia, Poland, and Romania. When utilizing IV-GMM, we continue to use institutional quality as the instrumental variable.

The following in-depth analysis of the coefficients and their significance levels in the IV-GMM models demonstrates that there exist significant differences among the several country pairs involving Russia, Poland, and Romania and the other country pairs. These differences relate to the effect of FDI, population ratios, wage ratios, an distance on the two groups of countries.

In the GMM model, the group involving Russia, Poland, and Romania shows that a 1% increase in FDI is expected to increase migration by 0.320%, although this is statistically significant only at the 10% level. In contrast, in other country pairs, the impact of FDI is more pronounced; a 1% increase can lead to migration increase of 1.138%, which is highly significant at the 1% level. This comparison suggests that FDI in country pairs not involving Russia, Poland, and Romania might be linked with more job opportunities and higher economic growth rates, thereby strongly stimulating migration.

Similarly, population ratios and wage ratios show different patterns of impact across the two groups. For instance, in the group involving Russia, Poland, and Romania, a 1-unit increase in population ratio leads to a 72.2% increase in migration output, whereas in other country pairs, the same increase in population ratio results in a decrease in migration output. This likely reflects differences in labor market conditions and economic opportunities within different country pairs. The increase in wage ratios significantly reduces migration output in the Russia group, indicating that higher wages may enhance the ability of local markets to retain labor, whereas in other country pairs, the impact of wage ratios is less significant, possibly due to economic and social structural differences in these regions.

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Combined with previous PPML regression result, there are some findings. Firstly, Russia's economy heavily relies on its abundant natural resources, especially oil and natural gas. The export of these resources significantly contributes to the country's GDP and foreign exchange income. Therefore, FDI in Russia primarily focuses on the energy and mining sectors. These investments are capital-intensive, bringing substantial capital and technology but do not significantly increase direct employment. Similarly, Sadikova et al. (2017) by exploring the relationship among unemployment, energy use, and FDI, concludes that While FDI and energy investments are linked, their direct effect on reducing unemployment is less clear, suggesting indirect benefits rather than direct job creation. Thus, such FDI may not directly stimulate large-scale migration outputs because it does not create widespread employment opportunities.

In contrast, the economies of Poland and Romania are more diversified, focusing on mid to low-end manufacturing and agriculture. These sectors are labor-intensive and attract FDI, which may consistently promote labor mobility initially and then sustain migration output(Blanchard & Giavazzi, 2003). However, they do not lead to large-scale migration because the migrants moving to Western Europe are typically high-skilled, whereas those from labor-intensive sectors often do not meet this skill level, and their earnings may not cover living expenses in Western Europe(Dustmann & Frattini, 2014). Similarly, high-skilled migrants often find more opportunities and have greater mobility due to their qualifications and the demand for specialized skills in Western Europe(Pekkala Kerr & Kerr, 2020). Immigration policies in Western European countries often favor high-skilled migrants, creating legal and procedural barriers for those from labor-intensive sectors lacking formal qualifications(Brain Drain and Brain Gain, 2012). On the other hand, Kalotay and Hunya (2006) concludes that other Central and Eastern European countries like Hungary, the Czech Republic, and Estonia, have smaller market sizes but their industries of advantage generally lie in high-end fields such as information technology and innovation. The inflow of FDI into these countries is more focused on these high-end industries, which rely heavily on foreign capital(Meyer & Sinani, 2009). Foreign investments also often bring technology transfer and industry upgrading to these areas and help to develop more skilled labor locally(Crespo & Fontoura, 2007). This skilled labor is not only better positioned to meet the requirements of Western European immigration policies(Docquier & Machado, 2016) but also tends to earn higher

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wages(Grogger & Hanson, 2011) compared to those in labor-intensive industries, facilitating their migration to Western Europe. The higher wages in high-tech and innovative sectors make it more feasible for these workers to cover living expenses in Western Europe, simplifying the migration process. Thus, the nature of FDI in these countries not only fosters a more skilled workforce but also aligns with the labor demands and immigration criteria of more developed Western European nations. Moreover, Onaran and Stockhammer (2008), by exploring the manufacturing industry in CEE, finds that FDI is driven positively by skilled sectors and the influence of unemployment seems stronger in unskilled sectors than in skilled ones, which proves that FDI will flow into skilled sectors and cultivate more skilled labors and positively influence migration trends in some high-end industries booming areas of CEE such as Estonia and Czech.

In summary, the economic architectures of Russia, Poland, and Romania have peculiar characteristics that condition foreign direct investment's role and influence in these countries. Russia's resource-dependent economy contrasts with Poland and Romania's focus on mid to low-end manufacturing, services, and agriculture, and other Central and Eastern European countries' reliance on FDI flowing into and concentrating on high-end industries like information technology and innovation. These differences create significant disparities in the attractiveness to FDI and the impact on labor market migration.

