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Differences in Economic Development in Central and Eastern Europe Over the Last 20 Years

The process of transition and growth in Central and Eastern Europe (CEE) provides interesting insights, considering the countries' historical relationship with the Soviet Union. The 20 years after the Eastern enlargement of the European Union show an integrative power within the Single Market. However, due to the complex development paths of CEE countries, the question regarding the factors influencing their economic performance arises. This paper considers the innovation and institutional factors, e.g. innovation system performance, institutional development and political practices, that influence the economic development of CEE countries. It also looks at the differences in the effects of these factors. The analysis is performed for 37 European countries for the period from 2000 to 2020. The results reveal the importance of innovation and institutional factors, which may have special implications for the development of non-EU CEE countries.

Economic growth and technological innovation have drawn the attention of economic literature for decades. The examination of the connection between innovation and economic growth goes back to the work of Schumpeter (1911, 1939) and Solow (1956), as highlighted by Pece et al. (2015). Schumpeter (1939) underlines the relationship between innovation and capitalist economic development as a process wherein capitalism fosters innovation, thereby generating new opportunities for economic growth necessary for its survival. Solow (1956) employs neoclassical models to depict economic growth as a function of capital and labour inputs, with techno-

logical innovation playing an important role in influencing the growth rate. Schumpeter (1939) considers the connection between entrepreneurial innovation and economic change as the main factor of economic development (Croitoru, 2017). Capitalism is creating innovation whereby new economic growth opportunities arise that sustain the core of capitalistic survival (Schumpeter, 1939). Romer (1986) and Lucas (1988) further develop the theories of Schumpeter (1939) and Solow (1956). They provide additional empirical evidence that innovation processes are a crucial factor influencing economic growth.

Discussing the relationship between economic development and innovation, Filippetti and Archibugi (2011) employ a concept of National Innovation Systems (NIS) to elucidate this relationship at the national level. This framework has been widely embraced in the literature on innovation economics (Freeman, 1995; Lundvall, 2016; Nelson, 1993). In essence, the NIS approach views innovation and technological development as outcomes of intricate interactions among various actors within a system. These actors include governmental institutions, firms, universities and other research organisations (Organisation for Economic Cooperation and Development [OECD], 1999), all engaged in collaborative efforts and knowledge exchange essential for developing new products and services (Freeman, 1995).

In addition to quantitative factors like the number of innovations introduced, the number of firms in the market, or the number of employees in high-tech sectors, norms and

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conventions within a specific country can also influence its economic growth, either directly or indirectly. These norms, often referred to as institutions, were introduced into economic analysis by North (1990), who states that institutions set the rules to govern human interactions and categorises these rules into formal institutions and informal institutions. In response, governments devise and implement policies aimed at influencing these innovation processes. The result is that the European Commission, the OECD and some European countries have adopted the NIS concept in their studies and policy efforts (López-Rubio et al., 2021; Lundvall et al., 2002).

Batrancea et al. (2022) further show the importance of financial institutions, for example, bank capital to assets ratio for developing countries' economic growth. Additionally, research has explored the relationship between different types of institutions. By analysing a sample of 50 countries, Holmes et al. (2013) find that informal institutions, like cultural dimensions of collectivism and future orientation, also impact formal institutions and influence economic growth.

Moreover, recent literature investigates how institutions interact with economic growth across specific country categories. Esfahani and Ramirez (2003) underscore differences in investment-to-GDP ratios between countries with stronger and weaker institutional frameworks. More recently, Dorożyński et al. (2020) highlight the impact of institutional variances (measured by the Global Competitiveness Index) among countries in Central and Eastern Europe (CEE) on investment attractiveness.

CEE countries exhibit distinct structural conditions and characteristics related to innovation. This can be attributed to the transition process from planned economies to market economies that these countries have undergone. This transition is described by the need to modify not only formal market conditions but also informal institutional frameworks, which requires significant time and effort from various actor groups (Gabrisch & Holscher, 2006). Kravtsova and Radošević (2012) emphasise that eastern European countries face challenges related to inefficiencies in their national innovation systems, resulting in difficulties in generating R&D output. Nevertheless, CEE countries have gradually begun to close this gap in knowledge production capacity since the early 2000s (Kirankabes & Erkul, 2019). The relative success of certain countries, however, was influenced by numerous factors beyond the pace of transition, such as militarisation or over-industrialisation of the economy (Popov, 2007). Additionally, variations in institutional quality have significantly affected the development trajectories of countries (Dorożyński et al., 2020). Radošević (2002) argues that in the post-socialist period, the development of

regional innovation systems became crucial for sustainable growth in CEE. The article underscores the development of regional innovation systems across four levels: national, sectoral, micro and regional. It further highlights the role of network organisers in promoting regional innovation. While numerous studies on innovation in CEE economies exist (e.g. Scricciu & Stringer, 2008; Stojčić, 2021; Stojčić & Orlić, 2019), Pece et al. (2015) specifically analyse the relationship between innovative characteristics and economic performance. They find a positive correlation between innovation and economic growth in several CEE countries, including Poland, Czechia and Hungary. Other articles focus on the convergence of EU enlargement (e.g. Niebuhr & Schlitte, 2009).

The literature gap for CEE countries

There exists extensive research on the role of innovation for economic development, as well as on the interaction between institutional arrangements and economic growth. However, the evidence on the impact of institutional variables, such as civil liberties and political freedom, in the analysis of economic growth remains limited. Here Henisz (2000) and Catrinescu et al. (2009) see a connection between economic growth and institutional quality, while Barro and Sala-i-Martin (2004) observed a partial relationship between growth rate and democracy. However, the specific evidence for the case of CEE countries, especially non-EU members, is still missing. Nevertheless, this evidence may be important, especially considering the potential future enlargement of the European Union (Dabrowski, 2022).

This paper advances the analysis by exploring innovative and institutional variables and their roles in the economic development of CEE countries. Unlike most of the existing research that focuses primarily on EU member states within the CEE region (Gherghina et al., 2019; Dorożyński et al., 2020; Havrylyshyn, 2007), this study includes both EU and non-EU members. Additionally, Western European countries are included in the analysis. This comparative approach aims to determine whether innovative and institutional variables exert different effects on country groups.

In summary, this paper investigates two main research questions:

- Which innovation and institutional factors influence the economic development of CEE countries?
- What differences in the effects of these factors can be measured between CEE countries that are EU or non-EU members, and Western European countries?

The research covers 37 European countries.¹ Out of these countries, 16 are categorised as CEE. Eight countries are members of the European Union: Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia and Slovenia. Another eight are neighbouring countries to the EU: Albania, Belarus, Bosnia and Herzegovina, North Macedonia, Montenegro, Moldova, Russia and Ukraine. Twenty-one are non-CEE countries that can be characterised as Western European countries. For the purposes of this research, non-EU countries that maintain significant ties to the European Union are included in this category. The UK was an EU member for a major part of the observation period; Norway and Iceland are part of the European Economic Area; and Switzerland has trade and political agreements with the EU, including the Schengen Agreement (EEAS, 2021; Eurostat, 2020).

GDP per capita is included in the analysis as a dependent variable as it is a key indicator in studies on regional development and convergence (e.g. Goecke & Hüther, 2016). Examining the evolution of GDP per capita over time enables us to observe the relative economic development of economies. To analyse the influence of institutional and innovation variables, the independent variables encompass macroeconomic indicators, innovation-related factors and institutional metrics. Drawing on prior studies by Pece et al. (2015), Petrariu et al. (2013) and Nistor (2015), the regressions also incorporate foreign direct investment (FDI) inflows as a determinant of economic development. To enhance comparability, FDI inflows are normalised by the GDP of the corresponding year.

The institutional variables are also included in the analysis. They reflect political freedoms, civil liberties and corruption within a country. Otáhal and Grochová (2012) and Svendsen (2003) have identified a notable negative correlation between corruption and economic growth in eastern European countries. Hence, building on Svendsen's (2003) research, this paper employs the Corruption Perceptions Index (CPI) to assess and quantify the impact of corruption on economic growth across the analysed countries. Furthermore, statistics on political liberties (PLF) in the respective countries provided by Freedom House are incorporated into the analysis.

Results of the path dependencies of development of CEE countries

The specifications are as follows: the relationship between log GDP, the innovation variables ($lag_FDI_pGDP_{i,t}$; $intlplEMPL_{i,t}$) and institutional variables ($lag_PLF_{i,t}$; $lag_CPI_{i,t}$) is calculated. Table 1 presents the results of these

Table 1

Panel regression of log GDP per capita with innovation and institutional controls

	(1)	(2)	(3)	(4)
	All	CEE: Yes EU: No	CEE: Yes EU: Yes	CEE: No EU: Yes
	LogGDPpc	LogGDPpc	LogGDPpc	LogGDPpc
lag_FDIpGDP	0.007 (0.015)	1.684 (0.976)	0.024 (0.187)	0.013 (0.013)
lag_intlplEMPL	3.221** (-1.144)	317.742*** (-70.564)	46.953** (-17.339)	3.84*** (-1.246)
lag_CPI	0.005** (0.002)	-0.006** (0.003)	0.005 (0.003)	0.004** (0.002)
lag_PLF	0.047* (0.023)	-0.053 (0.044)	0.006 (0.024)	0.301** (0.122)
rEMPL	3.743*** (-1.038)	2.51*** (0.635)	2.944*** (-1.007)	2.593*** (0.83)
TOTL	-0.122*** (0.027)	-0.135*** (0.014)	-0.076*** (0.019)	-0.086*** (0.023)
dPOP	-0.001 (0)	-0.094*** (0.023)	0.021 (0.012)	-0.001 (0.001)
tPOP	0*** (0)	0 (0)	0*** (0)	0 (0)
_cons	8.466*** (-1.077)	15.254*** (-1.879)	9.78*** (-1.245)	8.287*** (0.821)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	726	160	140	426
within-R ²	0.489	0.768	0.729	0.454
Pseudo R ²	.Z	.Z	.Z	.Z

Notes: Panel regression in a fixed effects model; strongly balanced panel; Driscoll and Kraay standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable is the logarithm of the gross domestic product per capita (LogGDPpc). Including 1-year lag for the innovation and institutional (explanatory) variables: lag_FDIpGDP = Inward FDI financial flows as a percentage of GDP; lag_intlplEMPL = Patents and trademarks in relation to the number of persons employed; lag_CPI = Corruption Perceptions Index; lag_PLF = Scores for political liberties (PLF). Further control variables: rEMPL = Employment to population ratio, 15+, total (%); TOTL = Manufacturing sector (percentage, ISIC divisions 05-43); dPOP = Population density (people per square kilometre of land area); tPOP = Total (national) population.