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Table 4.2.9

IV-GMM Regression Results of Different Group-based Comparison

VARIABLES	(1) RUS,ROU,POL group	(2) Other group
log_FDI	0.320* (1.95)	1.138*** (5.76)
GDP_Ratio	0.051 (0.62)	0.065*** (8.50)
Pop_Ratio	0.722* (1.94)	-0.092*** (-4.46)
Wage_Ratio	-0.186*** (-6.30)	-0.030** (-2.37)
Distan	-0.000*** (-3.56)	0.000 (1.04)
Unemployment	-0.366 (-1.47)	-0.999*** (-4.18)
Constant	7.655*** (6.46)	1.087 (0.97)
Observations	260	621
R-squared	0.592	-0.135
Under-ID test	31.041	28.544
(p-value)	0.0000	0.0000
Hansen J	0.000	0.000

Source: author's calculations

After analyzing the comparative foreign direct investment (FDI) and migration relations of the country pairs involved in Russia, Poland and Romania with the other CEE country pairs. We introduced new variables, 'log_mig/log_pop' and

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`log_fdi/log_gdp`, to further control for the impact of economic scale on this relationship.

First, the comparison of the log_FDI coefficients in different groupings shows that a 1% increase in the stock of FDI in the group containing Russia, Poland, and Romania would increase migration by about 1.99%; instead, for the other CEE countries, it would increase by about 14.07%.

Continuing in the same line, a positive coefficient of log_mig/log_pop is in keeping with the fact that an increase in the number of migrants per unit of population is significantly positively correlating with overall incitement of migration. This is because network externalities affect individual migration decisions (Epstein, 2008). It represents the reality that changes in the number of migrants are visible not only at the overall but at the per capita levels.

On the other hand, the negative coefficient of log_fdi/log_gdp supports the idea that migration decreases as the share of FDI increases. This may indicate that other alternatives are more promising for capital-intensive investments, while at the same time, countries with a high ratio of FDI to GDP are supposed to have some reasons that actually reduce the migration flows. This may also be a reflection of demand for low-skilled labor falling with the increase in inflows of capital-expensive investment. Economic restructuring and technological upgrading increase the number of workers whose low-skills jobs are lost (Bang & MacDermott, 2019; Mehic et al., 2013). Thus, the workers that were initially involved in labor-intensive industries may decide to migrate to Western Europe in seek of better economic terms (Jones, 1994; Ulrich & Martin, 2009).

In short, the addition of the two new variables, log_mig/log_pop and log_fdi/log_gdp, helps in controlling for the effect of economic scale in the relationship between FDI and migration. Therefore, the model is able to distinguish any difference among the economies of different size and to get more accurate reflection of the impact of FDI on migration. Though the presence of new variables has a strong positive influence with high FDI on increasing migration, the countries with a high FDI-to-GDP ratio will depress the migration flow. Those countries may have more resource-intensive and labor-intensive industry. As shown in the Table 4.10, the coefficient difference is approximately six times between the two groups in terms of log_fdi/log_gdp.

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Table 4.2.10

IV-GMM Regression Results of Group-based Comparison with two more adding variables

VARIABLES	(1) RUS,ROU,POL group	(2) Other group
log_FDI	1.990*** (11.17)	14.074*** (3.19)
GDP_Ratio	0.031*** (3.05)	0.026*** (3.03)
Pop_Ratio	-0.143*** (-3.76)	-0.012 (-1.34)
Wage_Ratio	0.009** (2.01)	0.012 (1.38)
Distan	-0.000 (-0.28)	0.001*** (3.71)
Unemployment	-0.044** (-2.22)	-1.243*** (-2.87)
log_mig/log_pop	17.689*** (136.18)	13.504*** (14.08)
log_fdi/log_gdp	-53.291*** (-10.72)	-356.410*** (-3.17)
Constant	-0.093 (-0.97)	1.520* (1.91)
Observations	260	621
R-squared	0.996	0.638
Under-ID test	11.391	6.016
(p-value)	0.0007	0.0142
Hansen J	0.000	0.000

Note: Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculations

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4.2.3.4 DGMM

The biggest concern for the first part of our exercise is that one actually misses the variations if one decides to break periods into parts. For instance, dramatic annual changes between 2005-2010 could be missed if we were to cluster them together as a block, in turn losing a better understanding of the dynamics. Moreover, the underwriting conditions of each defined period may have been driven by varying global economic conditions, political events, or policy changes. Such cyclical and external factors, unless properly accounted for, may strongly influence FDI and migration flows, which also is bound to bias their incidence downwards in the period-partition-based analysis. Specifically, the potential for new immigrants to migrate through networks established by earlier migrants is not addressed in this part of the analysis. As Tomohara (2017) mentions, migration flows can discourage FDI flows due to substitution effects, although larger migration stocks may induce FDI flows through ethnic network externalities. Thus, there are cyclical and external factors between migration and FDI.

Our research progresses by employing the difference-generalized method of moments (DGMM) technique, initially outlined by Holtz-Eakin et al. (1988) and further developed by Arellano and Bond (1991). This approach begins by calculating the dynamic model using first differences, leveraging all previous data points of the endogenous variables as instrumental variables. It subsequently delivers estimates that conform to the moment conditions specified in the levels equation. Although this estimator has some limitations, it remains fundamental in cross-country empirical studies because of its extensive application of exclusion restrictions, offering advantages over traditional techniques like the two-stage least squares. In implementing the DGMM method, we utilize a two-step procedure, applying GMM instruments to the endogenous variables in the levels equation, which include variables such as lagged migration and FDI flows.

In our empirical strategy, we adopt a sequential variable addition approach to examine the influence of FDI on migration flows. Initially, in the first regression, we confine our variables to $L.\log_Mig$ (lagged logarithm of migration) and \log_FDI (logarithm of FDI), allowing us to establish a baseline understanding of the relationship between migration and FDI without additional controls. In the second regression, the $Wage_Ratio$ and $Unemployment$ variables are included. As hypothesized in the Methodology section, this step explores the perspective of

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whether FDI can directly impact migration through economic opportunities, namely wage differentials and labor market conditions. In this regression, we dissociate the direct and indirect effects of FDI on migration, taking the economic incentives and barriers that potential immigrants will face into account. In the third regression, we further extend our model by including the remaining control variables. This becomes important because it provides room to control for other key variables that may potentially determine migration flows, including demographics, policy environment, and other macroeconomic variables, in a bid to make the relationships more robust and hence less susceptible to omitted variable bias. The fourth and last regression now incorporates time dummy variables, which is an important exercise in dealing with the specific challenges of estimation that dynamic panel data models like DGMM present. Time dummies help to control for unobserved heterogeneity, which may be modeled both by an additive individual effect and a multiplicative, time-varying individual effect. By doing so, we enhance the model's capacity to capture dynamic changes over time, improving its predictive accuracy and the validity of our inferences regarding the impact of FDI on migration.(Lee & Yu, 2014; Nauges & Thomas, 2003).

The findings reveal that a 1% increase in the natural logarithm of FDI corresponds to an increase in migration volumes ranging from 0.017% to 0.020%, consistently exhibiting a significant positive association across all models. This result highlights the pivotal role of FDI as an indicator of economic vitality in promoting international migration flows. Moreover, although the impact of wage ratios on migration volumes is very limited, a slight positive correlation is still observed, with coefficients decreasing from 0.003 to 0.001, indicating that wage level disparities exert a relatively weak influence on migration attractiveness. Concurrently, increases in unemployment rates significantly deter migration, with effects intensifying from -0.109 in the M1 model to -0.117 in the M3 model, suggesting that high unemployment rates may reduce the attractiveness of destinations and inhibit inbound migration. The impacts of GDP ratio, population ratio, and geographical distance did not show significance in the models, implying that these factors might be overshadowed by other more direct economic determinants in migration decisions

In the step-by-step DGMM analysis, firstly, we regressed the lagged logMig and logFDI and found that FDI alone has a slightly significant impact on Mig although there is a corresponding positive correlation uncovered. After introducing the wage and unemployment in the second regression, both FDI and Unemployment are

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significant but the wage_ratio is not significant. They indicate that FDI may relate to migration through their effects on employment levels. Likewise, Bonin(2005) by looking to the effect of migration on the labor market in Germany, concludes that FDI and unemployment might assume significant roles in migration, but the wage impact is still not evident.

In our dynamic panel analysis, the third regression underscores the strong positive impact of previous migration on current levels (coefficient = 1.017, $P < 0.001$), along with a marginally significant positive relationship between increases in FDI and migration (coefficient = 0.0195, $P = 0.048$). The unemployment rate negatively affects migration, suggesting economic conditions play a crucial role in migration patterns. Tests for autocorrelation and overidentification (Sargan and Hansen) indicate regression validity.

The addition of the time dummies adjusts several coefficients in the fourth regression, but the key results concerning the significance of lagged migration and FDI remain significant, to give some robustness to their predictive power for migration trends. The time dummies mostly display nonsignificant effects. All the regressions are also supported through tests for auto-correlation and for over-identification through Sargan and Hansen.

A positive relationship was found between increasing FDI in Western Europe with reference to CEE and organic migration from CEE to Western Europe in the dynamic panel model. This probably means that investment from the West improves economic conditions in CEE, hence enabling CEE residents to afford better living and working conditions that lead to aspirations towards good life opportunities in Western Europe. This seems like not only beneficial but necessary investment in providing mobility for those looking for better opportunities in life. In the same manner, Kancs and Kielyte (2002), in estimating the socio-economic impact to the likely migration of the countries which the transition countries of Eastern Europe to Western Europe, contends that the economic situation is a principal determinant of migration flows, and an improvement in these conditions may induce more migration through an increase in the economic capacity and mobility of the people.

The highly significant positive effect indicates that the earlier, more developed migration networks may work to create further migration. Such an impact suggests that the persons who have previously migrated may help out second-order friends and relatives to migrate or may build more options and resources in the destination

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countries that attract more migrants. In the same manner, Pekin (1986), in his study, the earlier entrants will assist returning migrants through employment search assistance, skills training, and employment opportunities open for the returnees.

Combining these insights, it is concluded that FDI from Western to Eastern Europe likely influences migration from CEE to Western Europe indirectly through economic pathways. From perspective of Economic Growth and Employment Opportunities, FDI boosts economic activities and job opportunities in CEE, indirectly enhancing the economic capacity and mobility of residents, which in turn may increase migration to Western Europe. Likewise, Popescu (2014), based on the effects of tax policies on FDI, and the economic catch-up of the CEE region, concludes that FDI contributes to productivity convergence in CEE and the impact of FDI inflows, which could indirectly affect migration through enhanced economic opportunities. Also, (Durova et al., 2022) by analyzing the relationship between FDI and migration between ten new EU member states from CEE, finds that FDI does indirectly benefits, such as job creation and improved economic capacity, which can influence migration decisions

In summary, FDI seems to indirectly increase migration from Central and Eastern Europe to Western Europe by improving economic conditions and employment rates.