Source: Authors' calculations.

main findings. The analysis is first performed for all countries in column (1), followed by a separate calculation for CEE countries without EU membership in column (2), CEE countries with EU membership in column (3), and finally, non-CEE countries with EU membership in column (4).

Some of the results are in line with existing literature. Bogliacino and Pianta (2011) and Westmore (2013) un-

¹ EUR-Lex with EuroVoc (5892) definition.

underscore the critical role of innovation activity in fostering economic growth. This is also reflected in our result, specifically in the significance of *lag_intlpEMPL* variable across all model specifications. Thus, despite the lagging position of CEE countries in developing their technologies (Radošević, 2017), some positive trends may be observed. Nevertheless, here the results need to be taken with caution, considering patent offshoring and FDI-related patenting, especially occurring in CEE countries (Kadlec et al., 2023). Here the negative impact of manufacturing (TOTL variable) should be underlined.

Furthermore, the literature consistently supports the notion that higher levels of the CPI indicate that economies with less corruption have stronger economic performance (Svendsen, 2003). We observe this effect for all countries as well as EU members. This aligns with theoretical expectations as outlined by Svendsen (2003). Surprisingly, for non-EU countries, the negative effect is observed. Some previous research (Christos et al., 2018) failed to identify a significant impact of CPI on GDP for CEE countries. One of the explanations for this may be the limits of the indicator itself and the data sources used in its calculation (Budsaratragoon & Jitmaneeeroj, 2020). Corruption hampers economic growth by distorting market incentives and weakening the effectiveness of public institutions. It leads to an inefficient use of resources and reduces investment in essential public goods. In addition, corruption harms innovation by lowering trust in institutions, reducing incentive to invest in research, and shifting resources away from productive and knowledge-driven activities (Gründler & Potrafke, 2019). The *lag_PLF* coefficient seems insignificant for CEE countries but positive when considering all countries or non-CEE countries, which may be explained by different levels of variation of this indicator for different country groups (Ahmed & Ahmad, 2020).

The panel model results do not indicate the impact of FDI as a percentage of GDP on the change of GDP per capita. This finding contributes to the ongoing discourse, given that Nistor (2014) previously identified a positive association between FDI inflows and GDP growth in CEE economies. Here Lefilleur and Maurel (2010) suggest that the impact of FDI investments can vary inside CEE countries. Enhanced market access in Central Europe can significantly boost FDI spending in CEE countries, specifically in some regions. Thus, a more detailed level of analysis, e.g. including NUTS2 regions, may be needed to obtain the significance in this case. Otherwise, these results can also be interpreted within the broader context of economic convergence between the selected regions.

Conclusion

The literature suggests that the enlargement reduced the gap and helped to integrate the CEE countries within the supply chains and market activities (Pasimeni, 2024). However, CEE countries continue to exhibit lower economic performance levels compared to western European countries. The reasons for this gap may stem from deficiencies in the innovation systems (Kravtsova & Radošević, 2012; Stojčić, 2021) or institutional frameworks, which are still transforming (Šimić Banović et al., 2018). This paper focuses on the role of innovation and institutional factors in the development of CEE countries (both EU and non-EU members) for the period 2000–2020, revealing the differences in the role of these factors in countries' transformation. When looking at the panel data, innovations show a positive impact on economic growth, suggesting that while CEE countries are still predominantly consumers rather than producers of innovation (Kravtsova & Radošević 2012), positive trends can be observed when looking at their development over 20 years. Conversely to Grela et al. (2017), who view FDI as a factor contributing to catching up, wherein countries with lower GDP experience faster growth, we do not observe such an effect at the national level for our sample. This may indicate a need to perform a more fine-grained analysis at the regional level.

Overall, the findings suggest that elevated levels of institutional and innovation variables play a crucial role in economic development. The research highlights behavioural differences between EU and non-EU countries. Nonetheless, the results also reveal distinctions between different country categories, particularly noticeable between EU and non-EU nations. The findings of this study affirm to policymakers and local stakeholders that prioritising the introduction of high-quality innovations and the development of institutions is crucial for promoting the convergence of CEE countries with Western European counterparts. These factors should also be integrated into EU-level policies, given empirical evidence suggesting that these policies can have a significant impact on the economic development of new EU member states and even candidate countries (Foreman-Peck & Zhou, 2022). In the long run, this could determine whether a state remains under Russian influence or develops independently within a stable institutional framework with access to the European market.

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