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Table 4.2.11

DGMM Regression Results with gradually-adding variable

	(1)	(2)	(3)	(4)
VARIABLES	M1	M2	M3	M4
L.log_Mig	1.035*** (57.24)	1.023*** (61.29)	1.017*** (63.27)	1.006*** (58.38)
log_FDI	0.017* (1.66)	0.017* (1.82)	0.020** (1.98)	0.021** (2.09)
Wage_Ratio		0.003 (0.99)	0.001 (0.51)	0.001 (0.39)
Unemployment		-0.109*** (-4.15)	-0.117*** (-3.96)	-0.073* (-1.90)
GDP_Ratio			-0.001 (-0.50)	0.001 (0.59)
Pop_Ratio			-0.001 (-0.19)	-0.004 (-0.92)
Distan			0.000 (0.33)	-0.000 (-0.10)
Constant	-0.305** (-2.21)	-0.141 (-1.04)	-0.095 (-0.74)	-0.053 (-0.36)
Observations	804	804	804	804
Number of Country_pair	98	98	98	98
ar1p	0.00124	0.00115	0.00127	0.00136
ar2p	0.0758	0.0747	0.0745	0.141
hansenp	0.267	0.322	0.301	0.221
chi2	354111	539271	614176	782070
chi2p	0	0	0	0

NOTE:1. z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1 2. In M4 with time dummies, the coefficients of time dummies will not be presented in the table

Source: author's calculations

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5 Discussion

Our empirical results primarily focus on the three questions raised in the first chapter. The relationship between migration from Central and Eastern Europe (CEE) to Western Europe (West EU) and FDI from West EU to CEE is positive. This relationship somewhat deviates from our expectations. According to most studies, FDI from Western European countries to the CEE region is supposed to enhance local employment and wage levels, further improving the economic and living standards of the local workforce, and then possibly reducing emigration (Carp, 2012; Kornecki & Raghavan, 2011; Marelli et al., 2014). However, according to our regression results, FDI from West EU to CEE promotes migration from CEE to West EU. The existing literature suggests several reasons for this. According to Popescu (2014) and Radulescu & Serbanescu (2012), FDI from Western European countries to the CEE region can improve local employment and wage levels, further enhancing the migration capacity of the workforce while maintaining the original desire to migrate due to the economic disparities that still exist between Western Europe and the CEE region, thereby promoting migration.

We analyzed the lagged effects of FDI on migration using PPML and IV-GMM, and introduced lagged migration as an independent variable using DGMM. The PPML and IV-GMM results indicate that the lagged effects of FDI on migration are minimal. Likewise, Manzoor et al (2021) by analyzing International Migration from BRIC to OECD Countries, concludes immediate effects can be clear, but the lagged effects might not be as straightforward or might manifest in complex ways that are not easily measurable in the short term. Analyzing from the perspective of using FDI as a bridge between new and old immigrants from CEE, a possible reason is that Western European FDI from old-generation CEE immigrants may be concentrated in certain specific industries or regions. These industries or regions often have migration barriers that make it difficult for people from the CEE region to migrate, thus not forming specific channels between new and old immigrants from CEE (Bijsterbosch & Kolasa, 2010).

The effect of time periods on the relationship between FDI and migration was minimal and the relationship between FDI and migration remained significant with coefficients showing a gradually increasing trend, throughout the time periods of 2005-2010, 2010-2015, and 2015-2020,. This indicates that from 2005 to 2020, the economic ties between Western Europe and the CEE have deepened, coinciding with

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the eastward expansion of EU member states (Djarova, 1999; Kouwenberg & Mentink, 2006). However, despite using time as a set of dummy variables, the relationship between FDI and migration remained significant, showing that time factors have little impact on their relationship. Nonetheless, between 2015 and 2018, there were very significant and high coefficients (all greater than 0.8) associated with migration, coinciding with the EU refugee crisis in 2015 when migration policies in Western Europe were relatively open before and after 2015 were likely to implement more restrictive policy toward migration (Slominski & Trauner, 2021). This suggests that the emergency events weaken the relationship between FDI and migration (Cwerner, 2001).

In our discussion of the relationship between migration and FDI, using PPML to control for country-specific effects resulted in an insignificant relationship between FDI and migration, suggesting the presence of different unobserved characteristics across country pairs that could further influence this relationship. Therefore, it is important to explore specific unobserved characteristics between country pairs that do not change over time and to address the issues involving country pairs. We included in the regressions the dummy variables for the country pairs. From the perspective of emigration countries, involving Russia, Poland, and Romania, the country pairs showed significant and positive correlations with migration (dependent variable). From the perspective of migration-receiving countries, the pairs involving Switzerland and Luxembourg were mostly negatively correlated and largely insignificant with migration, while those involving the UK, France, Germany, Belgium, and Austria showed significant and positive correlations with migration. After controlling for time, from the perspective of country pairs, FDI may no longer be the main factor affecting migration (not significant). The unique migration policies of the receiving countries could potentially be the main consideration for migrants, particularly because the migration policies of Switzerland and Luxembourg are more stringent compared to those of the UK, France, Germany, and Belgium (Yiqiang, 2009). In our detailed examination, we categorize country pairs involving Russia, Poland, and Romania into one group, and other country pairs into another, using PPML and GMM. We also discover that the relationship between FDI and migration is significantly stronger in Central and Eastern European countries not involving Russia, Poland, and Romania, with coefficients more than three times those of country pairs involving these three nations. This suggests that in country pairs excluding

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Russia, Poland, and Romania, FDI may be linked with more job opportunities and higher rates of economic growth, thus more effectively stimulating migration flows (Durova et al., 2022). In such context, to further mitigate the impact of the larger economic scale such as country pairs involving about Russia, Poland, and Romania when evaluating the relationship between FDI and migrations of the larger economic scale of Russia, Poland, and Romania in comparison to other Central and Eastern European countries, we introduced the ratio of migration to total population and ratio of FDI to GDP. In our case estimation equations show that interaction terms of the previous estimations are higher in the case of Central and Eastern European countries not involving Russia, Poland, and Romania. Still, the migration ratio factors negatively influence migration. This is because, in high FDI to GDP countries, these countries will attract capital-intensive investment, but lessen the need for low-skilled workers (Bang & MacDermott, 2019; Mehic et al., 2013). Besides that, ongoing economic restructuring and technology upgrading has reduced the work that is labor-intensive in nature, with a corresponding increase in the pressure of the local labor market. Therefore, workers previously working in labor-intensive industries will opt to migrate to Western Europe due to better economic conditions (Jones, 1994; Ulrich & Martin, 2009).

6 Conclusion

This thesis primarily explores the relationship between FDI from Western Europe to the CEE region and migration from the CEE region to Western Europe, considering the impact of specific time periods and country pairs on this migration relationship. Our evidence suggests a stable positive relationship between FDI from Western Europe and migration from Central and Eastern Europe in the period 2005 to 2021. This relationship is quite robust over time and across different country pairs, which implies a complementary dynamic: increasing FDI from Western Europe, indeed, attracts an increase in migration. Besides, FDI does not have a lag effect on migration. In terms of time, the analysis reveals that specific events such as the financial crisis, the refugee crisis, and the global pandemic, in particular years 2014, 2016, but 2020, do affect migration patterns, but the core relation remains unaffected over different periods. In terms of country pairs, our results also indicate that country pairs with Russia, Poland, and Romania do not prove to be significantly stronger than those of other country pairs, although the economic size is controlled by adding the migration-population ratio and the FDI-GDP ratio.

The study has the following policy implications in the context of Western Europe (a developed region) and the CEE (a relatively underdeveloped area).

First, developed countries often view FDI as a substitute for migration, hoping to tap into the labor force of relatively underdeveloped nations without provoking the cultural tensions that migration can cause. However, this strategy might be counterproductive, potentially leading to intensify it instead of curbing it. While the overall benefits of both FDI and migration for citizens are likely to be positive, the unequal distribution of these benefits between locals and migrants could result in significant political challenges and repercussions of migrant-receiving countries. Secondly, from the perspective of CEE and other developing countries, the process of FDI attraction might inadvertently promote the development of emigration. Emigration can be accelerated by the fact that the receiving countries may be ready to demand skilled workers from certain sectors of the economy. Due to the relative scarcity of such skilled workers in the respective sectors of the host countries, emigrants from the CEE regions may be easily selected due to the relative surplus of such skilled workers. These emigrants have the opportunity for training from multinational companies operating through FDI, which further develops their skills and employability and makes them more competitive in the foreign labor market. This

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emigration process may intensify the problem of brain drain, causing huge loss of a skilled labor force from the source countries.

Thus, for policy implication of our main study areas, Western Europe and the CEE, the government policy of migration and foreign investment are vital. The Western European government may manipulate its policies concerning FDI in the CEE area to encourage or hinder the local companies from investing in such areas in order to have a reasonable distribution of FDI. The CEE may manage and control Western European FDI in order to avoid the situation of labor market imbalance that may be caused by unbridled foreign investment by taking learned empirical lessons from the adverse impacts of FDI, as noted in our study. These policy strategies are providing pragmatic inputs in managing the economic and labor relations between developed and developing regions.

For limitations, the research presented in this paper is subject to several data constraints that impact the scope and generalizability of our findings. Firstly, the incomplete nature of the FDI and migration data, particularly within OECD datasets, necessitated the exclusion of certain countries with extensive data gaps, such as North Macedonia, Bulgaria, Albania, Moldova, Montenegro, Bosnia and Herzegovina, and Latvia. As a result, the conclusions drawn from this study do not encapsulate the complete picture of migration and FDI trends across the entirety of CEE and the Baltic region. Furthermore, the presence of negative values within the FDI data, indicative of debt repayments rather than investment influx, were excluded from the analysis, as they do not align with the research focus on investment flows from developed to developing regions.

Moreover, it would already be helpful to extend the research period by 15 years: the really drastic changes in Eastern Europe took place in the 1990s. High flows of migration from the CEE to Western Europe, which indeed were taking place simultaneously with the development and catching-up phase of the economic transition processes in the CEE countries, progressively attracted FDI inflows from Western Europe, during this period. This will also help in providing long-term impacts and trends attached to FDI and migration between these regions to be put in a deeper historical context.

Based on the findings of, and voids in, this paper, future research in this area could further expand and deep-dive into the discussion and explanation of the probably reciprocal relationship between FDI from WE to CEE and CEE migration to

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WE. On the other hand, the field of policy research will benefit from more empirical studies on the way of specific policy changes, especially the way policies affect the actual direction and volume of FDI and migration, through much stronger support and guidance for policy-making. In addition, upgrading the interdisciplinary perspectives and collaboration of economics, sociology, and demography, and international cooperative projects involving researchers from different countries and regions, will avoid the drawbacks of a single view and data limits, and jump to a higher level of the global view and applicability of the research. These suggestions for further research are expected to deepen the understanding of the complex relationship between FDI and migration and give practical advice to policymaking.

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Appendix A

Countries and their responding abbreviation

West EU		CEE	
Country	Abbreviation	Country	Abbreviation
Austria	AUT	Bulgaria	BGR
Belgium	BEL	Czech Republic	CZE
France	FRA	Estonia	EST
Germany	DEU	Croatia	HRV
Luxemburg	LUX	Hungary	HUN
Switzerland	CHE	Lithuania	LTU
Netherlands	NLD	Poland	POL
United Kingdom	GBR	Romania	ROU
		Russia	RUS
		Serbia	SRB
		Slovakia	SVK
		Slovenia	SVN
		Ukraine	UKR

Source: ISO 3166-1 alpha-3

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Appendix B

Table 1

Top 10 value of log_Mig and their matchable country pair

Country-pair	log_Mig
1. DEU-ROU	12.437069
2. DEU-ROU	12.409205
3. DEU-ROU	12.348453
4. DEU-ROU	12.311774
5. DEU-ROU	12.307749
6. DEU-ROU	12.199577
7. DEU-ROU	12.198192
8. DEU-POL	12.166146
9. DEU-POL	12.159159
10. DEU-POL	12.157008

Source: author's calculations

Table 2

last 10 value of log_Mig and their matchable country pairs

Country-pair	log_Mig
1. FRA-SVN	1.9459101
2. LUX-HRV	2.0794415
3. FRA-EST	2.0794415
4. LUX-HRV	2.1972246
5. LUX-HRV	2.5649494
6. LUX-HRV	2.7725887
7. LUX-HRV	2.8332133
8. FRA-EST	3.1780538
9. LUX-SRB	3.3322045
10. FRA-EST	3.4011974

Source: author's calculations

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Table 3

Top 10 value of log_FDI and their matchable country pairs

Country-pair	log_FDI
1. LUX-HUN	10.746822
2. CHE-HUN	10.20869
3. LUX-HUN	9.9540507
4. CHE-HUN	9.9012794
5. LUX-RUS	9.4640555
6. LUX-HUN	9.2892984
7. BEL-HUN	9.2207263
8. DEU-RUS	9.2052625
9. LUX-CZE	9.0129664
10. CHE-HUN	8.9732173

Source: author's calculations

Table 4

Last 10 value of log_FDI and their matchable country pairs

Country-pair	log_FDI
1. LUX-UKR	-2.0714734
2. CHE-CZE	-.55686956
3. BEL-SRB	.1007499
4. BEL-LTU	.1007499
5. BEL-LTU	.11955924
6. BEL-SVN	.21752781
7. BEL-HRV	.22713557
8. BEL-EST	.22713557
9. BEL-LTU	.22713557
10. BEL-BGR	.28292076

Source: author's calculations

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Table 5

Testing for endogeneity using OLS and 2SLS

Coefficients	OLS_1	ILS_1	Difference	S.E.
log_FDI	.4164324	.4735087	-.0570763	.0122211
GDP_Ratio	.0672025	.06853	-.0013275	.
Pop_Ratio	-.1243302	-.1367884	.0124581	.0019329
Wage_Ratio	-.0859148	-.0648876	-.0210271	.0044408
Distan	-.0004492	-.0001039	-.0003453	.0000781
Unemployment	.0494324	-.1697776	.21921	.0465252
b = consistent under Ho and Ha; obtained from regress				
B = inconsistent under Ha, efficient under Ho; obtained from ivreg				
Test: Ho: difference in coefficients not systematic				
chi2(6) = 19.15				
Prob>chi2 = 0.0039				

Source: author's calculations

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Table 6

PPML Regression Results With Two-Year-Lagged log_Mig as Dependent Variable

VARIABLES	(1) PPML	(2) PPML with Fixed Time	(3) PPML with Fixed Country_Pair	(4) PPML with Fixed Country_Pair and Time
log_FDI	0.068*** (11.41)	0.071*** (11.85)	0.001 (0.44)	0.004** (2.06)
GDP_Ratio	0.008*** (14.01)	0.008*** (13.99)	0.009*** (6.52)	0.003** (2.44)
Pop_Ratio	-0.016*** (-10.42)	-0.016*** (-10.22)	0.088*** (7.57)	0.028*** (3.15)
Wage_Ratio	-0.011*** (-6.13)	-0.011*** (-6.41)	-0.006*** (-4.05)	-0.003*** (-5.01)
Distan	-0.000 (-0.92)	-0.000 (-1.07)		
Unemployment	-0.024 (-1.27)	-0.047** (-2.46)	0.042*** (4.65)	0.002 (0.28)
Constant	1.655*** (40.91)	1.660*** (41.20)	1.402*** (18.38)	1.820*** (28.59)
Wald	363.20	396.69	103.64	39.29
P-value	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.0352	0.0398	0.1213	0.1233

Note: Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculations

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Table 7

PPML_DumWithCountryPair

VARIABLES	(1) log_Mig
log_FDI	0.002 (1.38)
GDP_Ratio	0.005*** (3.53)
Pop_Ratio	0.018*** (2.94)
Wage_Ratio	-0.004*** (-3.28)
Distan	-0.000*** (-10.84)
Unemployment	-0.017** (-2.42)
Country_Pair = 2, AUT-CZE	-0.195*** (-11.95)
Country_Pair = 3, AUT-EST	-0.675*** (-15.04)
Country_Pair = 4, AUT-HRV	-0.144*** (-8.19)
Country_Pair = 5, AUT-HUN	0.011 (0.72)
Country_Pair = 6, AUT-LTU	-0.379*** (-18.59)
Country_Pair = 7, AUT-POL	0.019 (0.91)
Country_Pair = 8, AUT-ROU	0.155*** (11.89)
Country_Pair = 9, AUT-RUS	0.201***

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	(8.34)
Country_Pair = 11, AUT-SVK	-0.088*** (-5.84)
Country_Pair = 12, AUT-SVN	-0.318*** (-15.02)
Country_Pair = 13, AUT-UKR	-0.025 (-1.28)
Country_Pair = 14, BEL-BGR	0.107*** (6.14)
Country_Pair = 15, BEL-CZE	-0.324*** (-15.18)
Country_Pair = 16, BEL-EST	-0.654*** (-9.96)
Country_Pair = 17, BEL-HRV	-0.379*** (-22.14)
Country_Pair = 18, BEL-HUN	-0.197*** (-14.82)
Country_Pair = 19, BEL-LTU	-0.401*** (-12.39)
Country_Pair = 20, BEL-POL	0.091*** (3.25)
Country_Pair = 21, BEL-ROU	0.254*** (17.69)
Country_Pair = 22, BEL-RUS	0.161*** (5.64)
Country_Pair = 23, BEL-SRB	-0.344*** (-29.11)
Country_Pair = 24, BEL-SVK	-0.297*** (-26.01)
Country_Pair = 25, BEL-SVN	-0.666*** (-19.94)
Country_Pair = 26, BEL-UKR	-0.033 (-1.61)

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Country_Pair = 27, CHE-BGR	-0.118*** (-4.11)
Country_Pair = 28, CHE-CZE	-0.224*** (-16.28)
Country_Pair = 29, CHE-EST	-0.610*** (-10.56)
Country_Pair = 30, CHE-HRV	-0.367*** (-20.19)
Country_Pair = 31, CHE-HUN	-0.081*** (-4.20)
Country_Pair = 32, CHE-LTU	-0.348*** (-14.25)
Country_Pair = 33, CHE-POL	0.032** (2.14)
Country_Pair = 34, CHE-ROU	0.025 (1.48)
Country_Pair = 35, CHE-RUS	0.241*** (10.35)
Country_Pair = 36, CHE-SRB	-0.150*** (-6.73)
Country_Pair = 37, CHE-SVK	-0.175*** (-6.52)
Country_Pair = 39, CHE-UKR	-0.006 (-0.34)
Country_Pair = 40, DEU-BGR	-0.066 (-0.53)
Country_Pair = 41, DEU-CZE	-0.159*** (-3.42)
Country_Pair = 42, DEU-EST	-1.895*** (-3.96)
Country_Pair = 43, DEU-HRV	-0.426*** (-2.68)
Country_Pair = 44, DEU-HUN	0.002

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	(0.04)
Country_Pair = 45, DEU-LTU	-0.743***
	(-3.28)
Country_Pair = 46, DEU-POL	0.291***
	(23.07)
Country_Pair = 47, DEU-ROU	0.294***
	(9.22)
Country_Pair = 48, DEU-RUS	0.426***
	(17.43)
Country_Pair = 49, DEU-SRB	-0.341**
	(-2.38)
Country_Pair = 50, DEU-SVK	-0.318***
	(-2.89)
Country_Pair = 51, DEU-SVN	-1.121***
	(-3.93)
Country_Pair = 52, DEU-UKR	0.131***
	(3.19)
Country_Pair = 53, FRA-BGR	-0.282***
	(-2.86)
Country_Pair = 54, FRA-CZE	-0.437***
	(-8.83)
Country_Pair = 56, FRA-HRV	-0.899***
	(-7.49)
Country_Pair = 57, FRA-HUN	-0.411***
	(-7.53)
Country_Pair = 58, FRA-LTU	-0.979***
	(-5.47)
Country_Pair = 59, FRA-POL	-0.018
	(-1.02)
Country_Pair = 60, FRA-ROU	0.128***
	(4.58)
Country_Pair = 61, FRA-RUS	0.378***
	(11.44)

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Country_Pair = 62, FRA-SRB	-0.494*** (-4.60)
Country_Pair = 63, FRA-SVK	-0.638*** (-7.45)
Country_Pair = 64, FRA-SVN	-1.471*** (-5.66)
Country_Pair = 65, FRA-UKR	-0.005 (-0.15)
Country_Pair = 66, GBR-BGR	-0.112 (-1.02)
Country_Pair = 67, GBR-CZE	-0.163*** (-3.68)
Country_Pair = 68, GBR-EST	-1.476*** (-3.76)
Country_Pair = 69, GBR-HRV	-0.642*** (-4.75)
Country_Pair = 70, GBR-HUN	-0.042 (-0.82)
Country_Pair = 71, GBR-LTU	-0.462** (-2.46)
Country_Pair = 72, GBR-POL	0.279*** (10.84)
Country_Pair = 73, GBR-ROU	0.275*** (6.60)
Country_Pair = 74, GBR-RUS	0.145*** (4.84)
Country_Pair = 76, GBR-SVN	-0.967*** (-4.16)
Country_Pair = 77, GBR-UKR	-0.036 (-0.98)
Country_Pair = 78, LUX-BGR	-0.294*** (-14.19)
Country_Pair = 79, LUX-CZE	-0.563***

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	(-19.61)
Country_Pair = 80, LUX-EST	-0.571***
	(-13.75)
Country_Pair = 81, LUX-HRV	-0.727***
	(-9.88)
Country_Pair = 82, LUX-HUN	-0.410***
	(-18.79)
Country_Pair = 83, LUX-LTU	-0.464***
	(-20.42)
Country_Pair = 84, LUX-POL	-0.249***
	(-13.74)
Country_Pair = 85, LUX-ROU	-0.149***
	(-7.15)
Country_Pair = 86, LUX-RUS	-0.157***
	(-5.31)
Country_Pair = 87, LUX-SRB	-0.306***
	(-3.56)
Country_Pair = 88, LUX-SVK	-0.570***
	(-21.40)
Country_Pair = 89, LUX-SVN	-0.703***
	(-26.31)
Country_Pair = 90, LUX-UKR	-0.434***
	(-16.96)
Country_Pair = 91, NLD-BGR	0.112***
	(3.95)
Country_Pair = 92, NLD-CZE	-0.243***
	(-23.54)
Country_Pair = 93, NLD-EST	-0.652***
	(-6.52)
Country_Pair = 94, NLD-HRV	-0.438***
	(-10.03)
Country_Pair = 95, NLD-HUN	-0.036*
	(-1.85)

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Country_Pair = 96, NLD-LTU	-0.267*** (-6.43)
Country_Pair = 97, NLD-POL	0.205*** (14.95)
Country_Pair = 98, NLD-ROU	0.123*** (5.76)
Country_Pair = 99, NLD-RUS	-0.047*** (-2.77)
Country_Pair = 100, NLD-SRB	-0.351*** (-14.41)
Country_Pair = 101, NLD-SVK	-0.198*** (-11.07)
Country_Pair = 102, NLD-SVN	-0.584*** (-11.41)
Country_Pair = 103, omitted	-
Constant	2.218*** (81.08)
Observations	881

Note: Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: author's calculations

Otsesed välisinvesteeringud EL läänepoolsetest riikidest Kesk- ja Ida-Euroopa riikidesse ja ränne Kesk- ja Ida-Euroopa riikidest EL läänepoolsetesse riikidesse: gravitatsioonimudeli analüüs riigipaaride andmetel

Käesolev magistr töö uurib Euroopa Liidu läänepoolsete riikide otseste välisinvesteeringute ja Kesk- ja Ida-Euroopa (KIE) riikide migratsiooni vahelist seost ajavahemikul 2005–2020. Kasutades Poissoni pseudo-maksimaalse tõepära (PPML) ja üldistatud momentide meetodit (GMM), keskendub analüüs selle seose mitmele erinevale aspektile, hõlmates erinevaid ajaperioode ja riigipaare. Eesmärk on seejuures vastata järgmistele küsimustele: (1) Milline on seos Lääne-Euroopa riikide poolt KIE riikidesse tehtavate otseinvesteeringute ja Kesk- ja Ida-Euroopa riikidest Lääne-Euroopa riikidesse toimuva rände vahel? (2) Kas otseinvesteeringutel on migratsioonile viitajaga mõju? (3) Kas otseinvesteeringute ja migratsiooni vaheline seos varieerub ajas ja üle riigipaaride? Töö empiirilises analüüsis leitakse järjepidevalt positiivne korrelatsioon otseinvesteeringute ja migratsiooni vahel, mis viitab sellele, et mõnevõrra üllatuslikult riiki tehtud otseste välisinvesteeringute suurenemine on seotud väljarände suurenemisega. Märkimist väärib, et meie tulemuste põhjal ei ole otseste välisinvesteeringute ja migratsiooni seos olulise viitajaga. Lisaks eelnevale on see seos otseste välisinvesteeringute ja migratsiooni vahel suhteliselt püsiv üle erinevate ajaperioodide, ehki seda on nõrgendanud olulised šokid, nagu 2008. aasta finantskriis, 2015. aasta pagulaskriis ja 2020. aasta COVID-19 pandeemia. Meie tulemused viitavad ka sellele, et otseste välisinvesteeringute ja migratsiooni vaheline seos riigipaarides, mis hõlmavad Venemaad, Poolat ja Rumeeniat kui suuremaid riike KIE regioonis, ei ole tugevam kui teistes riigipaarides, isegi kui arvestada riikide majanduste erinevat suurust. Need tulemused aitavad mõista, kuidas välisinvesteeringud ja erinevate riikide poliitikad mõjutavad EL-i riikide vahelise rände mustreid, iseloomustades rände majanduslike stiimulite ja tegelike rändeotsuste vahelise põhjusliku seose kompleksust.

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05/01/2025